

Study on Knowledge and Compliance of Standard Precautions among Intensive Care Units Nurses in Shaanxi Province, China

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Abstract

Introduction: The standard precautions advanced by the United States Centers for Disease Control and Prevention (CDC) in 1996, goals of Standard precautions to reducing the risk of transmission of blood-borne and other pathogens in hospitals. The prpous of this study :to assess the knowledge and compliance of standard precautions among ICU Nurses in Xi'an hospitals, and to identify the relationship between compliance, knowledge and general self-efficacy of standard among ICU Nurses in China.

Methods: This study used a descriptive study design. A convenient sample of 471 ICU nurses working in 11 hospitals from Xi'an of Shaanxi Province in China. Data were gathered over four months, from June to October 2017. Tools: The questionnaire used for data collection included four parts:(1) general information,(2) knowledge of standard precautions, (3) compliance of standard precautions and (4) General self-efficacy scale. Data analyzed by SPSS 18.

Result: 100% of respondents were female, their mean age was (28.6 ± 5.6), 90% of nurses have vaccination HBV, the mean knowledge score of participants were a good (17.3 ± 1.8 out of 20). (80.4%) of ICU nurses know Standard Precautions. The mean score of standard precautions compliance among ICU nurses were poor (66.12 ± 10.3 out of 80). Standard precautions knowledge was positively correlated with compliance (r=0.17) and general self-efficacy was also positively correlated with compliance (r=0.21).

Conclusion: Based on the conclusions of this study, it can be assumed that the standard prevention knowledge and compliance of nurses in this study are still lacking. Standard precautions education should be encouraged, and adequate practical personal protection equipment should be implemented in order to reduce hospital infections and protect the health of patients and medical staff.

Keywords: Knowledge • Compliance • Standard precautions • ICU nurses.

Introduction

Standard Precautions, projected by the United States Centers for Disease Control and Prevention (CDC) in 1996 [1]. Standard precautions Contains hand hygiene, use of Personal Protective Equipment [PPE], safe injection practices, safe handling and cleaning of polluted equipment, and respiratory hygiene/cough etiquette. Hand hygiene is the most important activity to preventing infection to Nurses and patients [2].

The World Health Organization (WHO) has been exposed to 55 hospitals in 14 countries, and it has been found that 8.7% of inpatients suffer from hospital infections [3]. According to Mao et al. [4], the incidence of nurses in clinics pricked with infected blood contaminated objects was high (80.6%). In Japan, data showed that 21% of patients in the ICU had an infection, 44% had a hospital infection, and the rest were obtained from the community. Therefore, more than one patients staying in the intensive care unit for more than one day were susceptible to acquired infection. 18.9% were infected while staying in the intensive care unit [5].

In China, in Hunan Province, data (50%) of participants showed that they

are familiar with all standard backup measures [6]. Whereas nurses and the intensive care unit compliance hygiene hand worker level was 211 out of 369 opportunities (57.2%) [7].

Moreover, in Korea, the result showed that the compliance rate among nurses and the intensive care unit with standard precautions was high. For individual standards, compliance with the evaluation criteria was the highest [8]. The scientific importance of the research is to know the level of knowledge and compliance with the standard precautions in the intensive care unit in nurses in Xi'an hospitals in order to reduce the increase in transmission infection in the intensive care unit in Xi'an Hospitals, where the rate of transmission during the last period of was increased. Increased treatment costs, extended hospital stay and increased mortality from infection, especially in the intensive care unit, according to reports from the Chinese Ministry of Health - Department of Epidemiology and ICU department [5] (Figures 1-4).

Research Methodology

A descriptive non-experimental research design was utilized to conduct the current study. This study was conducted in 11 hospitals from Xi'an of Shaanxi Province, China. A total 471 ICU registered nurses from 11 hospitals in Xi'an of Shaanxi Province, China. Data were gathered over four months, from June to October 2017, were recruited in the current study. were a convenience sampling according to the following inclusion criteria. ICU Nurses whose age 23-50 years, one year has passed since he worked in the intensive care unit and willing to participate in the study .**The questionnaire:** A questionnaire consisted of four parts were utilized to collect the data.

