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INFLUENCE OF ATTITUDE ON UTILIZATION OF PERSONAL PROTECTIVE EQUIPMENT AMONG NURSES AT THIKA LEVEL 5 HOSPITAL

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ABSTRACT

Hospital acquired infections have been recognized as a problem affecting the quality of health care and a principal source of adverse healthcare outcomes globally. Hospital acquired infection occurs due to poor utilization of Personal Protective Equipment (PPE) among healthcare workers. Attitude is one major factor that affects utilization of PPE among healthcare workers. This study examined attitude toward utilization of PPE among nurses at Thika level 5 hospital, Kiambu County, Kenya. The study adopted a cross-sectional descriptive survey design which provided both quantitative and qualitative data. The study population was 246 nurses working in Thika level 5 hospital and with more than 1year experience. Both descriptive and inferential statistics were used in line with the study hypotheses. Qualitative analysis of data revealed that nurses at Thika level 5 hospital have somewhat negative attitude towards use of PPE. The study concludes that, attitude was found to be the most significant predictor of utilization of PPE. Positive attitudes would enhance utilization of PPE. For hospitals aiming to reduce or avoid healthcare worker acquired infections or nurses acquired infections, the management should invest more to develop ways of enhancing positive attitudes among nurses.

KEYWORDS: Attitude, Nurses, nosocomial infection and Personal Protective Equipment.

INTRODUCTION

Health care professionals are constantly exposed to microorganisms, many of which can cause serious or even lethal infections. Health-care-associated infection (HAI) refers to infection that is acquired during the process of care and not manifested at the time of admission to a hospital or other health-care facility (Nejad et al., 2011). According to Karen et al. (2015), nurses are at high risk of contamination and transmission of infection within the hospital setting due to the nature of their responsibilities. Therefore, it is important to protect them from being infected by microorganisms, and also prevent the spread of these infectious organisms within the hospital setting.

Personal Protective Equipment (PPE) refers to specialized clothing or equipment used for protection against infectious materials. They are very important part of Standard Precaution (Karen et al., 2015). PPE includes aprons, gloves, gowns, eye protectors (goggles, glasses), caps, laboratory coats, boots, resuscitation bags and face shields/masks. PPE creates a barrier between the nurse and the infectious organisms thereby preventing the nurse, the patient, and the visitors from being infected, and also prevent the spread of infection within the hospital. PPE prevents contamination of the mucous membranes, airways, skin, clothing, hair and shoes of the Health Care Worker (HCW), thus preventing the transmission of infectious agents (Cally et al., 2015).

Attitude is a way of behaving towards something that shows how you feel and think about it. According to Ward (2012), in a study where student nurses and nurse mentors were interviewed regarding attitudes toward infection prevention, regardless of the guidelines and recommendations on good utilization of PPE, compliance was found to be low due to several reasons including attitudes. This study aimed at establishing the attitude of nurses toward utilization of PPE at Thika level 5 hospital.

METHODOLOGY

The study adopted a cross-sectional descriptive research design comprising both quantitative and qualitative methods in order to examine the utilization of PPE among nurses at Thika level 5. A descriptive cross-sectional research design is a type of design that allows a researcher to analyze collected data from the sample at a given point in time (Mugenda & Mugenda, 2003). This design is relatively quick and easy to conduct a study and data on all variables are only collected once.

Study Area

The study was conducted in Thika Level 5 hospital. The hospital is located in Thika Town of Kiambu County which is one of the 47 counties in Kenya. Thika is a major industrial town, located about 42 kilometers north-east of Nairobi, near the confluence of the Thika and Chania Rivers. The town is currently the headquarters of Thika West district and has residential areas such as Bendor estate, Maporomoko, Thika Greens, and Thika Golden Pearl, among others. Thika is best known for pineapple-growing in Kenya. The emergence of the famous Mount Kenya University and other institutions of higher learning as well as financial institutions has changed the history of Thika, especially in education and finance. Thika is home to Del-Monte Pineapples, and Bidco Oil Refineries, among others. Thika has a total population of 139,853 (Kenya National Census Report, 2009).

Thika Level 5 Hospital is located along General Kago Road in Thika town. The hospital was established on 10th October 1941 as a cottage hospital to care for the then native Africans and Asians. The hospital was upgraded to a Level 5 hospital on 30th November 2007. Being the largest health facility in Thika, the hospital attracts patients from within and beyond the county boundaries, as patients from Nairobi, Machakos, Murang'a, Garissa and Kirinyaga also receive health services at Thika level 5 Hospital. It serves as a referral hospital to many private hospitals within catchment areas such as Mount Sinai Hospital and St. Mulumba Hospital among others (Thika level 5 hospital report, 2016).

