Original Research Article

Assessment of Knowledge, Attitudes and Practices of Nurses Regard Infection Control Program in El-Hawwary Renal Dialysis Centre in Benghazi City, Libya.

**Amal Ali Mukhtad, **Rawand Ramadan Alfahkry, **Wafa Owhida Mousa **Amani M Alzawi, **Abeer Abd El-Alali Abd El-Razik.*

**Lecturer at Department of Health Environment, Faculty of Public Health, University of Benghazi_ Course Coordinator of Subject: Occupational Health*

*** Bachelor of Public Health (Environmental Health)_ University of Benghazi.*

Abstract

Background: Hospital-acquired infection (HAI) is one of the common health issues and difficulties faced by hospitals in all countries over the world. Since nurses are part of the healthcare team that perform an essential role in the control of hospital infection, this study is conducted to investigate the knowledge, attitudes and practice of nurses regarding infection control measures and precautions for hospital infection. **Methods and Materials:** This is descriptive cross-sectional conducted on "El-Hawary Renal Dialysis Centre" in Benghazi city, Libya in 2017. The data collection instrument is composed of a self-structure questionnaire based on precautions suggested by the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (CDC). Data were fed into the SPSS software v.22 and were analyzed using descriptive and inferential statistics. **Results:** The result found that 88 % of nurses reporting the higher level of exposure to the biohazards particularly, needle stick injury. In addition, most nurses do not have a good knowledge, attitudes and practices about infection control measures even though having an average efficacy. **Conclusion:** As the outcomes show a low level of awareness among the nurses regarding hospital acquired infection, it is proposed to offer training sessions on the prevention and control of HAI in order to upsurge the awareness of nurses in the renal dialysis centre and hold practical courses for practicing these principles in relation to the application of the standard health precautions of WHO and CDC guidelines. Further studies should be implemented.

Keywords: Dialysis, knowledge, attitude, practice, standard precautions, infection control

Introduction

Patients who undergo dialysis treatment have an increased risk for getting an infection. Any healthcare setting has issues related to infectious diseases and the safety of both patients and staff, but the renal dialysis setting has its own concerns because the process of hemodialysis requires frequent use of catheters or insertion of needles to access the bloodstream. Hemodialysis patients can carry blood-borne pathogens, and consequently can increase a risk to the healthcare workers (HCWs) treating them and to the other patients being treated in the dialysis center. Hemodialysis patients may have weakened immune systems and be more susceptible to infection themselves, and everyone in the surrounding area is also at high risk. One of the most critical issues challenging nurses of dialysis care is that of preventing infections. Because hemodialysis requires repeated exposure of the bloodstream for venous access, nurses must be diligent in keeping bacteria and viruses at bay. This is particularly important given that patients with kidney disease have lowered immune responses and are therefore more susceptible to infections. Bloodstream infections (BSIs) for instance are a leading cause of hospitalization in dialysis patients and one of the leading causes of mortality. According to the Centers for Disease Control and Prevention (CDC), an estimated 37,000 BSIs occur each year among dialysis patients with central lines, and as many as one in four of these patients may die as a result of their infection[1,2] . In addition, the estimated cost per hospitalization from a bloodstream infection among this population is $23,000 [2]. Thus, preventing BSIs fulfills the triple aim, which is to improve population health, enhance patient experience of care, and reduce health care costs. The main emphasis in most of this research ideas to the importance of applying the Standard Precautions by the healthcare providers, together with special focus on disinfection policies and measures to avoid cross contamination[2,3]. This study was conducted in order to examine the nurses' knowledge and awareness of cross infection and to document their practice in relation to the application of the standard health precautions of WHO and CDC guidelines.

Materials and Methods

Study Design: a descriptive Cross-Sectional study was conducted among healthcare workers (Nurses) at El-Hawwary Renal Centre in Benghazi city, Libya in 2017.

Data Collection: Data were collected through using a designed questionnaire that were distributed to all of them during a period of month from June to July 2017. For statistical analysis, the chi-square test was used to measure the association among independent variables to evaluate the compliance of the nurses related safety procedures at the setting.

Questionnaire Design: The questionnaire included 24 multiple choice questions. The following data was provided:

- Socio-demographic data: age, gender, educational level and marital status, shift

work and working years (Experience).

