IMPACT: International Journal of Research in Applied, Natural and Social Sciences (IMPACT: IJRANSS)
ISSN(E): 2321-8851; ISSN(P): 2347-4580
Vol. 3, Issue 3, Mar 2015, 45-60

ATTITUDES, KNOWLEDGE, AND SOURCES OF INFORMATION AMONG NURSING STAFF TOWARD STANDARD PRECAUTIONS AND INFECTION CONTROL AT KING ABDULAZIZ TERTIARY HOSPITAL- MAKKAH

ABDULLAH MUSTAFA BANIYOUSEF[1], ESSAM MOHAMMED MEHLAB[2], HATTAN AL SOBHI[3] & MD. KAMAL HUSSAIN[4]

[1]Lecturer, Department of Emergency Medical Services, Faculty of Applied Medical Sciences, Umm Al Qura University, Makkah Al-Mukaramah, KSA

[2]Associate Professor, Department of Emergency Medical Services, Faculty of Applied Medical Sciences, Umm Al Qura University, Makkah Al-Mukaramah, KSA

[3]Head, Department of Nursing, King Abdulaziz Tertiary Hospital, Makkah Al-Mukaramah, KSA

[4]Associate Professor, Department of Health Information Management & Technology, Faculty of Public Health and Health Informatics, Umm Al Qura University, Makkah, KSA

ABSTRACT

Infection Control (IC) and standard precautions (SPs) is evidence-based practices that can reduce the risk of transmission of microorganisms. IC practice is a fundamental component of high level of nursing quality of care. The present study **aimed** to Assess Attitudes, Knowledge, and Sources of Information among Nursing Staff toward infection control and standard precautions. **Subjects and methods**: A convenient sample consisted of 96 nursing staff from all levels of nursing education. **Setting:** The study was conducted at king abdulaziz Tertiary hospital, Makkah Al-Mukaramah, Saudi Arabia. One tool was used comprised of three sections. Section 1: General data. Section 2: Knowledge assessment questionnaire about 5 different domains of IC and SPs. section 3: Attitude assessment questionnaire used towards previous or current curricular sufficiency, and training needs related to IC and SPs. **Results:** The current study revealed the total score for knowledge was 38.71±7.02 (out of 53 points) with a total of 44 out of 96 nursing staff (45.83%) of staff scored ≥ 40 out of 53 points which is considered to be acceptable. Sharp injuries, indications and the use of gloves and alcohol-based hand rub, showed the least knowledge scores. It is concluded the main source of information for staff was their previous study curriculum. Nursing staff were satisfied with their content although they reported there need for further training and education regarding IC& SPs. It was **recommended** that teaching and training must be strengthened, evidenced based knowledge reform and training are required to fulfill staffs' knowledge deficiencies related to in IC & SPs to protect nursing staff and their patients.

KEYWORDS: Infection Control**,** Standard Precautions, Health Associated Infection Control, Nosocomial Infection

INTRODUCTION

The emergence of life threatening infections, which are invasions and multiplication of microorganisms in body tissues, have highlighted the need for effective infection control program in all health settings.[1] The United States Centers

for Disease Control proposed a series of procedures that health care workers (HCWs) should comply with for all patients regardless of their diagnosis; these are known as standard precautions (SPs). [2] These precautions require the application of basic principles of infection control through hand hygiene, the use of appropriate protective equipments, safe handling of needles and sharps devices and proper waste disposal. [2] Hospital-associated infections are those infections acquired during the patient's stay in hospital. They form a major worldwide public health problem despite advances in our understanding and control of these infections.[3,4]

The best clinical care in the world can be worthless if patients pick up other infections while they are in the hospital. Hospital-associated infections also include occupational infections which occur among health care workers due to occupational hazards. Nosocomial infections (NCI) which are infections that occur during hospitalization are the most frequently reported adverse events in health care delivery. Hospitals provide a favorable transmission pathway for the spread of nosocomial infections, owing partly to poor infection control practices among health workers on one hand and overcrowding of patients in most clinical settings on the other. [4] An infection is considered nosocomial if it becomes evident 48 hours or more after hospital admission or within 30 days of discharge following inpatient care.[4] Health care-associated infections have long been recognized as crucial factors undermining the quality and outcomes of health care delivery.[5] Although infection is most prevalent in patients upon admission, health care workers also act as potential vectors for pathogenic agents.

Reported cases of nosocomial infection assumed such terrifying proportions in 2002 that World Health Organization member states approved a World Health Assembly resolution on patient safety. Developing countries were reported to have up to 20 times the risk of contracting a nosocomial infection compared with developed countries. [6]

The history of infection control (IC) practices in nursing begins to take place in hospitals in 1840 when the importance and influence of hand-washing was brought to the forefront of the medical area after independent studies by Semmelweis who established a link between the hands of health care workers and the spread of hospital-acquired infection. Then in 1854, Florence Nightingale was the first to suggest that environmental factors affect health (often called the environment theory). She linked health with five environmental factors: Pure fresh air, Pure water, Efficient drainage, Cleanliness and Light, it was found that by implementing the improved patient care measures such as cleanliness and ventilation, the mortality rate dropped from 42.7% in early 1855 to 2.2% in June 1855.[7]

The other significant issue is none compliance with standard precautions (SPs) by HCWs has been postulated to be determined by a range of factors including lack of knowledge [8], interference with flow of work [8-10], and perception of risk [10]. Several studies reported that lack of appropriate knowledge of SPs and IC was the main Predictor for poor compliance [8,10,11].