The hospital provides services such as Basic Emergency services, Preventive in-patient and out-patient services, Curative In-patient and Outpatient Services, surgical services, Voluntary Counselling and Testing (VCT) services, HIV and Tuberculosis services, Antenatal, Obstetric Care, Family Planning services, as well as Radiology Services such as X-ray, Ultra-sound Scan, as well as MRI among others. The hospital houses the first blood transfusion centre in central Kenya.

Thika level 5 hospital has a total of 243 nurses, with a bed capacity of 265, and had attended to 200,000 outpatients, 23,000 inpatients, with an average of 1900 patients per month in the year 2015 (Thika level 5 hospital report, 2016) therefore suited the current study.

Target Population

A target population is defined as a population of interest to the research in which he or she wishes to generalize the study results. For the purpose of the current study, the target population was all nurses working at Thika level 5 Hospital totaling to 243 nurses (Thika level 5 hospital, 2016).

Study Population

The study population was all nurses with at least one year of working experience at Thika level 5 Hospital. This is because within six months of working, a practicing nurse is expected to have achieved familiarity with the environment as well as the practices within the hospital.

Inclusion Criteria

Inclusion criteria refers to a set of already defined features used by a research in the study to select respondents who are included in the survey (Kothari, 2012). Together, inclusion criteria form the selection or eligibility criteria used to exclude a respondent from participating in the study. Proper selection of inclusion characteristics optimizes the external and internal validity of the study, enhances its practicability, minimizes the costs of conducting the study, and increases the probability of finding a true relationship between the considered variables. In line with this, in order to participate in the study, only nurses with at least one year of working experience at Thika level 5 Hospital were selected into the study sample. Moreover, only the nurses who were willingly and voluntarily consented to take part in this study were considered.

Exclusion Criteria

Exclusion criteria, just like inclusion criteria, refers to a set of prior defined conditions that are used by researchers to identify respondents that are not included or will have to withdraw from a research study after being included (Kothari, 2012). Like the inclusion criteria, exclusion criteria are guided by the objectives of the study. In line with this, the researcher did not consider nurses with less than one year of working experience at Thika level 5 Hospital as participants. In addition, student nurses under training and nurses on internship at Thika level 5 Hospital were also not selected. In addition, other healthcare workers at Thika level 5 Hospital were excluded from the study. Participants who failed to provide consent were also excluded from participating in the study.

Study Variables

The study comprised both the independent and dependent variables.

Independent variables

In a survey research, an independent variable is thought to have an influence or at least correlated with the dependent variable. In this study, the independent variables were divided into two - nurse related factors and health facility related factors. The former encompassed demographic characteristics, knowledge about PPE, and attitude toward use of PPE. While this was the case, the latter comprised availability of PPE, accessibility of the available PPE, hospital policy, supervision, and practices of the nurses with regard to the use of PPE.

Dependent variables

A dependent variable in a study is a variable that is explained by one or more variables. The study dependent

variable was utilization of PPE among nurses at Thika level 5 Hospital which was measured in terms of frequency of use of PPE as well as compliance with the set guidelines for the use of PPE.

Sampling Procedures

In research, sampling occurs when a researcher examines a sample from the larger population the sample is collected. Sampling allows the researcher to make statements about the population of interest to a study. The goal of sampling is to ensure that selected participants are a true representation of the population from which they are selected. In line with this, the researcher used different sampling techniques to select the study participants. First, stratified random sampling was used to select the sample for this study to ensure good representation of the nurses working in the different units at Thika level 5 Hospital. In this sampling technique, the researcher segments the entire population of interest into distinguishable strata or sub-groups, then randomly selects the final respondents from the different strata. To implement this sampling technique in the study, all units or wards from the different departments were clustered together in strata and included medical wards, surgical wards, emergency wards, out-patient units, theatres, and intensive care unit.

To select the study participants, proportionate convenience sampling technique was used in order to ensure representation of each unit in the hospital. This technique allows the researcher to select participants from a population based on how convenient and readily accessible and available they are. The focus is on a sample that is easy to access. Using this technique allows a researcher to obtain a sample in an easy way as well as reducing the cost of obtaining them, which was the case in the present study. Self-administered questionnaires were issued to the selected nurses available on duty during data collection.

Moreover, purposive sampling technique was used to select key informants for interviewing. A purposive sample allows a researcher to select a sample that can be logically assumed to be representative of the population. In this study, senior nurses were purposively selected for interviewing as key study informants.

