

T.R.N.C
NEAR EAST UNIVERSITY
GRADUATE INSTITUTE OF HEALTH SCIENCES

**INFECTION CONTROL PRACTICES OF THE NURSES WORKING AT
HEMODIALYSIS UNIT IN SAUDI ARABIA**

ABDULWAHAB ZAZA

**In Partial Fulfillment of the Requirements for the Degree of
Master of Nursing**

NICOSIA 2019

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Supervisor:

Prof. Dr. Candan ÖZTÜRK

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THESIS APPROVAL CERTIFICATE

The thesis study of Nursing Department graduate student ABDULWAHAB ZAZA with student number 20165022 titled **Infection Control Practices of the Nurses Working at Hemodialysis Unit in Saudi Arabia** has been approved with unanimity / majority of votes by the jury and has been accepted as a Master of Master of Nursing Thesis.

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Working at Hemodialysis Unit in Saudi
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Supervisor(s): Prof. Dr. Candan ÖZTÜRK

Year: 2019

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Date:

Signature: _____

ACKNOWLEDGEMENT

I hereby declare that the work in this thesis entitled **Infection Control Practices of the Nurses Working at Hemodialysis Unit in Saudi Arabia**, is the study of my own research efforts undertaken under the supervision of **Prof. Dr. Candan ÖZTÜRK**

My deepest thanks to **Prof. Dr. Candan ÖZTÜRK**, my supervisor, for her expertise, on-going support and mentorship during my research.

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ABSTRACT

Introduction: Hospital-acquired infection (HAI) is an infection that associated in an inadequate or vast scope because of infectious responses associated with the infectious agents or its contaminants in the hospital.

Objectives: Assess of hemodialysis nurses practices on infection control practices.

Methods: Descriptive study was conducted on the registered nurses who work in the Dr. Bassam Medical Center is a dialysis centers in Riyadh region at Saudi Arabia. Total sample who was agreed to participate is 130 hemodialysis nurses with multi nationality such as (Philippines, India, Saudi Arabia and Arabic countries), data were collected in October, 2018.

Results: Majority of nurses were female, the mean age were 27,4 years, nurses who not receive training outside the hospital reported higher score than others groups with statistical difference. There were statistical significance in the India nurses $15.4 \pm SD=1.5$, $p=0.23$, Arabic countries $7.7 \pm SD=1.2$, $p=0.001$, among receive training inside the hospital. There were statistical significance in level of education and hand washing .004, using surgical mask .023, use isolation gown.031 and level of experience.

Conclusions: Providing staff education and training programs, establishing effective investigation systems and applying regulations in the hospitals should help improve infection prevention.

1. INTRODUCTION

1.1 Problem Definition

Hospital-acquired infection (HAI) infection that associated in an inadequate or vast universe since of infectious responses associated among communicable causes or contaminants inside hospital at lowest through the two or three days after admitted to hospital or during a indicated period of three to ten days after discharge (Hamed , 2016).

Hospital-Acquired Infections (HAI), also known as nosocomial infections, are created by infectious; the maximum common types are bloodstream infection (BSI), Ventilator-Associated Pneumonia (VAP), Urinary Tract Infection (UTI), and Surgical Site Infection (SSI) (Woeltje et al, 2014). Hospital acquired infections are predictable to a high period as a critical cases interrupt the quality of health-life and a main source of affect patients care (Cornejo-Jua'irez, 2015).

Hospital-acquired infections (HAIs) are associated with increased attributable mortality, prolong of stay in the hospital, and healthcare costs acquired by patients and healthcare services (Yang C-Cet al, 2011). Hospital-acquired infections are an increasing problem at every level of the healthcare system. World Health Organization assessed it is interrupts most of communities international and main worldwide problem for patient safety (WHO, 2011).

Hospital-acquired infections establish a critical international community wellbeing experiment, instigating affecting around 1.4 million persons crossways the domain at slightly assumed period (WHO 2012). In additional, it is rise budgets of well-being repair on together patients and fitness facilities (Kim et al, 2013). HAIs are avoidable as it is reported that agreement among policy importantly decreases both the frequency and amount of infections (Pittet et al, 2014).