Nursing staff are often exposed to various infections during their clinical practice, [12] and as health care workers, nursing staff have a huge responsibility to protect themselves, their families, and their patients from danger because they work in an environment that encourages infections, and health care is always facing new dangers from incurable infections.[13] At the level of nursing colleges, there is a need to strengthen the nursing curriculum on infection control, given that nurses are likely to have more contact with patients than any other health care professionals[14,15].

In Saudi Arabia, it was reported that there was a lack of knowledge and compliance of IC measures by health care providers in hospitals as well as at primary level of care. This was partially explained by the deficiency of the curricular content of

medical and nursing schools in Saudi Arabia as well as in many other developing countries where the role of SPs and infection control is not emphasized and SPs are often practiced incompletely. [16] The first Saudi Ministry of Health (MOH) IC manual was developed in1984 with one of its main objectives being to monitor wards and clinics for infections and to implement other IC standards. By 1987 infection control programs were extended to all MOH hospitals in the kingdom of Saudi Arabia.[17,18]

However, there is limited number of studies that have been performed to assess nursing staffs' knowledge and attitude towards infection control and Standard Precautions.[19,20] Moreover the nurses source of information for that topic is not adequately explored. A few research studies were found in Saudi Arabia regarding this issue. So, The present study was conducted to assess attitudes, knowledge, and sources of Information among different educational degrees of nursing staff at king abdulaziz hospital in Makkah Al-Mukaramah in Saudi Arabia in order to take appropriate measures as needed.

DEFINITION OF STUDY SUBJECTS

Study subject is filled in one of these categories:

- A licensed practical nurse (LPN) is a nurse who holds a training course in nursing for 12-24 months period, providing very basic patient care duties and supervised by baccalaureate nurse.
- Diploma holder nurse is a nurse who holds a nursing certificate from a college for 3 years of study including theoretical and practical nursing topics, providing higher scope of patient care than a licensed practical nurse.
- A baccalaureate science nurse (**B.S.N)** is a nurse who holds a nursing certificate from a university for 4 years of study including theoretical and practical nursing topics & in hospital clinical training providing professional practice and a full responsibility about patient care.

All these categories are licensed under Saudi Health Commission for Health Specialties guidelines.

SUBJECTS AND METHODS

A convenient sample consisted of 96 nursing staff : 33 Licensed Practical Nurses (LPNs), 27 Diploma nurses, and 36 baccalaureate Registered Nurses (RNs) working at the same hospital. A Descriptive research design was utilized to conduct this study. Inclusion Criteria: Nursing Staff from all levels who practice their profession at bedside.

Have enough previous or current contact with patients in hospitals in at least two years at king abdulaziz hospital.

Exclusion Criteria: Any nursing staff with less than two years experience at hospital setting as they don't had enough exposure or contact with patients in hospitals other out of hospital nursing staff regardless of their clinical experience.

Settings: The study was conducted at king abdulaziz Tertiary hospital, Makkah Al- Mukaramah, Saudi Arabia. This referral hospital consists of 250 beds with various specialties with approximately 290 nurses providing their care at bedside level.

STUDY TOOLS

One tool was used in the current study. It comprised of three Sections:

Section 1: General Data

It was developed by researchers to collect the following data: Demographic information: number of clinical experience at the specified hospital, number of study years at the college, age of participant, level of education, gender, receiving or not previous training or educational materials about IC and SPs, sources of information about infection control and SPs.

Section 2: Knowledge Assessment Questionnaire About Different Domains of IC and SPs

It was modified by researchers and adopted from (Tavolacci et al., 2008; Amin & Al Wehedy,(2009).[19,20] and it was used to assess nursing staff knowledge toward 5 domains of IC and SPs with a total of 53 items of closed ended questions in true or false, such as: general concepts of IC and SPs (7 questions), nosocomial infection (7 questions), hand hygiene (19 questions), personal protective equipment (PPE) (14 questions), sharps disposal and injuries (6 questions).

Section 3: Attitude Assessment Questionnaire

It is modified, tested for validity by researchers and adopted from (Tavolacci et al.,2008;Amin& Al Wehedy, 2009 [19, 20] and it was used to assess nursing staff attitude towards previous or current curricular sufficiency, and training needs related to infection control and standard precautions using template that consist of 5 questions. Nursing staff have to answer on attitude questionnaire with either agree or disagree.

Methods

- Administration acceptance was obtained from the dean of faculty of Applied Medical Sciences at Umm Al-Qura University to collect data. Approval was also gained from hospital administration and nursing department of the hospital.
- Study Tools was adopted from available literature about nursing professionals knowledge toward IC & SPs (Tavolacci et al., 2008; Amin & Al Wehedy, 2009) [19, 20] and modified by researchers and was reviewed by expert.
- The tool was reviewed for clarity, feasibility, applicability, and the content validity and all the necessary modifications that have validity and reliability were done.
- Official permission from nurses was obtained after explanation of purpose of the study.
- Data was collected through self administered questionnaire, confidentiality of participant and any obtained information was preserved; autonomy to take decision of participation was explained and assured.

Duration of the Research

- Data collection take approximately two months from Decembers 23rd 2014 to February 25th2015.

Pilot Study

Pilot study was done on 10% of varied staff nurses, 10 Nurses, 3-4 nurses from each level to test the clarity and feasibility of research tool, the necessary modifications that don't affect the course of study or results were done.

Statistical Design

- Data were coded, tabulated and analyzed using the numbers, frequency, and percentage distribution by using Statistical Package for Social Science. (SPSS) Version 17.
- Appropriate statistical methods tests (multiple regression analysis) was used to calculate the relation between:

Dependent Variable

Satisfactory nurses knowledge (answering ≥75% of questions correctly ≥ 40 out of a total of 53 points).