Sample Size Determination

The sample size for the study was computed using the Fishers *et al.,* 1998 formula (as cited in Mugenda & Mugenda, 2008).

$$n = \frac{Z^2 pq}{e^2}$$

Where Z is the value for the corresponding confidence level (i.e., 1.96 for 95% confidence); e is the margin of error (i.e., 0.05 = ± 5%) and p is the estimated value for the proportion of a sample that have the condition of interest. P= 0.5

$$n = \frac{1.96^2 x 0.5 x .05}{0.05^2} = 384.16 \text{ Participants}$$

Since the target population for this study was 243 which was less than 10,000, the sample size was adjusted using the equation developed by Yamane *et al*. (1967) which is recommended for the population less than 10,000.

$$nf = \frac{n}{1 + \frac{n-1}{N}}$$

Where;

nf = desired sample size

Calculated sample size 384

Estimate of population in the study area (i.e. number of nurses working at Thika level 5 Hospital which is 243).

$$nf = \frac{n}{1 + \frac{(n-1)}{N}}$$

$$nf = \frac{384}{1 + \frac{(384-1)}{243}}$$

$$nf = \frac{384}{1 + \frac{(383)}{243}}$$

$$nf = \frac{384}{1 + 1.58}$$

nf = 149 + 10% (for non-response = 15) = 164

Therefore, the sample size for the study was 164 participants.

Table 3.1: Sample size computation.

Units	No. of Nurses	Proportionate sample size	Proportionate %
Casualty	14	9	5.8
OPD	20	12	8.2
MMW	12	7	4.9
FMW	12	7	4.9
MSW	12	7	4.9
FSW	12	7	4.9
PAED	16	10	6.6
NBU	14	9	5.8
MCH	14	9	5.8
Maternity	26	16	10.7

Maternity-Theatre	11	7	4.5
Main Theatre	14	9	5.8
Gynae	11	7	4.5
ICU	13	8	5.3
ENT/EYE	9	6	3.7
CCC	8	5	3.3
RENAL	5	3	2.1
CSSD	8	5	3.3
Nurse Managers	12	7	4.9
Total	**243**	**149**	**100.0**
Note: The proportionate sample size is exclusive of non-respondents			

Data Collection Tools and Methods

A structured self-administered questionnaire was used to collect data for this study as well as an interview guide. A self-administered questionnaire refers to a questionnaire that has been developed specifically to be filled by a respondent without the help of a researcher. The questionnaire was used to collect data on the study variables that were necessary for testing of the study hypotheses. The questionnaire had four parts. The first part was used to collect data on the participant's demographic variables. The second part was designed to collect data on the participant's attitude toward use of personal protective equipment. The last part was used to gather data on the level of utilization of personal protective equipment and the general utilization of these equipment.

Pre-Testing of Instrument

Survey pretesting is a process of testing the usability of the questionnaire before actual data collection (Mugenda & Mugenda, 2003). This process is executed in order to detect and remediate issues with the questionnaire prior to actual data collection. According to Mugenda and Mugenda (2003) procedures used in pretesting the questionnaire should be identical to those which should be used during the actual data collection. However, pretesting sample should not be included in the final data collection.

In this study, pretesting of the questionnaire was done at Murang'a Level 5 Hospital to a selected sample (10% of 164) = 16 participants). The procedures used to collect data were identical to those the researcher used during the actual data collection exercise. Analysis of pre-testing information enabled the researcher to make meaningful observations for any correction. Additionally, the researcher encouraged the selected participants to make suggestions concerning the instructions, clarity of questions and relevance. Pre-testing helped the researcher to refine the questionnaire for the actual data collection. For example, pre-testing allowed the researcher to approximate the time it would take to completely fill the questionnaire which was between 15 to 20 minutes. Also, the researcher was able to adjust the questions in line with the suggestions made by the selected participants.

Validity of the Questionnaire

Validity refers to the extent to which a test (i.e., questionnaire in this study) measures the variables under study. It ensures accurate application and interpretation of study results. In order to ensure validity, a pretest was conducted at Muranga level 5 hospital. In addition, content validity of the questionnaire was ensured through supervisors' comments and suggestions.

Reliability of the Questionnaire

Reliability is the consistency of a measure that ensures the consistency of a test. A reliability measure fundamentally tells the researcher whether a study participant would provide the same score on a particular variable if that variable were to be administered again (Kothari, 2012). In order to ensure reliability, Chronbach's Alpha coefficient for internal consistency was used. Chronbach's alpha is a statistic that measures the internal consistency among a set of survey items that the researcher believes all measure the same construct or scale, are correlated with each other, and could be developed into some type of scale. Two separate Chronbach's alphas was computed for the construct on attitude and utilization of PPE among nurses. The results are presented in Table 3.1.