The World Health Organization (WHO) "Report on the Burden of Endemic Health Care-Associated Infection Worldwide" specifies that, in great-revenue nations (HIC; uncultured nationwide revenue each capita \$12,736) (WHO, 2011).

The contamination could be spread by several resources to the susceptible to clinical patient settings. That reflected might contain diseased staff & patients, and unclean tools, air droplets or bed linen, the foundation of the contamination and originate from the external situation, or anther bases that cannot be indomitable, or after a surgery that negotiations the defensive skin block (Amin et al, 2018).

Chronic hemodialysis patients are the maximum risk for contamination since the way of hemodialysis includes vascular admission for progress time. In this situation several patients become dialysis concomitantly, recurrent chances occur person-to-person spread of communicable agents, directly or indirectly by dirty maneuvers, tools and materials, conservation outsides, or hands of personnel (Pittet et al, 2012).

Hemodialysis patients are immunosuppressed which indication to rises their vulnerability to contamination, need hospitalizations and surgery, that upsurges their chances for contact to nosocomial infections. Hemodialysis connected with augmented danger of healthcare-associated hepatitis C virus (HCV) and hepatitis B virus (HBV) infections (Archibald et al, 2011).

The occurrence and the incidence of end stage renal disease (ESRD) has augmented in last 2 period by 15-20 in Saudi Arabia; the incidence of ESRD is 753 per million peoples with an annual occurrence of 172 per million peoples (SCOT, 2011).

The prevalence of infection in dialysis unit in different geographical locations in Saudi Arabia was reported in 1995 to be ranging from 42-87% (Huraib et al, 2015). Epidemiologic results secondary hemodialysis-associated HIV spread related by directly experiential or consistently stated indication of gross interruptions in IPC practices (Mashragi et al, 2014).

The increased risk of Hospital-acquired infection among hemodialysis patients are mostly outstanding to resistant cooperated vigorous; recurrent and lengthy blood contact throughout hemodialysis actions through the vascular admission and extracorporeal route (with several harbors and influences); handy closeness to extra patients through management in the hemodialysis capability; common interaction with healthcare provider who regularly change among patients and equipment; recurrent hospitalization and surgery; and greatest highly and non-observance or a disruption in application of suggested performs, counting hand cleanliness and practice of personal protective equipment (Karkar, 2016). Inadequate infection control methods in the hemodialysis units and the suppressed immunity of patients may also increase the risk (Elamin et al 2015).

Nurses play various roles which depend on the patients' needs at the moment. They fulfill their roles in the closest and most intimate contact with the care receiver, which means that the quality of nurses' work has direct impact on the overall quality of care a patient receives (Agnieszka et al, 2015).

Actual application of infection control practices is vital to regulatory the spread of HAIs in situations through great contamination amounts. A recent meta-analysis establish that more 95 % interference agreement is obligatory to decrease central line-associated bloodstream contaminations (Furuya et al, 2011).

The United States Centers for Disease Control and Prevention (CDC) planned a sequence of events for avoiding work-related contacts, falling danger of spread of blood-borne pathogens, and management possibly communicable resources such as blood and body liquids (Azap et al, 2015; Reda et al, 2010). In an exertion to controller hospital-acquired infectious disease occurrences, many events might be practice, occasionally in mixture, and contain improved cleanliness, separation of septic patients, registering of suitcases and nurses, guest limitations, and area closings (Harris JP et al, 2014;Greig et al, 2012).

Determination the level practices of nurses on infection control practices precautions risks and prevention may be useful in improving preventive strategies for this public health problem and the quality of care in hospitals. However a there were a few studies in Saudi Arabia among this subject. There is a need to increase awareness of nurses on infection control risks and prevention to avoid complications.

1.2 Research Questions and Goal(s):

In this thesis, the researcher will explore the practice of infection control practices precautions among hemodialysis nurses. Growing evidence suggests that nurse staffing affects the quality of care in hospitals. The aim of the study is evaluate of the practices of infection control practices among hemodialysis nurses. Study questions include followings:

- What is the level of hemodialysis nurses practice of infection control practices?
- Is there any difference between descriptive characteristics and practice on infection control of hemodialysis nurses?