- General information on occupational risks and hazards: such as the severity of this job, previous work accident, type of accident type, reason of accident.

- Infection control measures and procedures: including hand washing, disinfection, sterilization, disposable methods, written policy, conducting training program, vaccinations, periodic medical examination program and etc.

Sample Size: The total population in the dialysis setting in the different shifts was 53 nurses, Thus, the participation rate (Response Rate) was 96%.

Statical Analysis: The Statistical Package for Social Sciences (SPSS ver. 19) was used for data entry and analysis. Frequency distribution and cross tabulation were conducted to identify data entry error. Data were described using the mean and percentages**.**

Ethical considerations: There were no ethical issues but application for ethical approval was made by agreement statement of the manager office of this dialysis setting, in order to collect the data. Researchers informed the participants that taking part in the study was completely voluntary and no questions about their identity were asked.

Results

This study found out the outcome of 53 study subjects in the purpose of evaluating the nurses' knowledge, attitudes and practices of infection control measures and procedures in El-hawwary renal centre. Table (1) presents the majority of the study subjects were female (76%). Most of the study subjects ranged from 21 years to 40 years. (76%) their qualification were diploma and (10%) were Bachelor's degree. Also, most of the study subjects work six hours a day (84%)and only (16%) work for 12 hours a day. Nurses at the renal dialysis centre reported their exposure to the biohazards by (88%), while (12%) thought that they were not exposed, as presented in Figure (1). In addition, Figure (2) shows (24 %) of nurses at the renal dialysis centre were exposed to risk accidents during performing their duties. The higher proportions of the main causes of work accidents among nurses were (57%) stick needles, (16%) sharp instruments, and (12%) other causes including slips and trips. Lower proportions involve (10%) blood and/or fluids splashes, (5%) infections such as influenza, as shown in Figure (3). Moreover, Figure (4), (63%) of the nurses reported that they were un known what are types of the dialysis machine,

currently used in this centre. (Only 37%) (19 out of 51) were known about them. Figure (5) also presents the application of dialysis machine disinfection practice and provision of infection control policy at El-Hawwary Renal Dialysis Centre. (96%) of nurses stated that they applied disinfection for the dialysis machine between patients in particular heat disinfection. only (35%) of nurses confirmed that there was not infection control policy at this Centre, while the rest of them confirmed the opposite. They also stated that chemical disinfection applied only on machines which use on active positive serology patients. Figure (6) displays more than half of the nurses (63%) had the knowledge of the viability of hepatitis B virus on surfaces at room temperature ranging from 12 hours to 72 hours. A shorter duration of viability was stated by (35%) of nurses for one week. The report of nurses in the current study demonstrated in Figure (7) that a proportion of them were not practiced the proper handling of needles in renal dialysis centre as (47%) of nurses reported not always discarding needle at the point of use. (23%) of nurses reported passing needles directly from hand to hand (17%) reported recapping needles after use. Factors of work accidents Figure (8) presents as (39%) work stress, (18%) lack of safety culture, (6%) lack of PPE and (37%) of nurses referred to all factors together. Table (2) additionally determines the association between working years and different duties at work. It clearly found that the positive association increased among the nurses with (0-5) years and (6-10) years; and decrease gradually with the other categories. Furthermore**,** Table (3) shows all the nurses reported that they did not receiving on job training in infection control. Thus, more than half of them received training in infection control in dialysis unit (53%). The majority (88%) of nurses expressed a need for training in infection control in dialysis unit on regular basis. In addition, the majority of nurses reported the presence of infection control guidelines in dialysis unit (81%). The majority of nurses also stated an adequate supply of infection control equipment including gloves (96%), masks (88%) hand disinfectant (86%), Machine disinfectant (82%) and biohazard container/sharp box for each bed (80%). Lower proportions reported an adequate supply of Glasses (47%) and caps (45%) gowns (39%) and eye wear (10%). In the other hand, the knowledge of situations related to hand washing, (24%) stated hand washing after removal of gloves and (29%) of nurses stated hand washing before wearing of gloves. Lower proportion (18 %) stated hand washing after preparation of dialysis machine. In respect of the knowledge regarding needle stick, (76%) of nurses reported they trained and practice to avoid it during performing their duties. In respect of vaccination against Hepatitis B, (61%) of nurses reported they had it and (39%) did not vaccinated. However, (64%) of nurses mentioned that there was not periodic medical examination at work. While (36%) mentioned that they conducted periodic examination by their selves, not as an obligation of work. Furthermore, (27%) of nurses had the knowledge that the patients on dialysis should be monitored