Table 3: 2. Reliability Results.

Construct	Number of Items	Chronbach's alpha
Attitude towards PPE use	6	0.843
Utilization of PPE among nurses	2	0.815

As can be seen from Table 3.1, alpha coefficients for the constructs were above the threshold of 0.70 (Nunnaly & Bernstein, 1994). The values indicated sufficient reliability of the measures.

Data Management

The questionnaires were first sorted for data completeness. Following this process, they were coded and variables entered into Statistical Package for Social Sciences (SPSS) version 20. Descriptive and inferential

statistics were used to analyze data in line with the study objectives. Descriptive statistics comprised means, standard deviations, percentages and frequencies. Inferential statistics comprised of Chi-square and simple linear regression analysis. The chi-square (X^2) is a test of significance for categorical variables. This test lets the researcher to test the relationship between two categorical variables. In this study, chi-square test of independence was used to test the significance of the relationships among the study demographic variables (gender, age, marital status, work experience and education qualifications) and utilization of PPE at 95% confidence level.

Simple linear regression analysis was applied to examine the models in line with the study objectives and related hypotheses. Simple linear regression is an inferential statistical test that focuses on predicting variation in the outcome variable on the basis of data in the predictor variable. Therefore, this statistical test yields a regression model that helped the researcher to examine changes in one variable as a function of changes or differences in values of the other variable. This analysis aims to determine how, and to what extent, the outcome variable varies as a function of changes in the predictor variable. In this study, simple linear regressions were computed.

Simple linear regression was computed between attitude and utilization of PPE among nurses. Coefficient of determination was used to establish the percentage of variance that could be explained by the study significant variables. The significance of the simple linear regression model was examined using Analysis of Variance f-test at 95% confidence level. To analyze the qualitative data, content analysis technique was used where themes were extracted in line with the study objectives. Table 3.3 presents the analysis plan based on the study objectives.

Data analysis plan

Objective(s)	Statistical analysis
To establish the utilization level of PPE among nurses at Thika Level 5 Hospital	Descriptive statistics (means, standard deviations, percentages and frequencies)
To determine the influence of attitude on utilization of PPE among nurses at	Descriptive statistics (means, standard deviations, percentages and frequencies)
Thika Level 5 hospital	Inferential statistics (chi-square test of independence, simple linear regression analysis), significance tested at 5% level.

Ethical Considerations

The study ethical considerations comprised several procedures and steps in order to ensure the smooth running of the actual data collection exercise. First, the researcher obtained approval from the School of Nursing of Mount Kenya University. Second, the researcher sought and obtained ethical clearance from the Ethical Review Committee of Mount Kenya University. Third, permit to carry out research was sought and obtained from the National Commission for Science Technology and Innovation of Kenya. Fourth, permission was obtained from the Kiambu County Director for Health, County Commissioner, Chief Officer of Kiambu County, as well as the sub-chief of Thika sub-county. A clearly stated informed consent was obtained from the respondents who were willing to participate in the study. Before signing the informed consent forms, the researcher explained to all study participants the purpose of the study. Also, the researcher assured them of confidentiality of the information provided and that collected data would be used for the purposes of this study only. The researcher further notified the participants that participation in the study was on voluntary basis and one could refuse to participate or terminate his or her participation without incurring any harm whatsoever.

Assumptions of the study

The researcher assumed that the respondents were honest and provided genuine responses. In addition, it was assumed that the nurses would give 100% support after the researcher had explained to them the purpose and significance of the study, and they had positive attitude towards use of PPE. Another assumption was that attitude had an influence on utilization of PPE among nurses at Thika level 5 hospital.

RESULTS

Attitudes and Utilization of Personal Protective Equipment

Descriptive results of the analysis of attitudes influencing utilization of PPE comprised means and standard deviations. Results are presented in Table 4.16. As shown, all the means were above 4.00 indicating that respondents agreed with all the items measuring attitudes toward use of PPE. All the surveyed nurses agreed that use of appropriate PPE would prevent them from acquisition of infections (M = 4.32, SD = 0.99) and keep patients from getting infections (M = 4.13, SD = 0.97). This notwithstanding, when asked whether it was inconvenient to use recommended PPE when taking care of patients, participants indicated that it was the case (M = 4.23, SD = 0.94).

Moreover, the level of agreement with ‘use of recommended PPE interfere with patient treatment was

above the mean of 4.00 indicating that participants attitude towards use of recommended PPE was somewhat negative. However, participants in this study thought it was essential to adhere to guidelines for use of PPE (M = 4.21, SD = 0.99) and were confident that they could improve PPE compliance (M = 4.25, 0.91).

