IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e- ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 4 Ver. XI (Jul.-Aug. 2018), PP 57-63
www.iosrjournals.org

Standard Precaution Among Nurses In Primary Health Care Centers: Knowledge And Compliance

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Abstract: *Standard Precaution is a vital practice to protect healthcare workers from occupational hazards. Despite its importance, literature has shown poor compliance with standard precaution in nurses' practice. This study aimed to explore primary health care nurses' knowledge and compliance with standard precaution. A convenient sample of 416 nurses working in 45 primary health care centers in Jeddah participated. Data collected using a validated structured self-administered questionnaire. Data analyzed using SPSS version 22. The result indicated that the mean knowledge score of participants were relatively good (16.38 ± 2.34 out of 20). Significant differences between the mean scores of perceived compliances (85.92 ±10.54 out of 100) and observed compliance which were low (59.86 ±10.437 out of 100) (p <0.001) was noted. There is acceptable level of knowledge with poor observed compliance to standard precaution especially.*
This mandates a need for education and monitoring of the implementation of standard precaution among nurses in primary care centers.

Date of Submission: 20-08-2018 Date of acceptance: 03-09-2018

I. Introduction

Standard precaution also known as a universal precaution was developed by the Centers for Disease Control and prevention[CDC] in 1996, which are the minimum infection control practices that are being practiced and protecting both nurses as well as the clients in all healthcare settings from transmission of blood-borne and other pathogens[1,2]. It Includes hand hygiene, use of Personal Protective Equipment [PPE], safe injection practices, safe handling and cleaning of contaminated equipment, and respiratory hygiene/cough etiquette. Hand hygiene is the cheapest, easiest and the most important activity in preventing infection related to healthcare[3]. Several studies found a relation between improve hand hygiene practice and reduce infection rate[4]. Needle Stick Injury [NSI] is defined as any injury caused by hollow-bore needles or suture needles regardless of Its contamination with blood or any body fluids.[5]. According to the World Health Organization [WHO] (2015), a person who experiences one NSI from a needle used on an infected source of patient, has risks of 30%, 1.8%, and 0.3% respectively of becoming infected with HBV, HCV and HIV[6]. In an explorative study done by Jacob, Newson-Smith, Murphy, Steiner, & Dick(2010) in the United Arab Emirates found that 19% of the respondent had sharp injury[7]. PPErefers to a variety of barrier used alone or in combination by an employee to reduce the exposure to blood-borne pathogens[2]. Safe injection practice is another aspect of standard precaution identified as not harm the recipient, not exposing the provider to risk and avoiding waste that results in dangerous for the community[8]. Compliance with Standard Precautions is critical for an enhanced safety climate in the health-care settings[9]. Several studies found a relation between improve standard precaution practice and reduce infection rate[10].

More specifically, according to a study in Spain, it was estimated the impacts of hand hygiene on infection reduction at 50%[11]. Another explorative study was done by Jacob, Newson-Smith, Murphy, Steiner, & Dick(2010) in the United Arab Emirates found that poor compliance with standard precaution doubling the risk factor for sharp injuries[7]. Despite standard precaution importance, clarity and simplicity literature have shown poor compliance with standard precaution among nurses practice[12]. The researcher found multiple factors contribute to nurses a non- compliance to standard precaution, lack of knowledge was the primary factor[13]. Acharya et al. (2013) study revealed that the nurses had poor knowledge regarding standard precaution[14]. There is a need to provide an education program to enhance nurses' knowledge on standard precaution. Primary care nurses must be knowledgeable about standard precaution to prevent transmission of infection[15]. Thus, the intention of this study is to assess primary care nurses' knowledge and compliance regarding standard precaution. The importance of the study comes from providing the safe environment for nursing clinical

practices through using standard precaution. Nurses in PHCcenters are the first healthcare professionals who contact the client with the primary health system. Nurses are the first line of defense as they deal with a large number of populations on daily basis without identification of their infectious status. During an extensive literature review, there were little researches targeting the practice of standard precautions in PHC settings. The aim of this study was to explore PHCnurses' knowledge and compliance with standard precaution.

II. Material And Methods

A quantitative, cross-sectional study was conducted during the period of November 2015 to April 2017 among nurses who working under Ministry of Health in PHC centers at Jeddah city which is located in the Western Region of Saudi Arabia. A total of 416 nurses participated from 45 PHC Centers using a convenient sampling technique.