Independent Variables

Level of nursing education, Previous training on infection control(IC) / standard precautions (SPs), Receiving previous educational materials/instructions on IC/SP, Source of information and Nurses attitude toward previous or current teaching curricular information related to IC/ SP during their study years. A significant P value was considered when P value was less than 0.05 and highly significant when P value was less than 0.01.

Limitations of the study

- From the limitations of this study include the generalizability of the study to either all the hospital nursing staff and to other tertiary hospitals in the region, there were only 96 participants who participated in the final complete study.
- Lack of prior research studies on the topic.
- Difficulty to collect data from fixed night shift staff whom their work extended almost 8 consecutive hours and feel so tired to complete the questionnaire.

RESULTS

Table 1: Shows the demographic characteristics of nursing staff involved in our study and that most of our study sample have a clinical experience of 2 to 10 years in the specified hospital. This was satisfactory for inclusion criteria to participate in this study. In addition, the vast range of study period for most staff was ranged from 3 to 4 years with a percentage of 51.04 %. The table shows also that most of clinical nursing staff ages ranged between 20 to 39 years old with least participation ratio of older staff of older than 39 years of age. Finally gender trait was higher for female participants of 57.3% compared with 42.7% of male subjects. (As shown in table 1)

Table 1: Demographic Characteristics of Study Sample

Number of Clinical Experience at the Specified Hospital in Years			Length of Study Years/ Months at the College/ Course			Age in Years			Level of Education			Gender		
	N	%	Period	N	%	Age	N	%	Level	N	%	Gender	N	%
Above 2 to 4 years	**46**	**47.91**	12-24 months	**33**	**34.37**	20-29	**54**	**56.25**	LPN	**33**	**34.37**	**Male**	**41**	**42.7**
			Above 3 to 4 years	**49**	**51.04**	30 -39	**39**	**40.62**						
			Above 4 to 5 years	**8**	**8.33**	40- 49	**3**	**3.12**		**27**	**28.12**		**55**	**57.3**

Above 4-10 years	**28**	**29.16**	Above 5-6 years	**6**	**6.25**	50 -59	**0**	**0**	Diploma			**Female**		
Above 10-15 years	**18**	**18.75**				> 60	**0**	**0**	B.S.N	**36**	**37.50**			
Above 15 years	**4**	**4.16**				Other :	**0**	**0**						

Table 2: Ninety six nursing (96) staff were included in the study 33(34.37%) are LPN, 27(28.12%) nurses holding diploma in nursing & 36 (37.50%) baccalaureate Nurses. This table shows that 45.45%, 29.62% and 52.8 % of the LPNs, Diploma nurses and baccalaureate s respectively has a pervious training on IC & SPs. Also we can observe that 78.78 %, 81.48 % and 91.6% of the three educational levels respectively received educational materials/instructions on IC & SPs. (As shown in table 2)

Table 2: Distribution of Nursing Staff Response about Previous Training and Receiving Educational Materials Related to IC & SP

Items		LPN No.(33)		Diploma No.(27)		B.S.N No. (36)		Total No.(96)	
		No	%	No	%	No	%	No	%
Received previous educational materials/instructions on IC/SP	Yes	**26**	**78.78**	**22**	**81.48**	**33**	**91.6**	**81**	**84.37**
	No	**7**	**21.21**	**5**	**18.51**	**3**	**8.3**	**15**	**15.62**
Previous training on infection control(IC) / standard precautions (SP)	Yes	**15**	**45.45**	**8**	**29.62**	**19**	**52.8**	**42**	**43.75**
	No	**18**	**54.54**	**19**	**70.37**	**17**	**47.2**	**54**	**56.25**

Table 3: Shows that curriculum is the main source of information for 84.8%, 92.6%, and 83.3% of LPNs, Assisted nurses and baccalaureate RNs respectively. It also shows that bed side practice considered the least source of information among nursing staff with 10.4% for the total number of nurses. (As shown in table 3)

Table 3: Distribution of Nursing Staff Response about their Main Source of Information Related to IC & SPs

items	LPN No.(33)		Diploma Nurse No.(27)		B.S.N No. (36)		Total No.(96)	
	N	%	N	%	N	%	N	%
Course Training	**4**	**12.1**	**8**	**29.6**	**23**	**63.8**	**35**	**36.4**
Bedside Practices	**3**	**9.0**	**1**	**3.7**	**6**	**16.6**	**10**	**10.4**
Previous Curriculum	**28**	**84.8**	**25**	**92.6**	**30**	**83.3**	**83**	**86.4**
Self Learning	**8**	**24.4**	**8**	**29.6**	**3**	**8.3**	**19**	**19.8**

Table 4 show that almost nurses from all categories agreed that all patients are being sources of infection regardless of their diagnoses with high certainty. A low percentage of licensed practical nurses showed that sweat should not be viewed as a source of infection, while high percentage of diploma holder nurses approved that all body fluids except sweat should be viewed as a source of infection. Regarding the application of S P s by health care workers 60.6%, 62.96%, 61.1% of the nurses respectively, answered correctly that SPs should not be applied only to health care workers who have contact with body fluids. (As shown in table 4)

Table 4: Distribution of Nursing Staff Correct Responses About General Concepts of IC & SPs