monthly for the early detection of infection. (14%) of nurses had the knowledge that dialysis patients should be monitored every 3 months. The largest proportions (59%) of nurses had the knowledge of re-screening patients on dialysis patients every 6 months.

Table (1): Demographic Characteristics of The Nurses in The Dialysis Setting

Characteristics		Frequency	Percent (%)
Gender	Male	12	24
	Female	39	76
Age Category	>20	2	4
	21-30	37	72
	31-40	10	20
	41-50	1	2
	51-60	1	2
Marital Status	Single	33	65
	Married	15	29
	Divorced	3	6
Work Hours	6 hours	43	84
	12 hours	8	16
Working Years	0-5	26	51
	6-10	9	18
	11-15	13	25
	16-20	2	4
	<26	1	2
Qualification	Training Course	6	12
	Diploma	39	76
	Bachelor	5	10
	Master	1	2

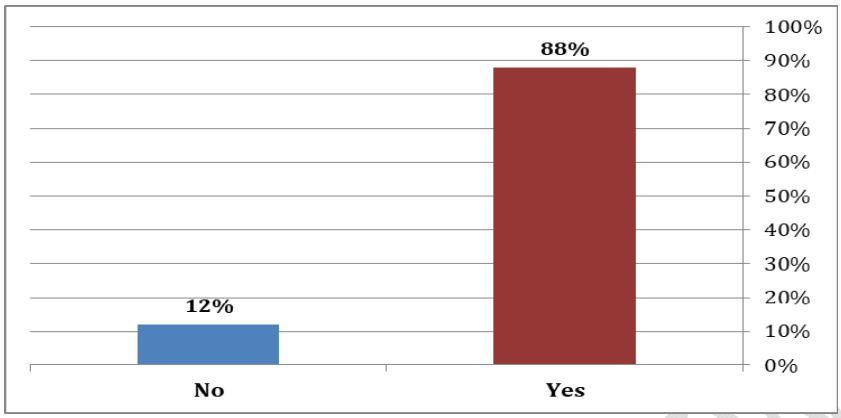

Figure (1): Biohazards Exposure at Work

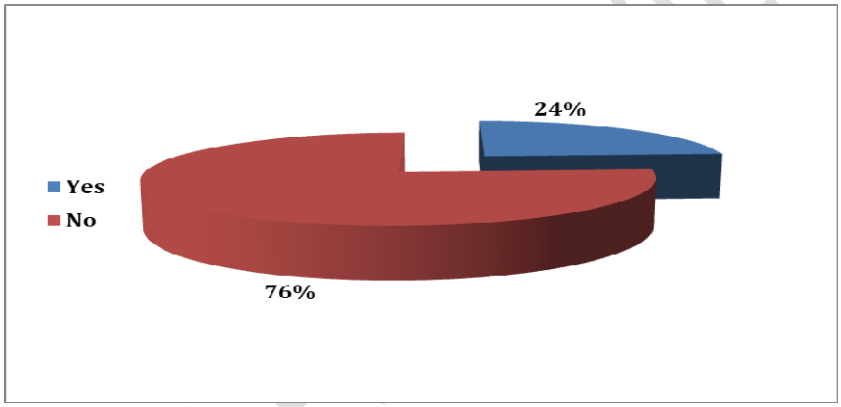

Figure (2): Accident Risk Exposure at Work

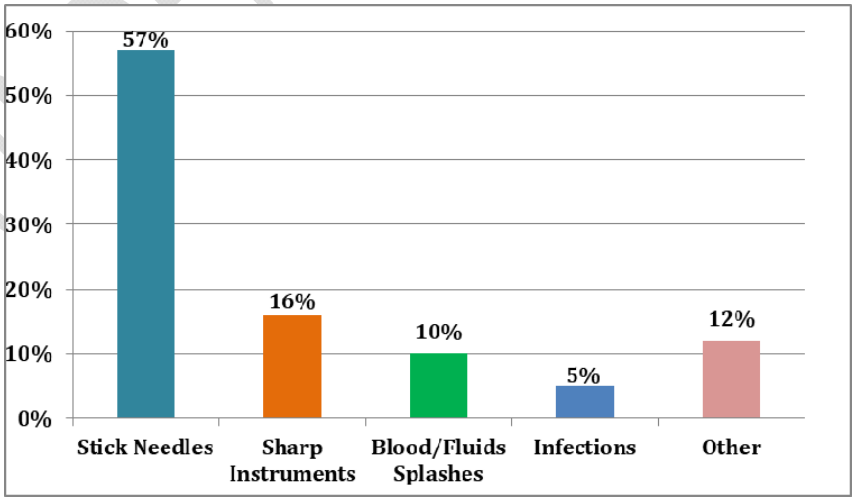

Figure (3): Knowledge Regarding The Causes of Work Accidents

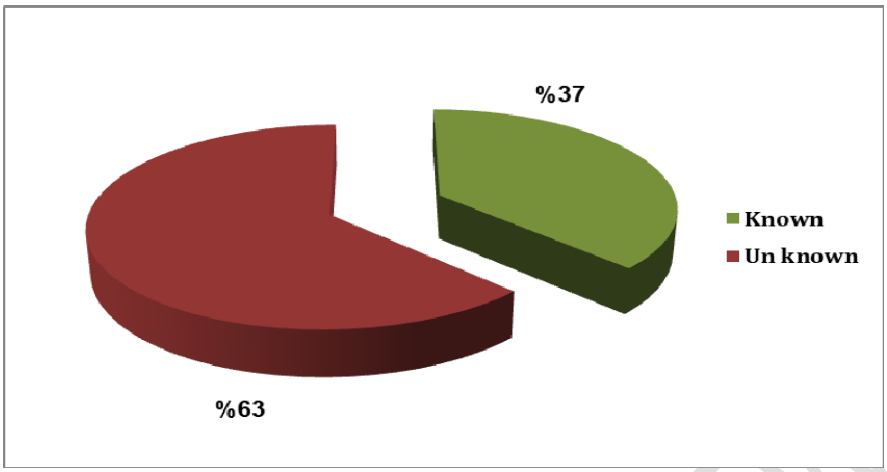

Figure (4)Awareness regarding Types of Renal Dialysis Machines

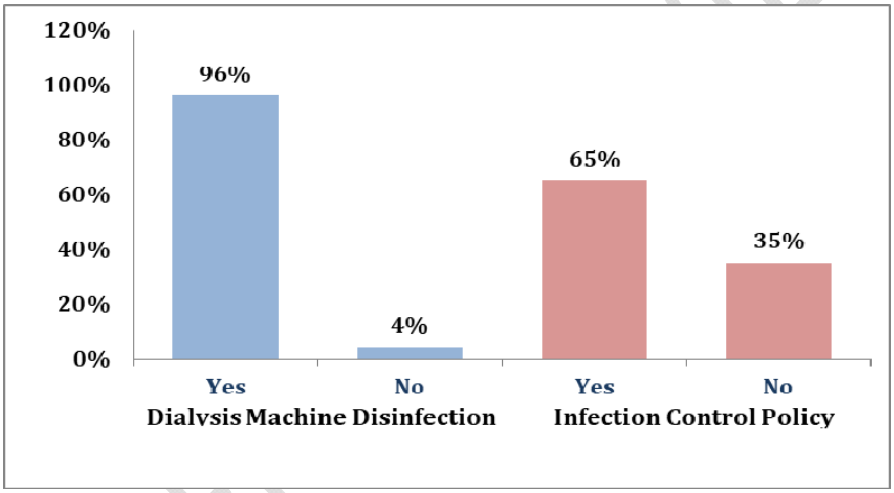

Figure (5): Disinfection of Machine and Infection Control Policy

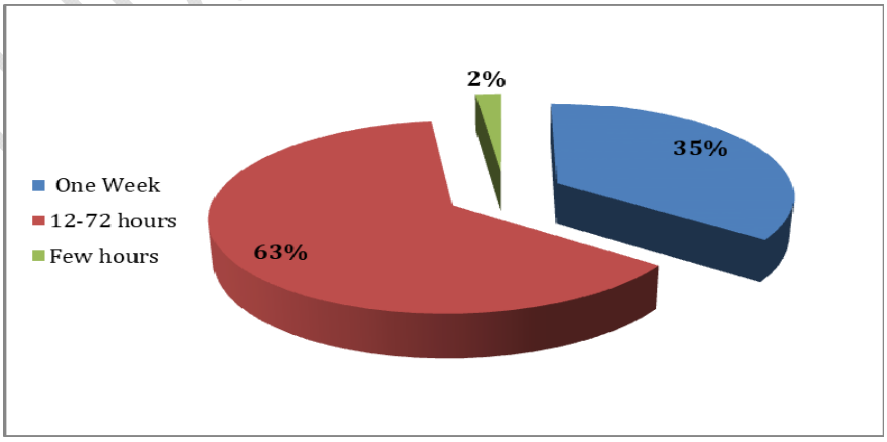