Study Design:A quantitative, cross-sectional study.

Study Location:In 45 PHC centers at Jeddah city which is located in the Western Region of Saudi Arabia.

Study Duration: November 2015 to April 2017.

Sample Size:416 nurses.

Ethical Consideration: The researchers strive to maintain high ethical standards. Participants of the research were protected through confidentiality, anonymously. Approved of Institutional Review Board [IRB] in Ministry of Health (public health sector). Invitation letter was sent with each questionnaire, as an aspect of autonomy, informing them about the purpose of the research, the potential benefits, and that the participation is voluntary. All the information provided was handled as confidential data by the researchers.

Measures: Self-administered questionnaire regarding knowledge and compliance of nurses, which was developedby Luo He, Zhou and Luo(2010)[27]which was adopted from Askarian, Mclaws & Meylan[16] Wang[17], and Li and Wang[18] was adopted with some modifications. The questionnaire contains of three subscales:

1. Demographic Characteristic of participants: consists of 17 items describing nurses' socio-demographic characteristics of nurses.
2. Primary care nurse's knowledge: consists of 20 items. With "Yes", "No" or "Uncertain" responses. Choices are: "Yes", given score 1 point or "No" and "Uncertain", given score 0 point. The maximum possible score is 20 reflecting higher knowledge about standard precautions.
3. Compliance to standard precaution tool: consists of 20 items. A five-point Likert-scale was used: never = 0, seldom =1, sometimes= 2, usually= 3 and always= 4. The score ranges from 0 to 80. The maximum score reflecting higher compliance

In addition to observation of the participant's compliance to standard precaution in primary health care settings.The questionnaire was validated using content validity with focus group. Then piloted using a small sample. Then the questionnaire was revised based on reproducibility and validity. The validity and reliability were established by Luo, He, Zhou and Luo[27], reliability is 0.87, and Cronbach's α is 0.93. After modification the tool has Cronbach's α of 0.86.

Statistical analysis

The collected data statistically analyzed using the SPSS software computer package version 22. Descriptive statistics were calculated using frequency and percentages. Mean scores of knowledge and compliance were computed. Multivariate regression analysis was used to find out predictor for low compliance.

III. Result

Socio-demographic characteristics

A total of 416 nurses working in 45 PHC canterparticipated in this study from five geographical sectors. 31% of the participants worked in North East sector, 21.6% worked in South East, 17.3% in middle, 16.3% in South West. The remaining 10.6% and 2.9% from North West and other areas. The mean of the participants ages were 35 ± 7.726 years. The mean years of experience working as a nurse were 13± 8.531 years whereas the mean years of experience working atPHC were 8±7.726 years. Majority of participants (70.7%) has a diploma degree and the remaining has an intermediate university degree or bachelor degree (19, 10%). **Table1**.

Table 1: Socio-demographic variable

Socio-demographic variable	(n=416)	
	Frequency	**Percent**
Age	Mean 35.47 SD 7.726	
Place of work		
North East	130	31.3
North West	44	0.6
South East	90	21.6

South West	68	6.3
Middle	72	7.3
Qualification		
Diploma	294	70.7
Intermediate university degree	79	19
Bachelor	43	10.3
Total Years of experience	Mean = 13 Years SD 8.53	
Years of experience in PHC	Mean = 8 years SD 7.7	

Previous exposure to body fluid of patients or sharp injury, availability of sharp container and training on standard precaution.

More than three quarters (87.8%) of participants have not exposed to clients'excretion within the last six months. Approximately three quarters (73.1%) of the participants had not exposed to sharp injury previously. Majority of participants (92%) stated that sharp disposal boxes are available in their working area. 90% of the participants had all required vaccination .Nearly two third (63.7%) of participants trained on standard precaution**. Table 2**shows details of Reponses about exposure to body fluids, sharp injury and training on standard precaution**.**

Table 2: Exposure to body fluids, sharp injury and training on standard precaution

Socio-demographic variable	(n=416)	
	Yes	**No**
Exposure to excretion of patients 51 (12.3%)	365 (87.8%)	
Exposure experience of sharp injury	112 (26,9%)	304 (73,1%)
Training on standard precaution	265 (63.7%)	151 (36.3)
Sharps disposal box in your department	383 (92%)	33 (7,9%)
Required vaccination	372(9,4%)	43(10,3%)