	Items	LPN		Diploma Nurse		B.S.N		Total	
		N	%	N	%	N	%	N	%
1	All health providers are at risk of occupational infections. (True)	29	87.87	27	100	36	100	92	95.8
2	Standard precautions (SP) Include the recommendations to protect only the patients. (False)	22	66.67	24	88.88	33	91.66	79	82.3
3	All patients are sources of infection regardless of their diagnoses. (True)	23	69.69	17	62.96	28	77.78	68	70.8
4	All body fluids except sweat should be viewed as source of infection. (True)	9	27.27	19	70.37	21	58.30	49	51.04
5	SP Include the recommendations to protect the patients and the healthcare workers. (True)	24	72.72	27	100	34	94.4	85	88.5
6	SP Apply for only healthcare workers who have contact with body fluid. (False)	20	60.6	17	62.96	22	61.1	59	61.5
7	SP Apply for all the patients. (True)	29	87.87	21	77.78	31	86.1	81	84.38
	Mean ± S.D	4.73±1.3		5.63±0.9		5.7±1.6		5.4±1.35	

Table 5 :Shows that 82.29% of the total nursing staff recognized that nosocomial infections are infections acquired in the hospital, it also shows that 87.5% of nursing staff respond correctly that nosocomial infections are occurred at 48 hours after hospital admission. While most of the staff answered incorrectly that the environment (air, water, inert surfaces) is the major source of bacteria responsible for nosocomial infection, only 5% of the total number of nursing staff answered correctly. About half of the staff in all levels of nursing study assumed that nosocomial infection has a prevalence of 25% in developing countries and nearly three quarters of the study sample believes that nosocomial infections are responsible for approximately 44% deaths per year in the world from hospital admissions. The total score for this domain was (4.88±1.46 out of 7 points). (As shown in table 5)

Table 5: Distribution of Nursing Staff Correct Responses about Nosocomial Infection

	Items	LPN		Diploma		B.S.N		Total	
		N	%	N	%	N	%	N	%
1	The environment (air, water, inert surfaces) is the major Source of bacteria responsible for nosocomial infection. (False)	0	0.0	3	11.11	2	8.33	5	5.21
2	Nosocomial infection has a prevalence of developing Countries 25%. (True)	18	54.54	14	51.9	22	61.11	54	56.25
3	Invasive procedures increase the risk of nosocomial Infection. (True)	30	90.90	27	100	36	100	93	96.9
4	Nosocomial infections are Infection that occurred at 48 hours after hospital admission (True)	29	87.87	24	88.89	31	86.11	84	87.5
5	Nosocomial infections are Infections acquired in the hospital (True)	30	90.91	21	77.77	28	77.78	79	82.29
6	Advanced age or very young age increases the risk of Nosocomial infection.	26	78.78	26	96.3	32	88.9	84	87.5
7	Nosocomial infections are responsible for Approximately 44% deaths per year in the world from hospital admissions. (True)	25	75.75	19	70.4	27	75	71	73.96
	Mean±S.D	4.8±1.7		4.96±1.4		4.9± 1.3		4.88±1.46	

In Table 6, the table shows that only 44.8% of nursing staff were able to respond correctly about the standard duration of hand washing. According to recommended indications for hand washing, 91.67% of staff responded correctly that hand washing is recommended before and after a contact with (or care of) a patient. While 65.63% of staff answered that hand washing is recommended after the removal of gloves. The lowest score for staff were in items related to indications of alcohol based hand rub as 24% of nursing staff of all categories answered correctly that alcohol- based hand rub is indicated instead of a antiseptic hand washing (30s) and only 10.4% of nursing staff answered correctly that

alcohol-based hand rub is indicated instead of surgical hand washing (3 min). The total domain of was high was high (14.3±1.5out of 19points). The least score was the score achieved by licensed practical nurses that measure was 12.9±1.1 out of 19 points. (As shown in table 6)

Table 6: Distribution of Nursing Staff Correct Responses About Hand Hygiene

	Items	LPN		Diploma		B.S.N		Total	
		N	%	N	%	N	%	N	%
1	Hand washing is indicated between tasks and procedures on The same patient. (True)	28	84.84	24	88.88	31	86.1	83	86.46
2	Alcohol hand rub substitutes hand washing even if the hands Are soiled. (False)	24	72.72	25	92.6	33	91.66	82	85.42
3	Standard hand washing includes washing of both hands and Wrists. (True)	24	72.72	25	92.6	33	91.66	82	85.42
4	Hand washing reduces the incidence of healthcare-related Infections. (True)	26	78.78	26	96.3	35	97.2	87	90.6
5	Hand washing minimizes microorganisms acquired on the Hands if soiled. (True)	29	87.87	27	100	35	97.2	91	94.8
6	Use of gloves replaces the need for hand washing. (False)	24	72.72	22	81.5	33	91.66	79	82.3
7	Hand washing is indicated after removal of gloves. (True)	30	90.90	24	88.88	33	91.66	87	90.6
8	In standard hand washing: minimum duration should be: From 10-15 seconds(False)	23	69.69	22	81.5	34	94.4	79	82.29
9	Hand washing is recommended before and after a contact with (or care of) a patient. (True)	29	87.87	25	81.5	34	94.4	88	91.67
10	In standard hand washing: minimum duration should be: Less than 15 seconds.(False)	30	90.90	27	100	34	94.4	91	94.8
11	In standard hand washing: minimum duration should be: Form 20-30 seconds.(False)	24	72.72	21	77.78	24	66.67	69	71.88
12	Hand washing is needed with patients with respiratory Infections. (True)	30	90.90	22	81.5	34	94.4	86	89.6
13	In standard hand washing: minimum duration should be From 40-60 seconds. (True)	11	33.33	13	48.15	19	52.8	43	44.8
14	Hand washing is recommended between patient contacts. (True)	23	69.69	23	85.2	20	55.56	66	68.75
15	Hand washing is recommended after the removal of gloves. (True)	21	63.63	21	77.78	21	58.3	63	65.63
16	Hand washing is recommended between the procedure to the same patient(True)	25	75.75	18	66.67	25	69.4	68	70.8
17	Alcohol-based hand rub is indicated instead of surgical hand Washing (3 min). (True)	6	18.18	1	3.7	3	8.33	10	10.4
18	Alcohol-based hand rub is indicated instead of a antiseptic hand washing (30 s). (True)	9	27.27	8	29.6	6	16.7	23	24
19	Alcohol-based hand rub is indicated instead of a traditional hand washing (30 s). (True)	9	27.27	18	66.7	19	52.7	46	48
	Mean±S.D	12.9±1.1		14.5±1.6		15.7±1.4		14.3±1.5	

