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Knowledge & Compliance of Nursing Staff towards Standard Precautions in the Palestinian Hospitals

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Abstract

Standard precautions are the basic level of infection control precautions which are to be used, as a level of precautions and recommended when delivering the care to all patients, regardless of their presumed infection status. Therefore nurses should have sound knowledge and compliance with standard precaution. **Aim of the study:** The study aimed to assess the level of knowledge and compliance of standard precautions among the nurses in the southern hospitals of Palestine. **Method:** A cross sectional study was conducted between March and May 2015 in three governmental hospitals (Alia hospital in Hebron city, Al Hussain hospital in Beit Jala, and Abu Al Hassan hospital in Yatta) and three private hospitals (Al-Ahli Hospital in Hebron city, Al- Mizan Hospital in Hebron city, and Bethlehem Arab Society hospital in Bethlehem city) found in south West bank districts. Data were collected using pretested questionnaire on 204 nurses selected by convenience sample. Collected data were checked, coded and transferred to SPSS version 20 for analysis. Frequency, Mean and other statistics were calculated. P-value less than 0.05 were set as statistically significant. **Results:** the current study revealed that 78 (38.2%) had fair knowledge, and 77(37.8%) had good knowledge of standard precautions. However, approximately one quarter 49 (24.0%) of the studied sample had poor knowledge level. According to their compliance, more half 108 (52.9%) of the participants had fair level, 93(45.6%) had good level and only 3(1.5%) had poor level. **Conclusion:** the nurses in the current study for both knowledge and compliance have fair level regarding standard precautions. However, one quarter still had poor knowledge level. **Recommendations:** Updating knowledge and compliance of nurses through continuing in-service educational programs; emphasizing the importance of following latest evidence-based practices of infection control in continuing education / training program; providing training programs for newly nurses about standard precaution and at regular intervals; and a replication of this study using observation checklist should be done to assess the level of compliance.

Keywords: Standard precautions, Knowledge, compliance, Nurse

1. Background

Health care professionals are constantly exposed to microorganisms. Many of which can cause serious or even lethal infections (Twitchell, 2003). Nurses in particular are often exposed to various infections during the course of carrying out their nursing activities (Kosgeroglu, Ayranci, Vardareli, & Dincer, 2004). Nosocomial infection (NI), or hospital-acquired infection or Health-care-associated infection (HCAI) 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, Allegranzi, Syed, Ellis, & Pittet, 2011). It has been estimated that the risk of health care-associated infection is 2 to 20 times higher in developing countries compared to developed countries and 5% and 10% of patients admitted to hospitals in developed countries acquire these infections (WHO, 2008). Many infection control measures, such as appropriate hand hygiene and the correct application of basic precautions during invasive procedures are simple and of low-cost, but require staff accountability and behavioral change, in addition to improving staff education, reporting and surveillance systems (Bouallègue, Naija, Said, Nouria, Jaidane, Dhidah, & Boujaafar, 2013). To utilize these precautions, the human element plays an important role in increasing or decreasing the chances of catching HCAI (Cole, 2007). Therefore, adequate nursing staff is necessary because a higher patient-to nurse ratio increases the risk of nosocomial infection (Hugonnet, Chevrolet, & Pittet, 2007). Transmission of infectious agents within a health care setting requires three agents; a reservoir, susceptible host, and a mode of transmission. Patients' health care workers and visitors are susceptible host in the hospital environment. The complex interrelationship between a potential host and an infectious agent produces infection. The mode of transmission may vary by type of organism as some types of organism may be transmitted more than one route. The complex interrelationship between a potential host and an infectious agent produces infection (Siegel, Rhinehart, Jackson, & Chiarello, 2007). Compliance on the part of healthcare workers with standard precautions has been recognized as an efficient and effective means to prevent and control health care-associated infections in patients and health workers (Garner, 1996, Siegel; Rhinehart, Jackson, & Chiarello, 2007). Standard precautions are defined as "group of infection prevention practices that apply to all patients, regardless of suspected or confirmed diagnosis or presumed infection status" (CDC, 2012). These precautions are the basic level of infection control precautions which are to be used, as a level of precautions