2. BACKGROUND OF THE STUDY

2.1 Definition of Chronic Renal Failure

Chronic kidney disease has develop a main community wellbeing problem universal more the previous periods (Samy et al, 2012). Chronic renal failure is a disorder that a harm of kidney role more a time of months or years. Dialysis cannot completely perform lost kidney function, but, to some extent, manages its activities by means of diffusion and ultrafiltration (Lee et al, 2017). Chronic renal failure it be detected by assessing serum creatinine levels, which are a derivative creation of muscle protein. (Sabitha et al, 2017). Glomerular filtration rate (GFR) of the patient beads to <60 mL/minute and the albumin-to-creatinine ratio of patient's urine turn into >30 mg/g (Amjad et al, 2016). The mortality rate is level extra noticeable in earlier patients against healthy complements, between their initially year of dialysis care. Only 35% of hemodialysis patients can supposed to live for a 5 year time (Port et al, 2013).

2.2 Complications of Hemodialysis

Hepatitis C virus (HCV) infection is a critical issues in care hemodialysis patients whom are at specific great danger for blood-borne infections since of lengthy vascular access and possible for contact to dirty tools (Yuqiang et al, 2011).

The occurrence of Hepatitis C virus between dialysis patients is commonly abundant advanced than fit blood donors and overall peoples. Study detained in dialysis centers from diverse nations exposed that occurrence varieties form 1-84.6% and there is a specific worry since Hepatitis C virus long-lasting contamination reasons important illness and death amongst patients suffering hemodialysis (Khan et al, 2013).

Danger influences for Hepatitis C virus in dialysis patients contain amount of blood transfusions, length of hemodialysis, and style of dialysis, occurrence of hepatitis C virus in the dialysis unit, preceding structure relocation, intravenous drug usage, gender, elder age, and nosocomial spread of hepatitis C virus in hemodialysis units (Nicolardi et al, 2010).

2.2.1 Bacteremia in Hemodialysis

Infection is a main reason of hospitalization in hemodialysis patients. In the United States, contamination remained experiential in about 30% of all hospitalizations of hemodialysis patients (Dalrymple et al, 2015). Hemodialysis patients have advanced degrees of bacteremia, while peritoneal dialysis patients have advanced degrees of peritonitis (Romano et al, 2016).

A population-based cohort study in Denmark presented that the occurrence of bacteremia was 13.7 per 100 person years in hemodialysis patients, while that in the overall peoples was 0.53 per 100 person years (Skov et al, 2016).

In the investigation of the reasons of hospitalization for contamination, the principal reasons of hospitalization for contamination were dialysis access or central venous catheter-related infections 30%, bloodstream infections or sepsis 24%, and pulmonary infections 22% (Dalrymple et al, 2016).

On a large cohort of Canadian HD patients, they establish a direct link among the danger of humanity and detachment from the contiguous nephrologist and this connotation was sturdiest for death owing to infection (Tonelli et al, 2012). The practice of tunneled central venous catheters (CVC) for dialysis vascular access donates to this HD-related illness and death (Stephanie et al, 2017).

2.2.2 Respiratory Infections in Hemodialysis

Pneumonia is the second extra mutual reason of plain contamination in the hemodialysis patients, pneumonia linked death amounts 14-16 times advanced in hemodialysis patients (Sarnak et al, 2012). The greatest mutual reason of pneumonia in hemodialysis patients are pneumonia of public, mostly by *Streptococcus pneumoniae*, influenza and bacterial pneumonia (Dinits-Pensy et al, 2013). Recent strategies endorse vaccination of all hemodialysis patients and revaccination after 5 years (Robinson, 2012).

2.2.3 Tuberculosis in Hemodialysis

The danger of lively tuberculosis is augmented in hemodialysis and frequently tuberculosis is articulated as temperature of unidentified source or is situated additional pulmonary (Chuang et al, 2012). CDC indorses that patients must be established with tuberculin skin test (TST), since of faulty cellular protection, TST is measured positive if the skin in length is greater than 5 mm in diameter (Eleftheriadis et al, 2011).