Table 7: shows the correct responses to items related to the domain of Personal Protective Equipment (PPE) by clinical nurses included. 98.9% believed that PPE such as masks and head caps provides protective barriers against infection. Also 91.67% answered correctly that use of PPE eliminates risk of acquiring occupational infections. While only 45.8% of staff answered that used PPE should not be discarded through regular municipal disposal systems. Most of the students 83% answered incorrectly that SPs recommend use of gloves for each procedure. Also 55.21% of students recognize that SPs recommend the use of gloves when there is a risk of contact with the blood or body fluid. 42.7% of

students answer that SPs recommend use of gloves when there is a risk of a cut. The total score for this domain was (10.03±1.35out of 14 points). (As shown in table 7)

Table 7: Distribution of Hospital Nursing Staff Correct Responses about PPE

	Items	LPN		Diploma		B.S.N		Total	
		N	%	N	%	N	%	N	%
1	Use of PPE eliminates risk of acquiring occupational infections. (True)	26	78.78	26	96.3	36	100	88	91.67
2	PPE should be used only whenever there is contact with blood. (False)	27	81.81	24	88.88	32	88.9	83	86.45
3	PPE such as masks and head caps provides protective barriers against infection. (True)	32	96.96	27	100	36	100	95	98.9
4	PPE is exclusively suitable to laboratory and cleaning staff for their protection. (False)	23	69.69	25	81.5	32	88.9	80	83.3
5	Gloves and masks can be re-used after proper cleaning. (False)	28	84.84	22	81.5	34	94.4	84	87.5
6	Used PPE are to be discarded through regular municipal disposal systems. (False)	13	39.39	16	59.3	15	41.67	44	45.8
7	The standard precautions recommend use of gloves: For each procedure. (False)	9	27.27	6	22.22	2	5.56	17	17.71
8	Masks made of cotton or gauze are most protective. (False)	18	54.54	17	62.9	20	55.56	55	57.3
9	Masks and gloves can be re-used if dealing with same patient. (False)	24	72.72	25	81.5	27	75	76	79.17
10	The standard precautions recommend use of gloves when there is a risk of a cut. (True)	21	63.63	11	40.7	9	25	41	42.7
11	The standard precautions recommend use of gloves when there is a risk of contact with the blood or body fluid. (True)	22	66.67	14	51.9	17	47.2	53	55.21
12	When there is a risk of splashes or spray of blood and body fluids, the healthcare workers must wear: mask, goggles, and gown. (True)	29	87.87	27	100	36	100	92	95.8
13	The standard precautions recommend use of gloves: When healthcare workers have a cutaneous lesion. (True)	21	63.63	12	44.44	14	38.9	47	48.9
14	Gloves should be changed between different procedures on the same patient. (True)	22	66.67	24	88.88	33	91.66	79	82.3
	Mean±S.D	9.5±0.9		10.2±1.4		10.4±1.2		10.03±1.35	

Table 8: This table shows the correct responses of nurses towards sharp disposal and sharp injuries.

It's obviously seen that 51.51%, 77.78% and 80.55 % of the licensed practical nurses, diploma nurses and baccalaureate nurses respectively correctly responded to the false statements that used needles should be recapped after use. Only 18.75% of staff nurses answered correctly that Soiled sharps objects should be shredded before final disposal. 84.4 out of the study sample of nurses know that Sharps injuries should be managed with the need of reporting. The total score of this domain was (4.1±1.36 out of 6 points). (As shown in table 8)

Table 8: Distribution of Nursing Staff Correct Responses about Sharps Disposal and Sharp Injuries

	Items	LPN		Diploma Nurse		B.S.N		Total	
		N	%	N	%	N	%	N	%
1	Sharps injuries should be managed with no need of reporting. (False)	23	69.69	24	88.88	34	94.4	81	84.4
2	Used needles should be bent after use to prevent injuries.(False)	21	63.63	23	85.2	32	88.9	76	79.17
3	Soiled sharps objects should be shredded before final disposal. (True)	9	27.27	4	12.12	5	13.88	18	18.75
4	Used needles should be recapped after use to prevent injuries. (False)	17	51.51	21	77.78	29	80.55	67	69.8
5	Post-exposure prophylaxis is used for managing injuries from an HIV-infected patient. (True)	29	87.87	23	85.2	29	80.55	81	84.36
6	Needle-stick injuries are the least commonly encountered in general practice. (False)	20	60.60	22	81.5	31	86.1	73	76.04
	Mean±S.D	3.6±1.2		4.3±1.3		4.4±1.6		4.1±1.36	