Figure (6) : The knowledge of the viability of hepatitis B virus on surfaces at room temperature

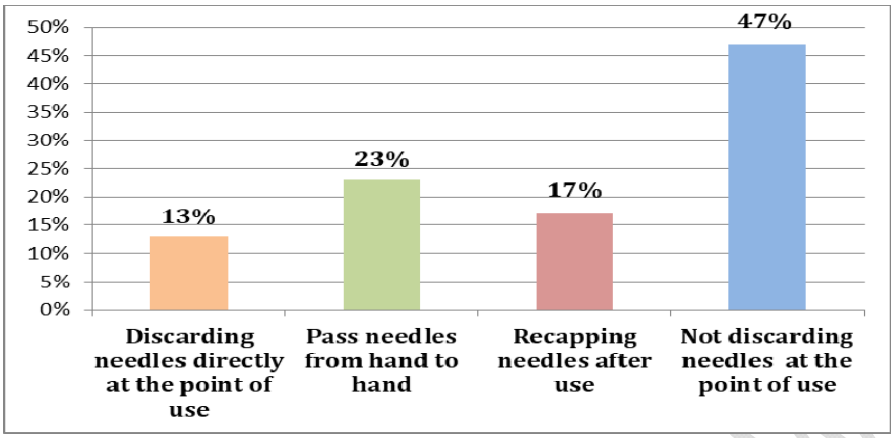

Figure (7): Practice of The Proper Handling of Needles

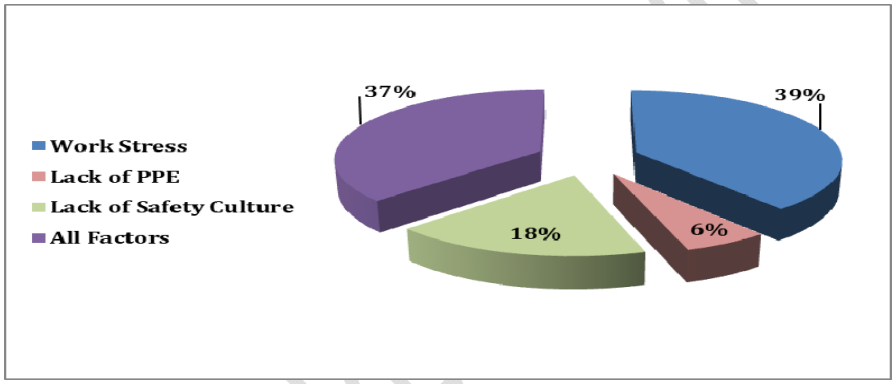

Figure (8): Knowledge Regarding The Factors of Work Accidents

Table (2): Association between Experience and Performing Duties

Working Years (Experience)	Immediate Dispose of any contaminated instruments/tools		Hand Hygiene Before and after Cross patients		Certain procedures with Patients (AIDs/Hepatitis)	
	Yes	No	Yes	No	Yes	No
0-5	24	2	25	1	12	2
6-10	7	2	9	-	21	8
11-15	9	4	11	2	5	-
16-20	2	-	2	-	1	-
>26	1	-	1	-	2	-