Perceived knowledge of participants

The mean knowledge score of participants were 16.38 ±2.34 **Figure 1**. Slightly less than one-quarter (23.3%) of the participants did not recognize the meaning of standard precaution. More than half (56.9%) of the participants stated that Standard precaution is only applicable for the patient with confirmed diagnosis of infection.Majority of participants (91.3%) stated that main goal of standard precaution is to protect the medical staff. Majority knew the importance of hand hygiene (92%) similarly regarding PPE (90%). Safe injection practice (97%) and disposal of sharps the knowledge was adequate.**Table 3** shows details of respondent knowledge to standard precaution.

Figure 1: Total knowledge of study sample

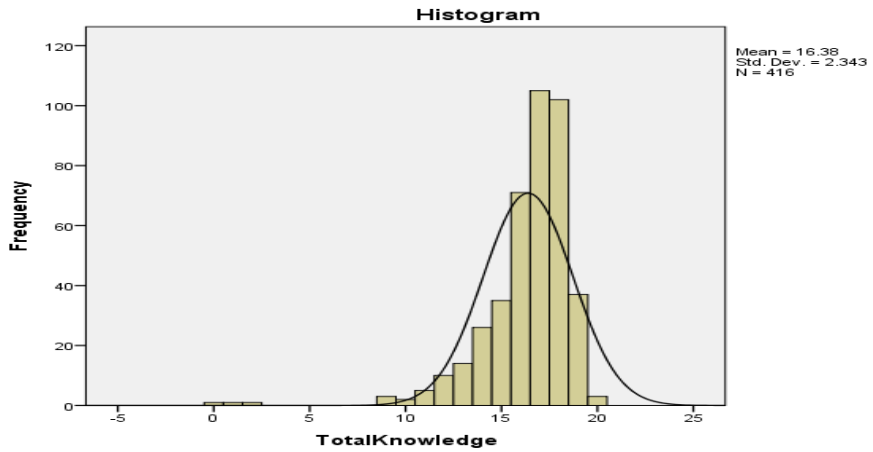


Table 3: Perceived knowledge of participants to standard precaution.

Statement	Response			
	Correct		**Incorrect**	
	No.	**%**	**No.**	**%**
1. Do you know what the standard precaution is ?	3199	76.6	97	23.39
2. Standard precaution is only applicable for the patient with confirmed diagnosis of infection.	237	56.9	179	43

3. The main goal to implement standard precaution is to the protect medical staff.	36	8.7	380	91.3
4. Washing and disinfecting the hands immediately if contacting any blood, body fluid, secretion excretion, or dirty substance.	413	99.3	3	0.7
5. Washing the hands if contacting different patients.	395	95	21	5
6. Since the gloves can prevent from the pollution for the hands, there is no need to wash hands after taking of the gloves.	343	82.5	73	17.5
7. It shall be avoided for the polluted protective articles to contact with the surface of other articles.	402	96.6	14	3.4
8. It shall not be shared for the personal protective articles such as the gloves, mask, …etc.	338	81.3	78	18.8
9. The gloves shall be worn in the operation of blood drawing , venous puncture, etc.	406	97.6	10	2.4
10. The gloves shall be worn in the operation might contact with the secretion and excretion of patient:	409	98.3	7	1.7
11. The gloves shall be changed if contact different patient.	402	96.6	14	3.4
12. The face mask shall be worn in the operation might induce the spraying of blood, body fluid, secretion excretion:	382	91.8	34	8.2
13. The protective eye patch or goggle shall be worn in the operation might induce the spraying of blood, body fluid, secretion excretion:	346	83.2	70	16.8
14. The protective suit shall be worn in the operation might induce the spraying of blood, body fluid, secretion excretion:	379	91.1	37	8.9
15. The protective cap or shoe shade shall be worn in the operation might induce the spraying, flowing or leaking of blood, body fluid, secretion excretion:	330	79.3	76	20.7
16. The sharps disposal box shall be put in the area close to the sharp applicable area.	407	97.8	9	2.2
17. Recapping and re-use of needle is prohibited	403	96.9	13	3.2
18. The caring for patients with HCV or syphilis only needs the standard precaution:	282	67.8		
19. The caring for patient with active pulmonary TB or varicella needs the standard precaution associated with the prevention from the airborne diseases.	376	90.4	40	9.6
20. The caring for patient with intestinal infection or skin infection needs the standard precaution associated with the prevention from the disease by contact transmission:	380	91.3	34	8.7