Table 9: Shows the attitudes of nursing staff toward their satisfactions with the previous exposure to curricular content during their study and the received training related to IC and SPs. Of the study sample included only 26, 7 and 20 persons of LPN, Diploma and baccalaureate nurses respectively agreed that their curriculum provides them with enough information on IC and SPs. 51.51%, 48.48% and 29.62% of licensed practical nurses, diploma and baccalaureate registered nurses respectively disagreed about the availability of training and/or orientation sessions towards infection control and SPs at the college. Only 27%, 24% and 3% of LPN, Diploma and baccalaureate registered nurses respectively agreed about the role of their previous tutors and faculty in providing them with necessary information on how to avoid health facilities related infections before their entrance into clinical practice at hospitals. 24 ,9, and 18 persons of Diploma and baccalaureate registered nurses respectively disagreed that they received adequate training on how to avoid heath related infections through scenarios and simulations. Almost 31,2, and 2 of LPN, Diploma and baccalaureate registered nurses respectively agreed about their need to receive training and orientations towards IC and SPs. (As shown in table 9)

Table 9: Attitudes of Nursing Staff Toward their Satisfaction with Previous Exposure to Curricular Content and Training Regarding IC and SPs

	Items	LPN		Diploma Nurse		B.S.N		Total	
		Agree	Disagree	Agree	Disagree	Agree	Disagree	Agree	Disagree
		N	%	N	%	N	%	N	%
1	Previous or current curriculum provides enough information on IC and SPs.	26	78.82	7	21.21	20	74.02	7	25.9
2	Training/orientation sessions about IC and SPs are provided to nursing	17	51.51	16	48.48	8	29.62	19	70.4
3	Previous tutors and faculty provided us with enough information on how to avoid health facilities related-infections before clinical work.	27	81.81	6	18.18	24	88.9	3	11.1
4	I received hands on training on how to avoid health facilities-related infections using case scenarios and simulations.	24	72.72	9	27.27	9	33.3	18	66.7
5	I need to receive training on IC and SPs.	31	93.93	2	6.1	25	92.5	2	7.4

Table 10: The cut off point for being knowledgeable towards IC and SPs with scores that $\geq$ the 75thpercentile ($\geq$ 40 out of a total of 53 points). This table shows that all the independent variables have an effect on the dependent

variable through the value of P as shown in the table is less than the value of α = 0.05 (95%). Table shows that the value of R2 (the coefficient of determination) for the levels of academic study with staff who got 75% and more is 8.5% and this indicates a positive relationship. As well as with Previous training 8.7% is a direct correlation, but very weak. The sources of information with 64% very strong relationship, as well as with Attitude score 44% weak relationship. This indicates that the sources of information have a significant impact on the staff get to 75% and more of correct answer to the questions. The attitude score have an effect on staff score but the effect is also is very weak. (As shown in table 10)

Table 10: Multiple Regression Analysis Model for The Possible Correlates Of Higher Knowledge Toward I.C & S.P among the Included Nursing Staff (N = 96)

Independent Variable	P Value	R^2
Previous training on infection control(IC) / standard Precautions	0.002	0.087
Number of Study Years at the college	0.002	0.085
Received educational materials/instructions on IC/SP	0.000	0.437
Sources of information	0.000	0.640
Attitude score	0.000	0.440

DISCUSSIONS

In the present study the total score for knowledge was 38.71±7.02 (out of 53 points) with a total of 44 out of 96 nursing staff (45.83%) of nursing staff scored ≥ 40 out of 53 points which is considered to be acceptable, staffs' knowledge differed according to the specific areas, the highest scores was noticed along the domain of hand hygiene while sharp management and injuries showed the least scores. Tavolacci et al. (2008) [21] reported in their study that the highest scores were achieved for knowledge of standard precautions and hand hygiene, and the worst score was for knowledge of Nosocomial Infections, which support current study results. Our study results showed student nurses were knowledgeable concerning general concept of IC and SPs (total mean 5.4±1.35 out of 7 points). Labrague et al. [22] (reported that nurses knowledge concerning SPs was high among nursing staff. Studies among nursing population also showed similar results to this study.

Vaz et al. (2010)[23] also reported that 90.0% of nurses had knowledge of SPs. Good knowledge of standard precautions among nurses may be due to inclusion of the concepts of standard precautions in the nursing curriculum. Result of the present study showed that 88.5 % of staff agreed that SPs include recommendation to protect patient and health care workers (HCWs), this is disagree with Sreedharan et al. (2011) [24]. About half of the staff in the present study assumed that Nosocomial Infections has prevalence of 25% in developing countries and nearly three quarters of the study sample believes that NCIs are responsible for approximately 44% deaths per year in the world from hospital admissions which reflect students perception on the importance of NCI prevention. For hand hygiene, only 44.8% were able to respond correctly about the standard duration of hand washing. Nursing staff knowledge regarding the indications of alcohol based hand rub was extremely low as the majority of them didn't believe that alcohol hand rub is indicated instead of traditional hand washing, anticipating hand washing and surgical hand washing. Also nearly third of the sample didn't know that hand washing is recommended after removal of gloves, between procedure to the same patient, and between patients contacts.

The present study shows that 90.6% of nurses had knowledge of hand washing is indicated after removal of gloves, while Tavolacci et al. (2008) and Bamigboye et al. (2006))[25,26] shows in their study that student didn't sufficiently understand the fact that hand hygiene should be performed after the use of gloves. It is important to address hand hygiene duration and alcohol hand rub indication during future clinical training sessions. Hand hygiene training sessions may need to be conducted more

frequently with continuous monitoring and performance feedback to encourage them to follow correct hand hygiene practices.