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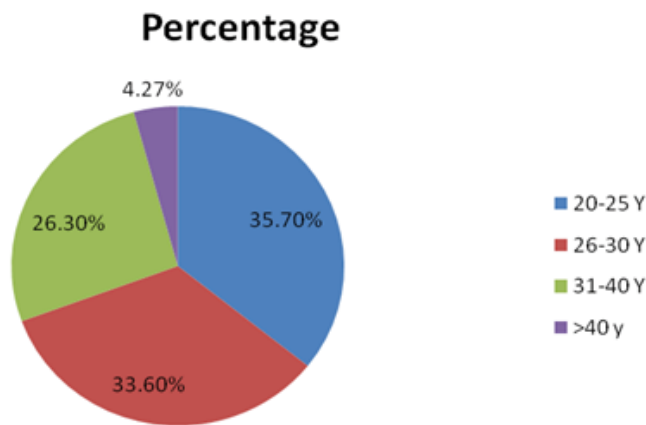


Figure 1. Shows the participants' age group of ICU nurses.

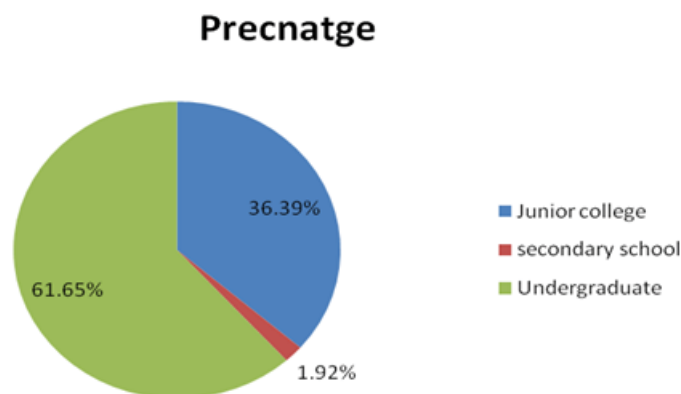


Figure 2. Shows the participants' Degree group of ICU nurses.

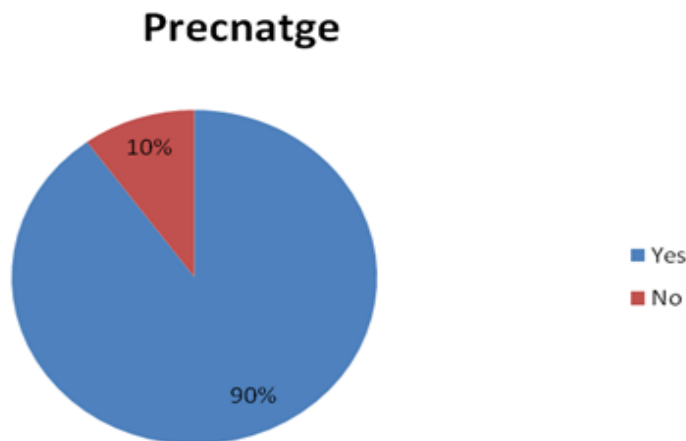


Figure 3. Shows the participants of ICU nurses have vaccine of HBV.

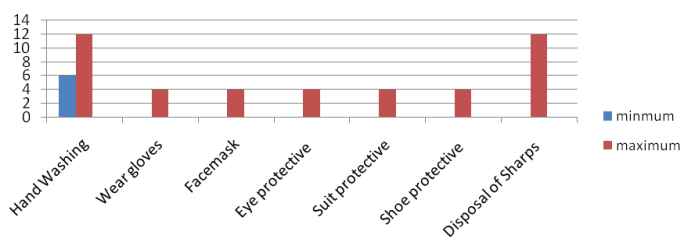


Figure 4. Compliance scoring of standard precautions among ICU nurses.