Compliance to standard precaution

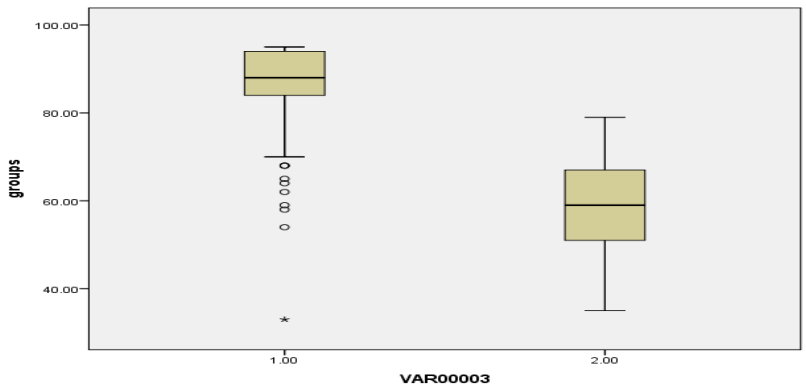
There is a significant difference between the mean scores of the perceived compliance (85.9±10.5) and observed compliance (59.8±10.4) ($p< 0.001$). **Table 4&5 or Figures 2** shows comparison between perceived and observed compliance to standard precaution.

Table 4: Total Perceived Compliance to standard precaution

Items	Never	Seldom	Sometime	Usually	Always
31-Washing hand if contact different patient.	7(1.7)	3(0.7)	23(5.5)	62(14.9)	321(77.2)
32-Washing hand if taking off the gloves.	7(1.7)	8(1.9)	15(3.6)	58(13.9)	328(78.8)
33-Washing or disinfecting hands immediately if contacting any blood, body fluid, secretion, excretion or dirty substance.	6(1.4)	1(0.2)	1(0.2)	10(2.4)	398(95.7)
Wearing the gloves in the following might contact the blood, body fluid, secretion and excretion					
34-Blood drawing	6(1.4)	6(1.4)	17(4.1)	26(6.3)	361(86.8)
35- Contacting the impaired skin of patient.	11(2.6)	3 (0.7)	24(5.8)	31(7.5)	347(83.4)
36- Contacting the mucosa of patient	17(4.1)	3(0.7)	6(1.4)	23 (5.5)	367(88.2)
37- Intramuscular or hypodermic injection	14(3.4)	16(3.8)	36(8.7)	42(10.1)	308(74)
38- Dressing change.	8(1.9)	6(1.4)	9(2.2)	23(5.5)	370(88.9)
39- Cleaning blood trace.	7(1.7)	3(0.7)	3(0.7)	12(2.9)	391(94)
40- Venous puncture	9(2.2)	6(1.4)	11(2.6)	22(5.3)	368(88.5)

41- Contacting blood sample.	15(3.6)	7(1.7)	16(3.8)	17(4.1)	361(86.8)
42-Wearing face mask to protect the oral and nasal mucosa in the operation might induce the spraying of blood , body fluid , secretion or excretion.	18(4.3)	9(22)	32(7.7)	50(12)	307(73.8)
43-Wearing protective eye patch and goggle to protect the eyes in the operation might induce the spraying of blood , body fluid , secretion or excretion.	65(13.4)	21(4.3)	33(6.8)	46(9.5)	251(51.6)
44- Wearing protective suit in the operation might induce the spraying of blood , body fluid , secretion or excretion	22(4.5)	43(8.8)	43(8.8)	53(10.9)	287(59.1)
45-Wearing protective cap or shoe shad to protect hair or shoes in the operation might induce the spraying , flowing or leaking of blood , body fluid , secretion or excretion	54(11.1)	17(3.5)	50(10.3)	50(10.3)	245(50.4)
46- Do not re-used syringes.	67(13.8)	3(0.6)	2 (0.4)	10(2.1)	334(68.7)
47- No return application of second-hand syringe or applying the return application with the single hand.	35(7.2)	14(2.9)	30 (6.2)	47(9.7)	290(59.7)
48- The second-hand sharps such as pinhead and blade are collected in the special sharp disposal box.	10 (2.1)	1 (0.2)	0	12 (2.5)	393(80.9)
49-If skin are injured by polluted sharps, it shall be squeezed for the blood flowing and then be thoroughly cleaned , disinfected and tap up.	41(8.4)	11(2.3)	8(1.6)	24(4.9)	332(68.3)

Figure 2: comparison between perceived and observed compliance



1.0 Perceived compliance
2.0 Observed compliance

Table 5: comparison between perceived and observed compliance.