For PPE The total score for this domain was acceptable (10.03±1.35out of 14 points). Shows the correct responses to items related to the domain of (PPE) by clinical years included. Of the surveyed staff 98.9% believed that PPE such as masks and head caps provides protective barriers against infection. Also 91.67% answered correctly that use of PPE eliminates risk of acquiring occupational infections. While only 45.8% of staff answered that used PPE should not be discarded through regular municipal disposal systems.55.21% of staff recognize that SPs recommend use of gloves when there is a risk of contact with the blood or body fluid, similar result was low with Labrague et al. (2012).[27]

For sharp disposal and sharp injuries the total score of this domain was (4.1±1.36 out of 6 points). 69.8% responded to the false statements that used needles should be recapped after use. This is unlike this studies Janjua et al. (2007) [28] they are finding the highest percentage of the participants were of the opinion that the used syringes should be disposed after recapping. Another key finding was that the attitude toward nursing staff was high percentage towards their previous and current curricular content and the received training towards IC and SPs. The present study included staff 78.82%,74.02% and 80.5% of LPNs, diploma, and baccalaureate nursing staff respectively agreed that the current curriculum provides them with enough information on IC and SPs. These results are consistent with studies carried out in more developed countries where teaching during the curriculum was the main source of information, and the information about SPs was emphasized more during the curriculum for nursing staff Tavolacci et al. (2008). Nurse educators may need to provide an environment that models and promotes standard precaution practices by positive role modeling (Tavolacci et al.,2008).

It is found that 48.48%, 70.4% and 41.67% of LPNs, diploma nurse and baccalaureate nurses respectively disagreed about the availability of current training and/or prior orientation sessions towards infection control and SPs at the specified hospital and that 81.81%, 88.9% and 80.6% of nursing staff respectively in the same order agreed about the positive previous role of their tutors and faculty in providing them with necessary information on how to avoid health facilities related infections before their entrance into clinical training at hospitals. Almost 93.93%, 92.5% and 86.1% of LPNs, diploma nurse and baccalaureate nurses attitudes respectively agreed about their need to receive training and orientations towards IC and SPs. That's approved with the study Wang et al. (2008). [29] The education and training was found to be of paramount importance for developing awareness among health care workers, as well as improving adherence to good clinical practice.

Learning during the current or previous curriculum was the main source of information. This result is consistent with (Tavolacci, 2008). While for Amin 2013 reported that self-learning and informal bed side clinical practices were the main sources. [25] this indicates that Most of the information necessary to answer this questionnaire was given during the curricula. Also Training courses appeared to be a significant source of knowledge for staff. although in the present study bed side practice and self-learning found to have significant effect on staffs' knowledge related to IC and SPs. Present study express that the level of knowledge was significantly correlated with how many years studied at college; this can be explained by the fact that those at baccalaureate level of nursing education because they are more exposed to clinical practices with substantial exposures to patients during their study and clinical practices and academic supervision in hospital wards compared to diploma nurses and LPNs. In this study previous training on SPs and infection control was a positive predictor for higher knowledge and this could be referred to nature and contents of these training. Studies showed that specific training of SPs can quickly improve staffs' knowledge of IC in a short period of time. Some authors

recommended that future educational approaches should include rigorous curricular reform with pragmatic presentation of effective hand hygiene and SPs, feedback from teachers at the bedside, and inclusion of IC&SPs scores for students in all clinical training courses (Tavolacci et al., 2008; Amin & AlWehedy, 2009)[16,25].

CONCLUSIONS

There was a significant relationship between staffs' knowledge scores and their level of education. Baccalaureate holder nurses fulfilled the highest score among all other levels of nursing study. The overall knowledge scores for nursing staff toward IC & SPs was acceptable. Generally, all nursing levels achieved the highest score in hand hygiene domain and that the lowest score in sharp disposal & sharp injuries. The main source of information for nurses was their previous or current curriculum, although courses training in hospitals have significant effect on staffs' knowledge especially for baccalaureate nurses.

Despite that the attitude of nursing staff were satisfied with the received curricular content and the training towards IC and SPs, they reported there need for further training and education regarding IC& SPs. Moreover, Teaching at the nursing programs must be strengthened, particularly with respect to the application of standard precautions for every patient, hand hygiene after use of gloves, the benefit of using alcohol-based hand rub to decrease the transmission of NCI in addition to safe handling of needles and sharp objects must adequately addressed to nurses. There must be adequate curricular reform and training which are required to fulfill nurses' knowledge deficiencies related to in IC & SPs.

RECOMMENDATIONS

- Development of a in-hospital written program about standard precautions and infection control that includes policies, procedures and guidelines on education and training, exposure prevention, and post-exposure management.
- Safe methods for dealing with sharp objects practice in order to take appropriate measures for post injury management that should be emphasized throughout nursing practice.
- Periodic training courses should be provided to keep nurses knowledgeable of updating data regarding to infection control and standard precautions to foster positive changes in attitudes.
- participation of all nursing staff in different activities regarding standard precautions should be encouraged and events such as training courses, workshops and other meetings regarding standard precautions and infection control should be organized consistently.
- Further studies are also recommended with regard to the IC & SPs, in order to gain more understanding about nurses practice during patient hospitalization. These studies should be done qualitatively rather than quantitatively, because they could then focus more on the perceptions of nursing staff.

REFERENCES

1. Rafei U, Omi SH. Practical guidelines for infection control in health care facilities. World Health Organization.2003.