2.3 Standard Precautions of Hospital Acquired Infection

According to the Centre for disease control (CDC), healthcare workers must institute standard hand washing procedures before attending to each patient also recommends routine use of alcohol-based hand rubs before or after contact with patients, after contact with body fluids, and before performing invasive procedure on patients (WHO 2009). Infections acquired through poor hand hygiene among health care workers caring for these patients has been documented to be among the major causes of such infections (Larson EA 2013).

In Switzerland, (Pitet et al, 2012), found poor hand hygiene among doctors compared with nurses even after intervention, and soap and water were commonly used. Similarly, (Kingstone et al, 2017) reported non-availability and poor acceptability of alcohol-based hand rub among the major barrier to its use among Irish doctors, and as of 2015, only 86% of the doctors studied were compliant with hand hygiene. In Italy, (Chittaro et al, 2013) found a very low (less than 30%) overall compliance rate among health care worker's following the introduction of alcohol-based hand rubs.

Contamination anticipation and control performs has remained established to avoid and regulator hospital-acquired infections amongst patient's and nurses. Infection control is confidential into standard precautions SPs and expanded precautions (EPs). SPs are applied in all patients notwithstanding of their findings. SPs comprehend hand hygiene, fitting conduct of corporal solutions and waste, and anticipation of damages with high-pitched matters. In contrast, EPs are practical in detailed circumstances contingent on the manner of disease spread (WHO, 2012).

Effective contamination anticipation needs continuous achievement at all heights of the health-care organization counting officials, capability directors, healthcare workers, (WHO, 2016). Teaching, observing, enhanced obtainability of capitals and corrective procedures for reduced agreement are mandatory to advance contamination practices in hospitals (Stein et al, 2013).

Personal protective equipment, commonly called as “PPE,” mentions to a diversity of obstructions and ventilators rummage-sale unaccompanied or in mixture to defend lubricated membranes, airways, skin, and clothing from interaction with communicable causes. The choice of appropriate PPE is created on the countryside of the patient communication and the probable styles of program of illness; individual defensive tools contains gloves, separation gowns, masks, goggles, face shields, and respiratory protection (Siegel J et al, 2017).

A new study review exposed that only one study, held in 2012 at the King Faisal University, Al-Ahsa, Saudi Arabia, has inspected information of SPs amongst Saudi-Arabian medical students in their scientific years. Informed that members’ information was little, and that self-directed knowledge and familiar bedside performs were the chief foundations of information (Amin et al, 2013).

Amongst the several issues accountable for sustained upsurge of HAIs in hospitalized patients are: deprived resistant rank of patients; excesses of age, usage of medical events and/or aggressive methods/strategies, appearance of drug-resistant bacteria and congestion in hospitals (Vinc et al, 2010). Reduced contamination regulator performs enable spread. Study establish that hand wash, teaching, breast-feeding, appropriate nutrition groundwork, individual cleanliness, information of dangerous performs, vaccination, communication with community health administrators once infection happens and break of fecal-oral feast are all vital for suppression of HAIs (Saka MJ et al, 2011). Deprived care to cleanliness, congestion, absence of an actual Infection Control (IC) program and lack of educated IC wage-earners stated as causal influences to the program of HAIs (Emily, 2011).

Several contaminations are avoidable finished submission with indication-grounded contagion control approaches. Nurses’ obedience with regular defenses, including hand hygiene, devotion to sterile methods, and practice of individual defensive gear container contributory in avoiding the extent of contaminations amongst patients and providers (Kenneley , 2012).

Deprived obedience with IC performs may trunk from information shortages and arrogances, counting apparent blocks such as absence of period, the intelligence that defensive apparatus inhibits with effort presentation, tools readiness, or patient uneasiness (Efstathiou et al, 2011).

Informed issues remained absence of information, deficiency of time, deficiency of means, harmful effect of the tools on nursing services, rough tools, skin annoyance, and deficiency of teaching (Oliveira et al, 2010).

Obedience was establish insufficient about hand hygiene strategies, usage of gloves when contact to body liquids was expected, eye defense, mouth and nose protection, tiring a gown when obligatory, circumvent recapping the needle after it was practice for a patient, and facility of care since all patients as possibly communicable (Kermode M et al, 2015; Stein AD et al, 2013; Chan R et al, 2012).