(CDC, 2007). The fact is that “standard precautions” are recommended when delivering the care to all patients, regardless of their presumed infection status. It is also recommended that when handling equipment and devices that are contaminated or suspected of contamination, and in situations of contact risk with blood, body fluids, secretions and excretions except sweat, without considering the presence or absence of visible blood and skin with solution of continuity and mucous tissues. They included precautions against agents that are transmitted by the following routes of transmission: air-borne, droplet and contact routes (CDC, 2007; Vaz et al., 2010). The aims of standard precautions are the following: prevention and/ or reduction of transmission of HAI, and, at the same time, protection of nurses from sharp injuries. These aims can be achieved by the application of SP measures which consist of the following elements: hand hygiene, personal protective equipment (gloves, gown, gaggle, facemasks, head protection, foot protection and wearing face shields) and prevention of sharp injuries (CDC, 2007). A cross sectional study aimed to assess the level of knowledge and practice of infection control measures among nurses in governmental hospitals of Palestine, revealed that, approximately half (53.9%) of the studied sample had fair knowledge level. However, the majority (91.1%) of the studied sample had Good practice. No significant statistical differences were found between mean knowledge scores towards age, years of experience, and training course. Significant statistical differences were found between mean knowledge scores towards gender and qualification. No significant statistical differences were found between mean practice scores towards age, years of experience, training course, and qualification. Significant statistical differences were found in mean practice scores only in relation to gender (Fashafsheh, Ayed, Eqtaït and Harazneh, 2015). A survey of doctors’ and nurses’ knowledge, attitude and compliance with infection control guidelines in Birmingham teaching hospitals was conducted by Stein, Makarawo, & Ahmad (2003). The results of this study indicated that overall knowledge regarding blood-borne virus transmission from an infected patient after needles stick injury was low [44.0% for hepatitis B virus, 38.1% for hepatitis C virus, and 54.6% HIV]. The results showed that, the education, monitoring, improved availability of resources, and disciplinary measures for poor compliance are required to improve infection control practices in hospitals. A study was conducted on role of hand hygiene in health care associated infection prevention and the study reveals that factors influencing hand hygiene compliance, the impact of hand hygiene promotion on healthcare-associated pathogen cross-transmission and infection rates, and challenging issues related to the universal adoption of alcohol-based hand rub as a critical system change for successful promotion (Allesranzi and pittet, 2009). A cross-sectional study was conducted among nurses and physicians providing direct patient care in four hospitals in Hong Kong on perceptions of the importance and impact of health care associated infections and hand hygiene. Among respondents a total of 60% of the nurses and 46% of the physicians acknowledged that over 75% of healthcare-associated infections can be prevented by hand hygiene (Tai, Mok, Ching, Seto, Pittet, 2009). A descriptive study was conducted on the level of knowledge and practice of prevention of hospital acquired infections among trained nurses in surgical wards and the factors that hinder this practice. The findings revealed that 98% of the respondents have heard about nosocomial infections while 2% have not. About 78% of the respondents practice prevention of hospital acquired infections while 22% do not. About 94% of the respondents expressed that they have hindrances to the practice of prevention of nosocomial infections. The hindrances include poor working environment among 26%, poor knowledge about prevention of nosocomial infection was 10%, and lack of water for hand washing and other material resources 58%. The Study reveals that majority of the trained nurses in surgical wards have knowledge about the prevention of nosocomial infections but not all practice it due to lack of equipments and poor working environment (Agaral and Thomas, 2003). A study was conducted to assess the knowledge of health team in relation to infection control measures as well as their level of practice in the application of infection control measures at the endoscopy units in El-Kasr El-Ani Hospital, The New Kasr El-Ani Teaching Hospital (French), and the Internal Medicine Hospital, all hospitals are affiliated to Cairo University. The selected sample consisted of 40 doctors, 50 nurses, and 30 workers. The result revealed that 5% of physicians, 10% of nurses had satisfactory knowledge and 30% of physicians and just 4% of nurses had adequate level of performance, while none of the workers had satisfactory level of knowledge or practice. The study recommended an educational program for the endoscopy staff about infection and infection control measures application for the protection of staff and patients (Talaat and Shamia, 2010). A quasi-experimental study was conducted among nursing personnel to identify the impact of a promotion program on hand hygiene practices and its effect on hospital acquired infection rates in a neonatal intensive care unit of a university hospital in Thailand. The study samples were 26 nursing personnel. The study reveals that after implementing a hand hygiene promotion program, compliance with hand hygiene among nursing personnel improved significantly from 6.3% before the program to 81.2% ,7 months after the program. All participants agreed that promotion program implemented in this project motivated them to practice better hand hygiene (Picheansathian, Pearson, &Suchaxaya, 2008). A prospective study conducted across three hospitals showed a significant drop in the rates of surgical site infections (SSI) and hospital-acquired urinary tract infection (UTI) by increasing the awareness of hospital acquired infections among healthcare workers. An education program for the healthcare workers in the three different hospitals was included in the study. This showed a significant reduction rate of 8.1% for SSI ($P < 0.001$)