Table 4. 1. Attitude towards use of PPE.

Statements	Mean	SD
1. Use of PPE keeps me from getting infections	4.32	0.99
2. Use of PPE will keep patients from getting infections	4.13	0.97
3. It is inconvenient to use recommended PPE when taking care of patients	4.23	0.94
4. Use of recommended PPE interfere with patient treatment/care	4.06	0.85
5. Adherence to guidelines for the use of PPE is very essential	4.21	0.99
6. I am confident that I can improve PPE compliance	4.25	0.91

With regard to attitude towards use of PPE, qualitative analysis of data revealed somewhat negative attitude. When asked about the challenges they faced when implementing the guidelines for the use of PPE, one respondent had this to say:

"I feel uncomfortable – for example like am suffocating when on mask".

Another respondent had this to say with regard to complying with WHO guidelines for the use of PPE:

"Insufficient PPE and negative attitude".

4.9.1 Relationship between Attitude and Utilization of PPE

The study sought to establish the relationship between attitude towards personal protective equipment and utilization among nurses. A null hypothesis (H_{02}) was used and suggested a non-existence of significant relationship between attitude and utilization of PPE among nurses. Simple linear regression was used to investigate the relationship between the two variables. Results are presented in Table 4.17 and showed a significant relationship between attitude and utilization of personal protective equipment ($p < 0.001$). The coefficient of determination value (R^2) was 0.251 meaning that 25.1% of the variation in utilization of personal protective equipment among nurses can be explained by the regression model containing attitude.

Table 4. 2. Relationship between Attitude and Utilization of PPE.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
					F Change	df1	df2	Sig. F Change
1	.501	.251	.217	.782	3.221	1	138	.000
a. Predictors: (Constant), Attitude towards PPE								
b. Dependent Variable: Utilization of PPE								

Table 4.18 presents the coefficients of the regression model equation and tests of significance.

Table 4: 3. Regression Coefficients in relation to Attitude.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	**3.152**	.217		7.233	**.000**
	Attitude towards PPE	**.246**	.081	.212	2.560	**.000**
a. Dependent Variable: Utilization of PPE among nurses						

As shown in Table 4.18, the constant was statistically significant ($B = 3.152$, $t = 7.233$, $p < 0.001$). The regression model is:

Utilization of PPE (y) = 3.15 + 0.246*Attitude towards PPE

DISCUSSION

Results on this dimension of the study indicated positive and negative attitudes towards PPE use among nurses in Thika level 5 hospital. It was found out that even though nurses valued the use of appropriate PPE towards preventing acquisition of infections, they equally indicated that it was inconvenient to use them when taking care of patients and interfered with the treatment rendered to the patients. This implied that they knew the importance of using recommended PPE but their attitudes were not positive. Daugherty et al. (2009) found similar results in a survey of 292 internal medicine house staff, pulmonary/critical care fellows and faculty, nurses, and respiratory care professionals working in four ICUs in two hospitals in Baltimore. In addition, Ward (2012) argued that the reason for the negative attitudes could be

attributed to the perception that it is an additional duty not part of the patient care and that infection prevention and control is seen as time consuming and inconvenient without considering its importance in improving patient safety and outcomes.

The simple linear regression results on attitudes towards use of PPE dimension revealed similar results as the coefficient for attitudes towards PPE use and utilization of PPE was found to be positive and significant ($B = 3.152$, $t = 7.233$, $p < 0.001$). These results underlined the crucial role of attitude towards overall utilization of recommended PPE among the nurses. The results could be used to mean that, utilization of PPE by nurses when dealing with patients is all about having positive attitudes. Consequently, negative attitude would yield a 'do not care' perspective on the utilization of recommended PPE among nurses when dealing with patients in the hospital. If hospital management and supervisors cannot be able to deal with negative attitudes of nurses towards utilization of recommended PPE, this could bring serious ramifications on the health of nurses and could cost the hospitals dearly.

CONCLUSION

The study concludes that attitude towards use of recommended PPE is very important on the overall utilization of PPE among nurses. In line with this, positive attitude among nurses with regard to PPE would enhance utilization of the same. Negative attitude would completely do the contrary. Further and on this dimension, the study concludes that attitude is the main driver of utilizing PPE among nurses, as an individual nurse could have all the required knowledge but still fail to use them due to negative attitude and perceptions.

RECOMMENDATIONS

On the basis of the study conclusions, the researcher recommends management of hospitals should reduce or avoid healthcare acquired infections or nurses acquired infections, the management by investing more to develop ways of enhancing positive attitudes among nurses.

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