First part

The demographic data: The general information among ICU nurses such as age, degree, technical, and administrative was collected in this section.

Second part

The knowledge of standard precautions. This part covers 20 items developed by Askarian, Wang, and Li and Wang, with possible responses of 'yes', 'no', or 'unknown'. 'Yes' is assigned a value of 1 point, and 'no' or 'unknown' 0 points; the maximum possible score is 20. The higher the score, the greater the knowledge about standard precautions the participant has [9-11].

Third part

The compliance of standard precautions. This part covers 20 items developed by Askarian, Wang, and Li and Wang. There are 20 compliance items with a scale of 0–4 points: 0=never, 1=Seldom, 2=Sometimes, 3=Usually, and 4=Always, giving a score range of 0–80. The greater the score, the more reliable that person in carrying out the standard precautions [9-11].

Fourth part

The general self-efficacy scale (GSES). This scale is a self-report measure of self-efficacy developed by Schwarzer and Jerusalem in 1995. The scale is a single dimension scale, with ten questions. Each question is allocated points from 1 to 4, and the final score is the average score of the ten questions [12,13].

Administrative approval: Official permission was obtained from Central South University and from the Healthcare institution authorities in the specified setting to collect the necessary data, and ICU nurses' consent was obtained to participate in the study.

Pilot study: Following the tool development, a pilot study was carried out on 10% of the ICU nurses. These ICU nurses were excluded from participation.

The objectives of the pilot study were to:

- (1) Discover the accuracy and the applicability of the instrument
- (2) Determine the relevance and content validity of the instrument.
- (3) Calculate the time required to finish the questionnaire.
- (4) Identify any query unusual to the statemen such as order and precision that might intervene with the method of data collection.

The required alterations were undertaken.

The outcomes of the pilot study:

After conducting the pilot study, it was decided that:

- (1) The instrument was clear and applicable.
- (2) The tool was found as relevant and valid.

Validity: Content validity was performed to confirm that the used instrument measure what it was assumed to measure. The instrument developed by the researchers were examined by a panel of five experts to determine whether the included items clearly and adequately cover the domain of content addressed.

Reliability: The Cronbach's coefficient alpha of knowledge of standard precautions is 0.83 for total Score, Cronbach's coefficient alpha of Compliance of standard precautions is 0.87 for total Score, while Cronbach's coefficient alpha for General Self-efficacy Scale is 0.87.

Ethical considerations

1. The objective of the study was described to the participants. Filling and returning the questionnaire considered as a consent to participate in the study.
2. Anonymity was assured as the filled questionnaire sheets were given a code number (not by names).
3. The anonymity and confidentiality of the participants were explained to them. Any data yield of this study will be used for research purposes only.

- The ICU nurses who participated in the study were informed about having the right to withdraw at any time without giving any reason.

Field work

The Data were collected over a 4-month period from June to October 2017. The study setting was visited in the morning and evening hours in order to achieve the required number. At the commencing of the interview, the researcher greeted the ICU nurses, introduced herself to each participant, explained the purpose of the study, took oral consent to participate in the study, filled interviewing questionnaire sheet, and then each ICU nurses was asked to fill the tools.

Statistical analysis

The collected data were organized, categorized, tabulated and analyzed using Statistical Package for Social Science (SPSS) version 18 by computer. Qualitative data were represented as frequency and percentage. Mean and standard Deviation of compliance score and the relation between different numerical variables was tested using the Pearson product-moment correlation coefficient. P-value < 0.05 was considered significant.