and 3.9% for hospital-acquired UTI ($P < 0.001$). This reveals that linking of prevention efforts and continuous monitored infection rates are thus necessitated (Joyce and Nanjaiah, 2009). An observational study was conducted among health care worker's including nurses to determine the hand hygiene practices. The intervention consisted of problem-based and task orientated hand hygiene education, enhancement of minimal handling protocol and clustering of nursing care, liberal provision of alcohol-based hand antiseptic, improvement in hand hygiene facilities, ongoing regular hand hygiene audit, and implementation of health care– associated infection surveillance. The observational study was repeated 6 months after the completion of the intervention program, which extended over 1-year period. The study reveals that there was improvement in most aspects of hand-washing technique in the post intervention stage and the health care– associated infection rate decreased from 11.3 to 6.2 per 1000 patient-days and it emphasize the need for a problem-based and task-orientated education program that can improve hand hygiene compliance (Barbara and Josephene, 2004). A Study regarding nosocomial respiratory infections and nurses' performance related to infection control measures was conducted in artificially ventilated patients in Egypt to assess nurses' practices regarding daily care activities, ventilator decontamination, use of universal infection control measures and the maintenance of the patients' care environment. The study revealed a high incidence of nosocomial respiratory infections. Also, it was revealed that pseudomonas was the causative agents in more than one fourth of the cases. Moreover, nurses' infection control practices were inadequate (Ahmed, Eshra, Nassar, &El-Shikh, 2000). A recent descriptive study conducted by Eskander, Morsy, & Elfeky (2013) to assess critical nurses' knowledge and evaluate their practice regarding infection control standard precautions. The study revealed that, approximately two thirds (63.6%) of the studied sample had unsatisfactory knowledge level, more than half (57.1%) of the studied sample had satisfactory performance level. Negative significant correlations were found between mean knowledge scores, and age; mean knowledge scores and years of experience ($r = -.323$ & $r = -.325$ at $P < 0.004$ respectively); between mean practice scores and age; and mean practice scores and years of experience ($r = -.235$ & $r = -.291$ at $P < 0.39$, 0.010 respectively). However, positive correlations were found between mean knowledge scores and mean practice scores; age and years of experience ($r = 0.318$ & 0.794 at $P < 0.005$ & 0.000 respectively). A descriptive study was conducted on nurses who worked at surgical wards in in Azady Teaching Hospital in Kirkuk city to assess the practices of nurses towards standard precautions. The study revealed that the majority (91.9%) of the nurses did not get training sessions regarding infection control and (83.4%) of them had not participated continuous learning about infection control. According to the level of practices towards standard precautions, it has revealed that poor practices of standard precautions by surgical wards nurses had shown in surgical wards (Mahmud and Abdul Sahib, 2011).

1.1 Statement of the problem: Nosocomial infections have been recognized as a problem affecting the quality of health care and a principal source of adverse healthcare outcomes. It has been documented in the literature that within the realm of patient safety, these infections have serious impact. Increased hospital stay days, increased costs of healthcare, economic hardship to patients and their families and even deaths, are among the many negative outcomes (Klebens, Edwards, Richards, Horan, Gaynes, Pullock, &Cardo, 2007; Kaye, Anderson, Sioanne, Chen, Choi, Link, Sexton, & Schmader, 2009).

A systematic review of published literature on costs attributable to nosocomial infections among only 28 community hospitals in southeastern region of U.S. over a one-year period, revealed that the annual cost associated with nosocomial infections exceeded \$26 million (Anderson, Kaye, Chen, Schmader, Choi, Sloan, &Sexton, 2009). These findings are indicative of the enormous economic burden associated with nosocomial infections. Findings from several epidemiological studies reveal that healthcare workers such as physicians, dentists and nurses are implicated in the transmission of nosocomial infections. It has also been reported that transmission frequently occurs during the performance of medical procedures, when these healthcare workers fail to follow aseptic precautions. Thus, noncompliance with recommended guidelines by healthcare workers expose patients to an abundance of pathogens (Racco &Hom, 2009; Costello, Graham, Morrow, Morrow, Potter-Bynoe, Sandora, Pigula, & Lause, 2010).