Level of compliance	Mean	SD	Min.	Max.	P-value
Perceived	**85.9**	**10.5**	**33**	**95**	0.000
Observational	**59.8**	**10.4**	**35**	**79**	

Factors Impacting Compliance

Linear regression test was run to predict factors that can play a role in compliance with standard precautions. Place of work and qualification of the nurses were found to be the most predictors affecting the compliance of nurses to standard precaution. **Table 6** shows Multivariate analysis regression model for compliance.

Table 6:Multivariate analysis regression model for compliance

Variable	Standardized coefficient(beta)	t	Sig.	95% CI	
				Lower	Upper
Constant	**66.6**	**18.9**	**.000**		
Place of work	**- .242**	**-2.056**	**.04**	**2.71**	3.02
Qualification	**-.252**	**-2.151**	**.035**	**-7.11**	0.26

IV. Discussion

Nurses knowledge with standard precaution means that nurses are able to define the concept, identify the goals and ways of implementing standard precaution. The mean score obtained for the total knowledge regarding the standard precaution acceptable(16 out of 20). This result is similar to other studies done in Iran by Askarian, Memish, & Khan (2007)[19] and different from the result of the study of Aomranand Onwube (2013), where there is inadequate knowledge regarding standard precautions strongly in relation to inadequate staff training and supervision[20].Although the participant gets an acceptable mean score for the total knowledge but one quarter of the PHC nurses not familiar with concept of standard precautions itself. This result is similar to Li and Zhao (2005) who found (25%) of the sample not understanding the concept of standard precaution[21]. Ninety percent of PHC nurses failed to define the main goal for implementing standard precaution which is providing safe environment for their self as well as for the patient. Majority of the study sample (91%) they stated the importance of standard precaution is to protect themselves. Although the role of the nurse is providing safe environment for the patient free from harm. This finding represents the need for an effective educational program (workshop) to improve the study sample theoretical knowledge regarding standard precaution[22]. This study shows that the more experience the nurse the lower knowledge score which indicate that years of experience is not factor affecting knowledge. This finding is consistent with Ayed, A. et. al study who indicate that years of experience have no effect in gaining and enhancing the level of knowledge[23].Although had another study different as Ogoina et. Al (2015) claimed that more experienced nurses had higher knowledge scores[24]. Regardless to the acceptable knowledge score of the nurses in this study and availability of PPE equipment, the observed compliance score to the standard precautions was low, this finding is supported by the findings of another study done by Tariku, Eshetu and Abdella (2016)[22]. Hail, Engeda & Abdo (2017) and difference from Askarian, Memish & Khan (2007) who identified poor compliance with standard precaution by the nurses as well as the surgeon and physician[19, 25]. There were differences between perceived and observed level of compliance. Observed compliance scores were much lower than perceived compliance ones. The nurses are unable to respond correctly to the compliance questions. This result indicated that nurses were not fully aware of the actual poor compliance. Moreover, the self- reported data has disadvantages of overestimating the actual compliance[26]. This reflects the importance of continuous monitoring the nurses' compliance to standard precaution. Lastly, the outcome of this study found two predictors for nurses'compliance to standard precaution, place of work and qualification.Primary health care centers during data collection were distributed into five geographic health sectors.There were different supervisors for infection control in each sector which explained how the place of work can affect the nurses' compliance.

V. Conclusion

There is an acceptable level of knowledge with poor compliance to standard precaution especially in observation compliance. There is a need to educate nurses and monitor the implementation of standard precaution in nurses in primary care centers.

Acknowledgement

We are grateful to the directorate of health affairs in Jeddah who gave permission for this survey to be carried out in their Primary Care Centers and to all their staff who participated in this survey.This study was developed as a part of nursing research developing program which established by nursing research department in Nursing administration at the Directorate of health affairs in Jeddah city at Saudi Arabia.

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