Results

Table 1 reveals that 478 questionnaires were issued, and a total of 471 participants completed the questionnaires, 100% of respondents were female, whose average age was (28.6 ± 5.6) shows 33.6%of respondent's aged from 20 to 25 years. Shows Nurses with secondary education accounted for 1.9%, tertiary education made up 36.6%, and undergraduates accounted for 61.5% while 53.4% of nurses have work experience less than five years shows 90% of nurses have vaccination HBV. 54.04% of nurses have been trained toward standard precautions. Almost, all of ICU departments have sharp box disposal

Table 2 explains the mean knowledge score of participants were good (17.3 ± 1.8 out of 20), the results showed that the Percentage of knowledge for nurses about standard precautions (80.4%), and the correct rate of more than 50% had 20 items. 21.3% of participants thought Standard precautions only for the patients, (98.9%) of participants washing hands when contact blood, body fluids, and 98.3% washing hands when contact different patient. While 97.7% of participants wear gloves when blood drawing and venous puncture. 89.3%

of participants thought face mask should be worn might induce the spraying of blood, body fluid

Tables 3 and 4 reveal the mean score of compliance was poor (66.12 ± 10.3). With a maximum score possible 80 (Minimum= 31, maximum= 80), was higher score for hand washing (minimum=6, maximum=12, mean ± SD =11.02 ± 1.30) the lowest score obtained for the use of protection equipment such as eye-protective, face mask, suit protective (mean ± SD=2.70 ± 1.42, mean ± SD =2.85 ± 1.38)

Table 5 represents that a correlation analysis among standard precautions knowledge, compliance and general self-efficacy were calculated. It was found that standard precautions knowledge was positively correlated with compliance (r=0.17, p=0.00), suggesting that the higher the standard precautions knowledge was, the better the activity compliance was. General self-efficacy was also positively correlated with compliance (r=0.21, p=0.00), suggesting that the higher the self-efficacy was, the better the activity compliance was.

Discussion

Hospital-acquired infection is a universal problem all over the world. Therefore, up to date knowledge and nursing skills can play essential roles in standard precautions. Nurses should have the opportunity to practice standard precautions on a day-to-day basis as an integral part of patients' care. That is why the current study was carried out. In our study that was conducted at 11 hospitals in Xi'an, China, revealed from the current study, 69.3% of the participants aged between 20 and 30 years old. This result is in agreement with that of [14,15] emphasizing the need to protect this group of workers in the prime of their life from hospital infections. The results of our study showed that the majority of the participants had a previous course on standard precaution. Education is a critical element in the training of all HCWs, particularly in countries where there is a lack of formal and well-organized infection control programs, that showed in Goiania public hospital (11%) of all participants understood SP as protective measures for nurses only as opposed to (52.4%) who believed that SP was meant to protect both nurses and patients. Education must be specified on issues in standard precautions and infection control measures. The findings from this study provide that the majority of the study group had received hepatitis B vaccine, emphasizing the hospitals' policies to be vaccinated when employed new nurses to deal with exposure to blood-borne pathogens and needle stick [16].

Table 1. Distribution of general Information among ICU nurses (n=471).

Items	Classification	Total hospitals	
		N	%
Age (y)	20– 25	158	33.61
	26– 30	168	35.73
	31– 40	123	26.26
	>40	21	4.27
Degree	Junior college	172	36.69
	technical secondary school	9	1.92
	Undergraduate	289	61.56
Technical	Nurse	234	49.85
	Nurse Practitioner	192	40.94
	Nurse in – charge	44	9.17
Administrative	Yes	18	4.00
	No	450	96.00
Working Life (y)	1 – 5	251	53.42
	6 – 10	152	32.36
	11 – 20	48	10.25
	>20	24	9.87
Have sharp box disposal	Yes	469	99.79
Exposure of impaired skin to blood	No	469	99.72
Have vaccination HBV	Yes	423	90.00
Training Standard precautions	Yes	254	54.04
Sharp injury by polluted	No	471	100.00

Table 2. Knowledge among ICU nurses of standard precautions (n=471).