1.2 Significance of the Study: It has been documented in several epidemiological studies that healthcare workers such as physicians, dentists and nurses are implicated in the transmission of nosocomial infections. Literature that has explored the knowledge and practices of nurses is limited. Therefore, it is important to further investigate the impact of knowledge and practices of nurses with regard to the degree of the infection control. Assessing compliance with infection control measures in any health care setting is vital. Regular updating and strengthening of infection control practices should be one of the priority function of any place where health services are rendered. The findings from this study will add to the existing literature and may be used in developing interventions to increase infection control practices

2. Subjects and Method

2.1 Aim of the study: The study aimed to assess the level of knowledge and compliance of standard precautions among the nurses in the southern hospitals of Palestine

2.2 Research questions: the following three research questions were formulated to achieve the aim of the current study:

1. What are levels of nurses' knowledge about the standard precautions at the selected Palestinian hospitals?
2. What are levels of nurses' compliances of the standard precautions at the selected Palestinian hospitals?
3. Are there relationship between the standard precautions knowledge and compliance with age, gender, education, years of experience, and training course on standard precautions.

2.3 Research design: A cross-sectional study was adopted for this investigation.

2.4 Study Setting: The data were collected from ICU, ER, Medical wards, and Surgical wards, pediatric, neonatal, and operational wards of six hospitals, three of them governmental (Alia hospital in Hebron city, Al Husain hospital in Beit Jala, and Abu Al Hassan hospital in Yatta) and three private hospitals (Al- Ahli Hospital in Hebron city, Al Mizan Hospital in Hebron city, and Bethlehem Arab Society hospital in Bethlehem city), in south West Bank region.

2.5 Study period: The study was conducted between March and May 2015 in the selected hospitals

2.6 Study Sample: A convenience sample consisted of 250 nurses, who work in the previously mentioned settings invited to participate in the study. Sixty four nurses refused to participate without unknown in the study. So, the final participants were 204 nurses.

2.7 The inclusion criteria: The inclusion criteria set for sample selection were as follows: Palestinian nurses and working in the ICU, ER, Medical wards, and Surgical wards, pediatric, neonatal, and operational wards of targeted hospitals with full time employment.

2.8 Tool of the study: For data collection a self-administrative questionnaire was developed by researchers and used to assess:

- a. Nurses' socio-demographic characteristic as regards their age, gender, marital status, Hospital, Nursing Qualification, Department of work, Working experience, hepatitis B vaccine, infection control training course.
- b. Participants' knowledge was assessed by 32 items as follows: each item had a group of answer points, one point was awarded for each correct answer; incorrect or I don't know answer took zero. Correct responses were summed up to get a total knowledge scores for each participant. Total score for all questions reached 32 grades. The knowledge scores were classified into Poor knowledge ($\leq 50\%$), Fair knowledge (51- 80%), and (> 80) considered Good knowledge.
- c. Practice was assessed by 23 items using a 3-item Likert scale (every time (3), sometime (2), and never (1)). The practice scores were categorized into good ($>80\%$), fair (51-80%), and poor ($\leq 50\%$).

3. Validity and reliability of the study

The questionnaire was revised and validated by panel of 5 experts in academic and health field; they agreed and no comments. Internal consistency among the questionnaire items was 0.88 Cronbach's alpha (α) and it was considered within the acceptable range.

4. A pilot study

A pilot study was used to test the instrument. (Polit & Beck, 2012) defines pilot study as a smaller version of a proposed study conducted to refine the methodology. It is developed much like the proposed study, using similar subjects, the same settings, the same treatment, the same data collection and analysis techniques. A pilot study was conducted with ten nurses in the medical and surgical wards from Rafedia hospital to determine the clarity of questions, effectiveness of instructions, completeness of response sets, time required to complete the questionnaire and success of data collection technique. Pilot subjects were asked to comment on the applicability and appropriateness (validity) of the questionnaire. All questions were answered no clarity of questions was required. The researchers determined that it would take twenty (20) minutes to complete the questionnaire.