Total	**43**	**8**	**48**	**3**	**41**	**10**

Table (3): The Knowledge, attitude of Nurses regarding Infection Control Program in Renal Dialysis Unit

Infection Control Program	Frequency		Percentage%	
	Yes	No	Yes	No
ICP training before conducting the job	-	51	-	100
ICP training after conducting the job	27	24	53	47
A need for more ICP on regular basis	45	6	88	12
Presence of IC Guidelines/Policy	42	9	82	18
Supply IC Equipment				
Mask	45	6	88	12
Gown	20	31	39	61
Gloves	49	2	96	4
Eyewear	5	46	10	90
Caps	23	28	45	55
Biohazard Container & Sharp box	41	10	80	20
Hand Disinfectant	44	7	86	14
Machine Disinfectant	42	9	82	18
Hand Washing				
Before wearing gloves	15	36	29	71
After wearing gloves	12	39	24	76
After preparation of dialysis machine	9	42	18	82
Training to avoid needle stick injuries	39	12	76	24
HBV Vaccination (Nurses)	31	20	61	39
Serology Monitoring/Rescreening (for –ve Dialysis Patients)				
Monthly Interval	14	37	27	73
3 Months Interval				

6 Months Interval	7	44	14	86
	30	21	59	41

DISSCUSSION

More than 90% of nurses in this study reported being always wearing gloves when attending to patients and drawing blood samples as well as the changing of gloves between patients. However, it has been observe that non-negligible proportions of nurses ranging between (24%), (29%) and (18%) were not always adherent to hand washing practices. The practice of hand hygiene before and after any contact with the patient and patient's environment and after removal of gloves fall in category I level of evidence in preventing infection in healthcare settings and disagreed with CDC guidelines regarding hand hygiene in health sectors[2-4]. Although hand hygiene is the least expensive mean of preventing healthcare-related infections, the prevalence of sub-optimal practice has been, and is still high[5]. Failure to perform hand hygiene has serious consequences, including the negative effects on patients' health and their confidence in healthcare delivery. Nurses are well placed to support and express good hand hygiene techniques to inspiration culture change and hold hand-hygiene compliance at all levels in their healthcare organizations.

In this study also, the extent of nurses' use of personal protective equipment was unsatisfactory as (39%) reported always wearing gowns though performing their duties while (90%) of nurses were not always adherent to the use of eyewear. The evidence conducted by Bublitz[6] have presented that renal dialysis nurses are at significant risk of per mucosal (splash) contamination with increased likelihood of acquisition of major communicable diseases including HBV, HCV and HIV. For the prevention of the transmission of infections in hemodialysis units, the CDC recommends the wearing of gowns, face shields, eyewear or masks by health workers to protect themselves and prevent the soiling of clothing when performing procedures during which spraying or splashing of blood might occur[7]. Thus, Bublitz [6] emphasized that the availability of face shield/eye wear and their appropriateness to healthcare workers is of significant importance for adherence to their use. However, nurses in the current study reported that they were not wearing eye wear because of lack of provision.

The CDC guidelines recommend that all patients and healthcare workers in renal dialysis unit should be vaccinated for HBV. Dialysis machine and related peripherals could be a considerable source of viruses and bacteria transmission. These involve not only often touched surfaces, but also waste containers, blood tubing clipped to waste containers, and items placed machines such as dialyzer caps and medication ampoules [8,9]. Additionally, there is a significant probability that items used by patients or taken to patient's dialysis station could become

contaminated with body fluids and serve as a considerable source of infection to other patients either directly or by contamination of the hands of personnel [9]. In the current study awareness and practice of nurses of these recommendations was acceptable as the most of them informed that they continuously dispose in designated container used dialyzer line and dialyzer (91%) and bedside single use items (96%). In the other hand, still there is more than quarter of the nurses did not vaccinated against hepatitis B virus, although the most of nurses in this study that agreed they are at high risk of HBV and HCV infection and that protection with full dose of hepatitis B vaccine and following infection control guidelines is needed for their protection. This indicates that nurses at dialysis centre were at poor to average level of knowledge, attitudes and practices regarding their safety.