Items	Total hospitals		
	N	Percentage %	
1. Do you know what standard precautions?	Yes	378	80.3
	No	93	19.7
2. Standard precautions are only applicable for the patients with the confirmed diagnosis of infection or latent period of infection?	Yes	100	21.3
	No	370	78.7
3. The main goal to implement standard precautions is to protect the medical staff	Yes	462	98.1
	No	9	1.9
4. Washing and disinfecting the hand immediately if contacting any blood, body fluid, secretion, excretion, or dirty substance?	Yes	465	98.7
	No	6	1.3
5. Washing hand if contact different patient?	Yes	463	98.3
	No	8	1.7
6. Since the gloves can prevent from the pollution for the hands, there is no need to wash hands after taking the gloves.	Yes	41	8.7
	No	430	91.3
7. It shall be avoided for the polluted protective articles to contact with surface of other articles the clothes or staff outside of the ward	Yes	464	98.5
	No	7	1.5
8. It shall not be shared for the personal protective articles, such as the gloves, the mask, etc.	Yes	462	98.1
	No	9	1.9
9. The gloves cannot be worn in the oral operations ICU, which may contact the mucosa of patient?	Yes	461	97.8
	No	10	2.2
10. The gloves shall be worn in the ICU of blood drawing, venous puncture, est.	Yes	460	97.7
	No	11	2.3
11. The gloves shall be worn in the ICU might contact with the secretion and excretion of patient?	Yes	421	89.4
	No	50	10.6
12. The gloves shall be changed if contacting different patient	Yes	440	93.4
	No	31	6.6
13. The face mask or mask shall be worn in ICU might induce the spraying of blood, body fluid , secretion and excretion	Yes	420	89.3
	No	51	10.7
14. The protective eye shall be worn in the operations might include the spraying of blood, body fluids	Yes	439	93.2
	No	32	6.8
15. The protective suit shall be worn in ICU might induce the spraying of blood, body fluid, secretion and excretion	Yes	432	91.7
	No	39	8.3
16. The protective cap or shoe shade shall be worn in ICU might induce the spraying of blood, body fluid, secretion and excretion	Yes	462	98.1
	No	9	1.9
17. The sharps disposal box shall be put in area close to the sharp applicable area, forbidden the returned ICU of second hand pinhead, as well as the transformative pinhead application if the pinhead must be returned, it shall be processed by single hand	Yes	446	94.7
	No	25	5.3
18. The caring for the patient with HCV or syphilis only need standard precautions	Yes	466	98.9
	No	5	1.1
19. The caring for the patient with active pulmonary tuberculosis or varicella need standard precautions associated with prevention from the airborne diseases	Yes	452	95.9
	No	19	4.1
20. The caring for the patient with intestinal infection or skin infection need the standard precautions associated with the prevention from diseases by contact transmission	Yes	416	88.3
	No	55	11.7

Table 3. Perceived Compliance to standard precaution (n=471).

Items	Never	Seldom	Sometimes	Usually	Always
1. Washing hand if contact different patient	7 (1.4%)	2 (0.4%)	15 (3.1%)	78 (16.5%)	369 (78.3%)
2. Washing hand if taking off the gloves	9 (1.9%)	16 (3.3%)	39 (8.2%)	96 (20.3%)	311 (66.3%)
3. Washing or disinfecting hands immediately if contacting any blood, body fluid, secretion, excretion or dirty substance	8 (1.6%)	3 (0.6%)	18 (3.9%)	22 (4.7%)	420 (89.2%)
4. Blood drawing	5 (1.0%)	4 (0.8%)	7 (1.4%)	19 (4.2%)	436 (92.6%)
5. Disposal for stool and urine	7 (1.5%)	18 (3.8%)	32 (6.8%)	79 (16.8%)	335 (71.1%)
6. Contacting the mucosa of patient	18 (3.8%)	19 (4.2%)	22 (4.7%)	98 (20.8%)	314 (66.6%)
7. Saliva culture	22 (4.2%)	14 (3%)	39 (8.2%)	117 (24.8%)	279 (59.35)
8. Contacting the impaired skin of patients	21 (4.5%)	16 (3.4%)	42 (8.9%)	138 (29.3%)	254 (53.9%)
9. Intramuscular or hypodermic injection	30 (6.4%)	24 (5.1%)	68 (14.4%)	182 (38.6%)	167 (35.5%)
10. Dressing change	16 (3.4%)	19 (4.2%)	39 (8.2%)	66 (14%)	331 (70.2%)
11. Cleaning blood trace	13 (2.8%)	18 (3.8%)	36 (7.6%)	58 (12.3%)	346 (73.5%)
12. Venous puncture	12 (2.5%)	19 (4.2%)	12 (2.5%)	41 (8.7%)	387 (82.1%)
13. Contacting blood sample	20 (4.3%)	30 (6.4%)	42 (8.9%)	65 (13.8%)	314 (66.6%)