5. Ethical considerations

This study was approved by the nursing department, Arab American University. This emphasized by MOH agreement with their permission for the investigators to utilize the targeted hospitals. Approval from nurses were

obtained. Several strategies were utilized to protect the nurse's rights who agreed to participate in this study. First, oral verbal consent of the nurses was obtained prior to the administration of the questionnaire. The nurses were informed of the purpose of the study, and that they had the right to refuse to participate. Also the voluntary nature of participation was stressed as well as confidentiality. Furthermore, the nurses were told that they can refrain from answering any questions and they can terminate at any time. Anonymity of the nurses was maintained at all times.

6. Results

Table (1) presents demographic characteristics of the studied sample. It clarifies that around half of the studied nurses 113 (55.4%) were in the age group of 20-30 years, had bachelor degree 117 (57.4%), and more than half was male 112 (54.9%). However, two thirds 137(67.2%) were married, and 91(44.6%) had less than five years of experience. Most of the sample assured that they have sharp box 199 (97.5%). Regarding attendance of training courses, around two thirds of the studied sample 132 (64.7%) were received training course about infection control. The majority of the nurses 198(97.1) had vaccinated against hepatitis B.

Table 1. Assessment the base line demographic and characteristics of the sample

Parameters		No.	%
Age	20-30 years old	113	55.4
	31-40 years old	76	37.3
	more than 40	15	7.4
Education	Nursing Diploma	79	38.7
	Bachelor	117	57.4
	Master	8	3.9
Gender	Male	112	54.9
	Female	92	45.1
Marital status	single	66	32.4
	married	137	67.2
	other	1	0.5
Experience	5 years or less	91	44.6
	6-15 years	90	44.1
	more than 15 years	23	11.3
Sharp box	yes	199	97.5
	no	5	2.5
Training course	Yes	132	64.7
	No	72	35.3
Hepatitis B Vaccine	Yes	198	97.1
	No	6	2.9

Table (2) presents the targeted hospitals and departments of the studied sample settings. It clarifies that around half of the studied nurses were from Al-Ahli and Alia hospitals (55(27.0%) and 48 (23.5) respectively, and the rest from the others.

Table 2 Assessment of the targeted hospitals and departments of the sample

Hospital	Neonate	Pediatric	Medical	Surgical	ICU	Operation room	Emergency department	Total
Alia	9	2	9	6	11	1	10	48 (23.5%)
Beit Jala (Al Husain)	9	3	5	5	1	3	5	31(15.2%)
Abu Al Hassan Governmental Hospital	0	6	3	1	1	7	4	22(10.8%)
Al -Ahli Hospital	2	8	10	12	10	6	7	55(27.0%)
Al -Mizan	1	5	7	3	13	4	2	35(17.2%)
Bethlehem Arab Society	0	1	4	4	0	2	2	13(6.4%)
Total	21	25	38	31	36	23	30	204(100.0%)

Table (3): shows percentage distribution of the participants according to their knowledge and compliance of standard precautions. It clarifies that approximately one quarter 49(24.0%) had poor knowledge level, 78 (38.2%) had fair knowledge, and 77(37.8%) had good knowledge level. On the other hand, it indicates that more half 108 (52.9%) of the studied sample had fair compliance, 93(45.6%) had good compliance, and the rest 3 (1.5%) had poor compliance.

Table 3. Assessment of the nurses' knowledge and compliance level of standard precautions

item	levels of standard precautions			Total
	Poor	Fair	Good	
Knowledge	49(24.0%)	78 (38.2%)	77(37.8%)	204 (100.0%)
Compliance	3 (1.5%)	108 (52.9%)	93(45.6%)	204 (100.0%)

Table (4) shows comparison of knowledge level in relation to targeted hospitals of the studied sample. It displays that Al-Mizan hospital 20(40.8%) had the poorer knowledge level between the hospitals. On the other hand, Al-Ahli hospital 36 (46.8%) had the highest level of good knowledge. While, Alia hospital 23(29.5%) has the highest level of fair knowledge.