The report of nurses in this study regarding their compliance to the proper handling of needles in this centre was un acceptable. These practices can raise the risk of needle stick injury that is not infrequent in healthcare setting and may be responsible for the transmission of at least 20 different pathogens, so performing infection control guideline is of very significant in view of the absence of hepatitis C vaccine [10,11]. A study in Japan presented a 10% risk of transmission of HCV from a source patient with HCV PCR-positive blood following needle stick injury because of improper handling of needles[12]. These evidences suggest that occupational exposures will continue to occur in spite of improved methods of preventing exposure. Consequently measures to decrease risk taking behaviours in regards to these occupational exposures among nurses should be applied and regularly checked. This study also revealed that the common type of accident at work was needle sticks, and the reason of work accidents was work stress.

The findings of this study found Increasing positive knowledge and attitudes among the nurses with (0-5) years and (6-10) years rather than the other categories. This can result of up to date with information regarding hospital acquired infection due to recent graduation. Also it may be challenging to change safety culture and behaviours for workers with more years of experience and to change behaviour, it may take long period. There was no evidence can agree or argue this point of result.

The incubation periods of acquiring the infection with HBV or HCV is very long, ranging from 45 to 160 days for HBV and from 14 days to 168 days for HCV. Chronic HBV infection is usually asymptomatic and acute infection could be symptomatic in 10% of children and 30 to 50% of adults. Published studies recommends that HBV and HCV patients are capable to spread the infection even if no clear symptoms occur[13]. Patients with chronic infection with mutations in the precore region of the HBV genome that prevent the expression of HBeAg but

permit the expression of infectious virus has been defined. High titers of HBsAg have been detected in these patients despite the fact that they were HBeAg negative[14]. In the United States also, recent dialysis-associated outbreaks have occurred and HCV transmission most likely caused by inadequate infection control practices, mainly in situations when patients received dialysis immediately after an HCV-infected patient received dialysis. The CDC does not recommend using dedicated dialysis machines for patients with HCV, but recommends universal precautions and strict sterilization procedures for all dialysis machines [15]. Thus, it is clear that patients who are acutely infected may be hard to recognize. These patients could be a potential hazard of cross infection to healthcare workers and patients. Hence the CDC guidelines stated that all hemodialysis patients should be routinely tested on admission and on monthly basis afterwards [5,14]. Despite of this fact, (27%) of nurses correctly responded that hemodialysis patients should be tested for hepatitis B and C on monthly basis, strongly agreed testing patients on admission. This reflects the lower level of knowledge, attitudes and practices of nurses regarding the cross infection in some ways.

CONCLUSION

To sum up, most nurses have a lower level of knowledge, attitudes and practices regard infection control measures even though having an average efficacy of performance their duties. Hence, it is essential that Libyan Ministry of Health , medical education institutions and offices of infection control inside the healthcare settings do their best to inform the nurses and all the healthcare workers about the prevention of HAIs according to world standards and policies by way of academic courses, posters, and conferences as well as by implementing infection control policies. It is also essential to develop the knowledge of standard precautions, improve programs for HAI control, and hold training courses based on successful educational models. it has been detected that the nurses tend to be compliance with certain infection control practice than the others. Generally, the performance of nurses is acceptable but the intention is to reach best practice in all related areas. Training in infection control independently predicted better performance especially among those who received recent training. On job training in infection control should be frequent and emphasize on shaping nurses attitudes moreover to the delivery of comprehensive knowledge and standard practice. This agree with the CDC guidelines which advocates nursed education. The main component is hand hygiene and basic infection control practices during catheter accessing process (e.g., aseptic technique, masks, disinfection). Despite diversified results in other studies, Cheng et al.[16] pronounced a (40%) lower risk of hospitalization due to infection and a (51%) mortality reduction in patients with chronic kidney disease who received a multidisciplinary education prior to working in renal

dialysis units. We conclude that nurses education is a valuable tool in the prevention of HAIs. To advance this study, it also recommended that investigating a broader amount of dialysis clinics in other cities of Libya and/or maybe compare to other nations such as Europe and United states, can provide a comprehensive information about the infection control programs over the world.

Conflicts of interest

The author has no conflicts of interest to declare.

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