14.	Wearing face mask to protect the oral and nasal mucosa in the operation might induce the spraying of blood, body fluid, secretion, excretion	72 (15.3%)	28 (5.9%)	46 (9.8%)	78 (16.6%)	247 (52.4%)
15.	Wearing protective suit in the operation might induce the spraying of blood, body fluid, secretion, excretion	26 (5.5%)	55 (11.7%)	63 (13.4%)	94 (19.9%)	233 (49.5%)
16.	Wearing protective eye patch and goggle to protect the eyes in the operation might induce the spraying of blood, body fluid, secretion, excretion.	46 (9.8%)	25 (5.3%)	91 (19.3%)	98 (20.8%)	211 (44.8%)
17.	Wearing protective cap or shoe shade to protect hair or shoes in the operation might induce the spraying of blood, body fluid, secretion, excretion	70 (14.9%)	24 (5.1%)	16 (3.4%)	21 (4.4)	340 (72.2%)
18.	No return application of second hand syringe, or applying the return application with the single hand	46 (9.8%)	19 (3.6%)	52 (11.4%)	92 (19.6%)	262 (55.6%)
19.	The second hand sharps such as pinhead and blade are collected in the special sharp's disposal box	18 (3.8%)	0	24 (5.1%)	39 (8.3)	390 (82.8%)
20.	If the skin injured by polluted sharps , it shall be squeezed for the blood flowing and then be thoroughly cleaned , disinfected and taped up	45 (9.6%)	7 (1.5%)	34 (7.2%)	55 (11.7%)	330 (70.0%)

Table 4. Compliance scoring of standard precautions among ICU nurses (N=471).

Items	Range	Minimum ~ maximum	Mean ± SD
Total Score	0.00 ~80.00	31.00~80.00	66.11 ± 10.31
Hands Washing	0.00~12.00	6.00 ~12.00	11.02 ± 1.30
Wear gloves	0.00~40.00	0.00~40 .00	32.21 ± 6.80
Facemask	0.00~4.00	0.00~4.00	3.47 ± 1.04
Eye protective	0.00~4.00	0.00~4.00	2.85 ± 1.38
Suit protective	0.00~4.00	0.00~4.00	2.70 ± 1.42
Shoe protective	0.00~4.00	0.00~4.00	3.19 ± 1.20
Disposal of Sharps	0.00~12.00	0.00~12.00	6.91 ± 1.38

Table 5. Correlation analysis of standard precautions knowledge, general self-efficacy, and precaution compliance (r)

Variables	R	P-value
Knowledge	0.17	0.000
General self	0.21	0.000

Sharp injuries and needle stick injuries may increase the risk of transmission of the blood-borne pathogen (BBP) especially hepatitis C, hepatitis B and HIV, which have adverse consequences such as disabilities, and long-term illnesses. These may lead to death [17]. Therefore, it is crucial to follow up the injured participants and give them post-exposure prophylaxis and hepatitis B vaccine. Table 1 showed that (100%) of the injured participants had received care. Regarding hepatitis B vaccine, Table 1 revealed that the vast majority of participants (90%) had taken the hepatitis B vaccine. This high percentage might be due to the requirement of MOH. In another study done in Turkey, [18] study found that (81.8%) of participants were immunized against hepatitis B. In a third study in, Saudi Arabia done by Mahfouz [19] found that (82.4%) of participants had received at least three doses of hepatitis B vaccine. In a study in Cyprus, Akgur and Dal [20] reported that (92%) of participants had taken the hepatitis B vaccine.