Table 4. Assessment the nurses' standard precautions knowledge according to the hospitals

Hospital	Knowledge level of standard precautions			Total
	Poor	Fair	Good	
Alia hospital	14(28.6%)	23(29.5%)	11(14.3%)	48(23.5%)
Beit jala (Al-Husain) hospital	4(8.2%)	17(21.8%)	10(13.0%)	31(15.2%)
Abu Al Hassan Governmental hospital	2(4.1%)	8(10.3%)	12(15.6%)	22(10.8%)
Al- Ahli hospital	7(14.3%)	12(15.4%)	36(46.8%)	55(27.0%)
Al- Mizan hospital	20(40.8%)	12(15.4%)	3(3.9%)	35(17.2%)
Bethlehem Arab Society hospital	2(4.1%)	6(7.7%)	5(6.5%)	13(6.4%)
Total	49(100.0%)	78(100.0%)	77(100.0%)	204(100.0%)

Table (5) shows comparison of compliance level in relation to targeted hospitals of the studied sample. It displays that each Alia, Al-Ahli, and Al-Mizan 1(33.0%) was the poorest hospital in compliance of standard precautions. Where, Al-Ahli 28 (25.9%) took the first hospital in the fair compliance level. At the same time, Alia hospital 27 (29.0%) came in the first place in good compliance level.

Table 5. Assessment the nurses' compliance level of the sample according to hospitals

Hospital	Compliance level of stand precautions			Total
	Poor	Fair	Good	
Alia hospital	1(33.3%)	20(18.5%)	27(29.0%)	48(23.5%)
Beit Jala (Al Hussain) hospital	0(.0%)	18(16.7%)	13(14.0%)	31(15.2%)
Abu Al Hassan hospital	0(.0%)	12(11.1%)	10(10.8%)	22(10.8%)
Al -Ahli hospital	1(33.3%)	28(25.9%)	26(28.0%)	55(27.0%)
Al Mizan hospital	1(33.3%)	21(19.4%)	13(14.0%)	35(17.2%)
Bethlehem Arab Society hospital	0(.0%)	9(8.3%)	4(4.3%)	13(6.4%)
Total	3(100.0%)	108(100.0%)	93(100.0%)	204(100.0%)

Table (6) shows comparison of mean knowledge scores in relation to socio-demographic characteristics of the studied sample. It displays that high mean knowledge scores were found among those who were at the age group of 31-40 years, females, master degree, had years of experience 6-15 years, and hadn't attended training courses with means of (74.3832, 73.3356, 74.2188, 76.5972, and 71.3542) respectively. Significant statistical differences were found between mean knowledge scores towards age, gender, and experience ($F=3.875, 4.992, 12.207$) respectively at $p < 0.05(0.022, 0.027, 0.000)$ respectively. No significant statistical differences were found in mean knowledge scores only in relation to education and training course ($F = 2.985, 0.400$) at $p < 0.05 (0.053, 0.528)$ respectively.

Table 6. The relationship between the nurses' age, gender, experience, education, and training course towards the knowledge of standard precautions

Items		N	Mean	Std. Deviation	F	Sig
Age	20-30 years old	113	67.2290	18.54010	3.875	0.022
	31-40 years old	76	74.3832	16.16983		
	More than 40	15	72.5000	17.48724		
Gender	Male	112	67.7734	18.20739	4.992	0.027
	Female	92	73.3356	17.04377		
Education	Diploma	79	66.4953	20.08431	2.985	0.053
	Bachelor	117	72.5694	16.05083		
	Master	8	74.2188	15.01023		
Experience	5 years or less	91	64.1484	19.70563	12.207	0.000
	6-15 years	90	76.5972	13.32631		
	Above 15 years	23	69.8370	17.86770		
Training course	Yes	132	69.6970	19.06518	0.400	0.528
	No	72	71.3542	15.49683		

Table (7) shows comparison of mean compliance scores in relation to socio-demographic characteristics of the studied sample. It displays that high mean practices scores were found among those who were at the age group of more than 40 years, females, master, had years of experience above 15 years, and attended training courses with means of (79.4203, 80.4663, 82.4275, 81.2224, 79.8419) respectively. No significant statistical differences were found between mean practice scores towards age, gender, education, years of experience, and training course ($f=0.306, 3.256, 0.585, 1.514, 2.298$) respectively at $p < 0.05(0.737, 0.073, 0.558, 0.222, 0.131)$ respectively.