2. Whitehouse JD, Sexton DJ, Kirkland KB. Infection control: past, present, and future issues. Compr Ther 1998; 24: 71–6.
3. Horan TC, Gaynes RP (2004). Surveillance of nosocomial infections. In: Hospital Epidemiology and Infection. 3rd ed. Mayall CG, editor. Philadelphia, PA: Lippincott, Williams & Wilkins.
4. Samuel SO, Kayode OO, Musa OI, et al.(2009) Nosocomial infections and the challenges of control in developing countries. Afr J Clin Exp Microbiol.;11:102–110.
5. McDermott C, Gibb AP, Paterson-Brown S, Brady RR.(2008) Fact or infection: do surgical trainees know enough about infection control? Ann R Coll Surg Engl; 90 (8): 647-50.
6. World Health Organization. 10 facts on patient safety. Available from:

   http://www.who.int/feature/factsfile/patientsafety/en/index.html.
7. Queensland Government. Infection Prevention and Control History. 17 October 2011.cite 16-11-2013 available from www.health.qld.gov.au.
8. Motamed N, BabaMahmoodi F, Khalilian A, Peykanhertitati M, Nozari M. Knowledge and practices of health care workers and medical students towards standard precautions in hospital in Mazandran Province. East Mediterr Health J 2006; 12: 653–61.
9. Stein AD, Makarawo TP, Ahmad MF. A survey of doctors' and nurses' knowledge, attitudes and compliance with infection control guidelines in Birmingham teaching hospitals. J Hosp Infect 2003; 54: 68–73. doi:10.1016/S0195-6701(03)00074-4
10. Ayranci U, Kosgeroglu N. Needle-stick and sharp injuries among nurses in the health care sector in a city of western Turkey. J Hosp Infect 2004; 58: 216–23. doi:10.1016/j.jhin.2004.06.029
11. Nelsing S,Nielsen TL,Nielsen JO. Non compliance with standard precautions and the associated risk of mucocutaneous blood exposure among Danish physicians. Infect Control Hosp Epidemiol 1997;18:692-8.
12. Labrague LJ. Rosales RA. And Tizon MM. Knowledge of and Compliance with Standard Precautions among Student Nurses. International Journal of Advanced Nursing Studies 2012.1: (2).84-97.
13. Johnson. Infection Control Curriculum Module.Center for Aide Regulation and Education. North Carolina Department of Health & Human Services 2000 cite 10-12-2013 Available in www.ncdhhs.gov
14. Ann Shuttleworth. Teaching nurses the importance of microbiology for infection control. Nursing Times.net. Vol: 100, Issue: 36, Page No: 56
15. Kim, K. M., Kim, M. A., Chung, Y. S., & Kim, N. C. (2001). Knowledge and performance of the universal precautions by nursing and medical students in Korea. Am J Infect Control, 29, 295-300.
16. Amin TT. Al Noaim K I. Bu Saad M A. Al Malhm TA.Al Mulhim A. and Al Awas MA. Standard Precautions and Infection Control Medical Students' Knowledge and Behavior at a Saudi University: The Need for Change. Global Journal of Health Science.2013. 5:(4) 114-125.

17. Memish ZA. Infection control in Saudi Arabia:meeting the challenge. Am J Infect Control.2002.30:(1).57-65.

18. Memish ZA, Ahmed QA. Mecca bound: the challenges ahead. J Travel Med. 2002. 9:(4). 202-210.

19. Tavolacci MP, Ladner J, Bailly L, MerleV, Pitrou I, Czernichow P. Prevention of Nosocomial Infection and Standard Precautions: Knowledge and Source of Information Among Healthcare Students.Pubmed. 2008. 29:(7),642-647.

20. Tarek Amin, Adel Al Wehedy. Healthcare providers' knowledge of standard precautions at the primary healthcare level in Saudi Arabia. Healthcare Infection.2009;14(2)65.

21. Tavolacci MP, Ladner J, Bailly L, MerleV, Pitrou I, Czernichow P. Prevention of Nosocomial Infection and Standard Precautions: Knowledge and Source of Information Among Healthcare Students. Pubmed. 2008. 29:(7),642 647.

22. Labrague LJ. Rosales RA. And Tizon MM. Knowledge of and Compliance with Standard Precautions among Student Nurses. International Journal of Advanced Nursing Studies 2012.1: (2).84-97.

23. Vaz K., McGrowder D. Alexander-Lindo R.Gordon L. Brown P. Irving R. Knowledge, Awareness and Compliance with Universal Precautions among Health Care Workers at the University Hospital of the West Indies, Jamaica, University of the West Indies. 2010.1:(4). 171-181.

24. Sreedharan J. Muttappillymyalil J. Venkatramana M. Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. Eastern Mediterranean Health Journal, 2011. 17:(4). 331-334.

25. Tavolacci MP, Ladner J, Bailly L, Merle V, Pitrou I, Czernichow P. Prevention of Nosocomial Infection and Standard Precautions: Knowledge and Source of Information Among Healthcare Students. Pubmed. 2008. 29:(7),642-647.

26. Bamigboye, A. P., & Adesanya, A. T. (2006). Knowledge and Practice of Universal Precautions among Qualifying Medical and Nursing Students: A Case of Obafemi Awolowo University Teaching Hospitals Complex, ILE- IFE. Research Journal of Medicine and Medical Sciences, 1(3), 112-116.

27. Labrague LJ. Rosales RA. And Tizon MM. Knowledge of and Compliance with Standard Precautions among Student Nurses. International Journal of Advanced Nursing Studies 2012.1: (2).84-97.

28. Janjua NZ, Razaq M, Chandir S, et al. Poor knowledge--predictor of non adherence to universal precautions for blood borne pathogens at first level care facilities in Pakistan. BMC Infect Dis 2007;7:81.

29. Wang H, Fennie K. He G. et al. A training programme for prevention of occupational exposure to bloodborne pathogens: impact on knowledge, behaviour and incidence of needle stick injuries among student nurses in Changsha, People's Republic of China. J Adv Nurs 2008,41:(2).187-94.