The mean knowledge score of participants was good (17.3 ± 1.8 out of 20), our results consistent with the results of a study conducted by Reema Almoghrabi, the mean knowledge score of participants was relatively good (16.38 ± 2.34 out of 20) [21]. The nurses have high score knowledge about handwashing, wear gloves The results of this study are consistent with the results of a study conducted by Yang Luo [6] et al. in China on 1,444 nurses, in which they assessed the knowledge of nurses about standard precautions as average, and our results higher than what was reported in studies [10,22,23], However, the study revealed that nurses have low score about disposal sharp, this was found to be higher than what was reported in [24]. This may result due to the lack of specific training courses in standard precautions that held for nurses in the targeted hospitals Knowledge & Compliance of Nursing Staff towards Standard Precautions in the Palestinian [25].

Compliance with the standard precautions means that nurses should wash and sterilize their hands, use personal protective equipment correctly, and deal effectively with sharp instruments. The self-report questionnaires adopted for this research collected information on handwashing and sterilization, the use

of Personal Protection equipment and the disposal of sharp instruments. The scores obtained were similar to those found in the study of Li and Wang [10] among clinic nurses (from 116 questionnaires) and the study of Kermodé et al. [24] among healthcare workers in rural north India (from 266 questionnaires). we found that the use of protective items such as eye shields, masks, and quarantine clothes had the lowest compliance while the use of gloves was high. In fact, gloves were generally found to be readily available in the departments. Reasons given for nurses not using gloves the last time were: the application of gloves will influence the operation (48.7%), too busy to use gloves (18.3%), the patients will complain about the application of gloves (0.8%), gloves are uncomfortable (5%), the gloves are not readily available (4%), and other reasons (13.8%). In this survey, we also found that a lot of the ICU nurses were not equipped with personal protection items such as eye shields, protective masks, quarantine clothes, and shoe covers. There was relatively higher compliance with handwashing and sterilization and the disposal of sharp instruments. This is mainly related to hospital regulations and repeated education.

Regarding the correlation between knowledge and practice by Bushra Jamal Almurr, the results revealed that the knowledge about SP measures was significantly positive with compliance. This suggests that the greater the knowledge of SP, the more active the practice. It also showed that the approximately (3.2%) variation in practice score of participants to SP measures was explained by knowledge scores of participants to SP measures, and (2.1)% of variation in practice score of participants to SP measure related to SI was explained by knowledge scores of participants to SP related to SI [26]. This finding is in accordance with a study by Luo and Zhou. (2010) (r=0.24, p value= 0.00). Also, these results are in agreement with a study conducted by Kim et al. (2001) (r=0.317, p=0.00). However, this finding contradicts the finding of a study done by Labrague [27]. In this study, there was positive not a significant correlation between knowledge and practice of SP measures (r=0.05, p=0.386). This means that knowledge about SP did not necessarily affect the practice of this SP. A study showed that the correlation between knowledge and practice was negative, and it was not significant (r=-0.001,

$p=0.993$) [28]. Also, our research results reveal a positive correlation between general self-efficacy and compliance with precautions ($r=0.21$).

Conclusion

Based on the results of this study, it can be concluded that the standard prevention compliance of nurses in this study are still lacking. However, despite possessing good knowledge about standard precautions, some nurses have not good compliance about standard precautions. So, Ministry of Health and Medical Education and the subsidiary universities should pay more attention to nurses 'standard precautions knowledge and compliance, and do their best to inform the nurses and all the medical personnel about the prevention of HAIs according to world standards and tailored to each region's ecology through the way of academic courses, posters and conferences. It is also necessary to improve the knowledge of standard precautions, develop programs for HAI control, and hold training courses based on successful educational models. Standard precautions education should be encouraged, and adequate practical personal protection equipment should be implemented in order to reduce hospital infections and protect the health of patients and medical staff.

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