Table 7. The relationship between the nurses' age, gender, qualifications, and training course towards the standard precautions

Items		N	Mean	Std. Deviation	F	Sig
Age	20-30 years old	113	78.5302	10.21410	0.306	0.737
	31-40 years old	76	79.7101	10.76764		
	more than 40	15	79.4203	9.21825		
Gender	Male	112	77.8597	10.43495	3.256	0.073
	Female	92	80.4663	10.05805		
Education	diploma	79	78.4260	9.28855	0.585	0.558
	bachelor	117	79.2147	11.05565		
	master	8	82.4275	9.27787		
Experience	5 years or less	91	77.7194	9.97944	1.514	0.222
	6-15 years	90	79.8068	11.14121		
	Above 15 years	23	81.2224	7.69964		
Training course	Yes	132	79.8419	9.66738	2.298	0.131
	No	72	77.5564	11.35181		

Table (8) shows that there was significant statistical difference found between knowledge and compliance of standard precautions of the studied sample ($t=7.079$) at $p < 0.05(0.000)$.

Table 8. The relationship between the nurses' knowledge and compliance of standard precautions

Item	Mean	N	Std. Deviation	t	df	Sig.
knowledge	70.2819	204	17.86577	7.079	203	0.000
Compliance	79.0352	204	10.32375			

7. Discussion

Hospital acquired infection is a common problem all over the world. Therefore, up to date knowledge and nursing skills can play important 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 six hospitals in south West Bank districts, Palestine, revealed from the current study, 55.4% of the participants aged between 20 to 30 years old. This finding is in concordance with that of (Johnson *et al.*, 2013; Janjua *et al.*, 2007; Reda *et al.*, 2010) 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 majority of the participants had 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. Education must be specify 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 bloodborne pathogens and needle stick. About three quarters of the respondents were found to have good and fair knowledge of standard precautions. This satisfactory knowledge was found to be higher than what was reported in studies by (Abdulraheem *et al.*, 2012; Isara and Ofilii, 2010; Talaat and Shamia, 2010; and Fashafsheh *et al.*, 2015). However, the study revealed approximately one quarter of the respondents were with poor knowledge, this was found to be higher than what was reported in (Agaral and Thomas, 2003). This may due to lack of specific training courses in standard precautions that held for nurses in the targeted hospitals.

Concerning assessment of nurses' practice regarding compliance of standard precautions, the current study demonstrates that, the majority of the studied sample had good and fair compliance level of standard precautions. compliance was found to be consistent with (Fashafsheh *et al.*, 2015) and higher than what was reported by (Agaral and Thomas, 2003; Talaat and Shamia, 2010). This may due that they believe that behavior is more critical than knowledge of standard precaution. The study reported that there were significant statistical differences between knowledge of standard precautions towards age, gender, and experience. Also, the study revealed that no significant statistical differences were found between knowledge towards education and training courses. This study is consistent with Fashafsheh *et al.* study (2015) according to gender but inconsistent according age, education and experience. Also, it inconsistent with Hamid *et al.* study (2010), indicated that, factors such as age and years of experience didn't contribute to acquisition of knowledge about blood-borne illness. This may be related that group of age between 31-40 years and have experience 6-15 years were married and had families, and this increase their awareness and responsibility than other ages. Concerning the relationship between compliance of standard precautions towards age, years of experience, training course, and education, the present study revealed that no significant statistical differences were found. This is consistent with Fashafsheh *et al.* study (2015) according to age, years of experience, training course, and education, but inconsistent according gender. This reflects the need for enhancing compliance of standard precautions, and could emphasis the need for continuous specific training courses about standard precautions to facilitate adherence to infection control measures. Nevertheless, the prevention of infection is a major concern of all health workers and health policy makers. Nursing is crucial to the success of any preventive program aimed at reducing the incidence of infections in our health care facilities. Nurses therefore, must possess adequate knowledge and compliance towards achieving the goal of prevention of infections.

8. Conclusion

Based on the findings of this study, it can be concluded that nurses in the current study for both knowledge and compliance have fair level regarding standard precautions. However, inspite of having fair knowledge about standard precautions, still their one quarter have poor level.

9. Recommendations

The current study recommends the following:

- Updating knowledge and compliance of nurses through continuing in-service educational programs.
- emphasizing the importance of following latest evidence-based practices of infection control in continuing education / training programs.
- Providing training programs for newly nurses about standard precautions and at regular intervals.
- A replication of this study using observation checklist should be done to assess the level of compliance.

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