2.4 Prevention and Control of Infections in Hemodialysis Units

Infection is the greatest public source of hospitalization and the second greatest public source of mortality amid hemodialysis (HD) patients. Causes of infections might be unclean water, tools and ecological outsides in the action range and patients with contaminations who position a danger to other close patient's existence preserved in the dialysis unit (Ayman Karkar 2018).

Infection control in dialysis units remnants the greatest vital amount to keep a healthy situation and to inhibit and evade distribution of infection amid immunocompromised patients. Unclean healthcare worker hands are amongst the greatest public manners of communication of healthcare-associated infections (Pittet et al, 2012).

The obvious augmented possible for spread of infections in the HD situation controlled to the formation and operation of explicit and severer infection anticipation and control events in adding to the typical standard precautions (Karkar 2016).

2.4.1 Hand Hygiene

Hand hygiene is singled out as the greatest significant infection anticipation interference. However, the obedience proportions of HCWs in hand hygiene is identical poor, with a general regular of only 40% (Boyce et al, 2012). Studies presented that the chief way of spread of HAIs is via the rapidly unclean hands of the HCW (Bauer et al 2013; Bhalla et al 2014).

The great number of periods an HD operate is obligatory to accomplish hand hygiene might be a purpose for deficiency of obedience. However, obedience can be enhanced by incessant teaching and management, and by providing, in suitable settings, an adequate number of basins with soap machines, paper towels, and hand creams and alcohol-based hand rubs sited at each patient position (Siegel et al, 2015).

Other protective methods contain limit of consuming extended nails and tiring of false fingernails or extenders by health-care personnel who deliver straight patient precaution, as false nails might port gram negative bacilli and molds (Pottinger et al 2013; Lin et al 2010).

Checking hand hygiene obedience is vital, and straight remark is the present gold standard technique. However, straight remark has some restrictions, with existence employment intensive, minor trial size (may cover only 1% of total hand hygiene activity) and not standardized (Karkar et al 2014). It can facilitate the work of the Infection Preventions (IP) by footage the explanations, which can be overloaded to an outshine database for complete investigation.

Performance the hand hygiene finished device or wristband discovery, with suggestion of the period of day and day of the week hand hygiene is achieved and uniform deliver response/ prompting to inspire appropriate hand hygiene (Hedderwick et al, 2013).

2.4.2 Cleaning and Disinfection of Environmental Surfaces

In the health-care situation, uncleanness of conservational exteriors with several pathogens and the perseverance of these pathogens on exteriors (Dietze et al, 2011). Can be a significant and recurrent foundation of spread of communicable mediators through the recurrent hand poignant of HCWs (Cataño et al, 2012).

Microorganisms can persist on conservational exteriors for variable phases of time, reaching from few hours to days and months. Little fever, great moisture and great inoculums kindness the extended perseverance of pathogens on lifeless exteriors (Kramer et al, 2012).

In order to avoid and control the feast of ecologically conveyed pathogens, scrubbing and fumigation of the exterior outsides of tools (i.e., HD appliance, dialysis president or bedstead, technique trolley) and additional ecological exteriors confidential the HD units, particularly those that are regularly affected by patients and team, must be achieved among all patient actions (Vanholder et al, 2012).

The submission of resistance throughout washing is highlighted as around organisms like *C. difficile* are not effortlessly deactivated by greatest superficial antiseptics (excluding lighten) and involve exclusion by resistance (Siegel et al, 2014).

2.4.3 Cleaning and Disinfection of External Surfaces of HD Machines

It is suggested to spotless and sterilize the exterior exteriors of the HD mechanism afterward individually dialysis meeting (Kampf et al, 2011). Little-equal antiseptic or slightly EPA-registered antiseptic explanation branded for usage in a health-care situation is suggested to be used on non-critical substances (counting HD equipment), and would also be in agreement with the device producer's endorsements (Rutala et al, 2008).

The occurrence of bio-burden will decrease the murder/deactivating result of antiseptics. Therefore, if noticeable blood tumbles or other communicable substantial is current on the exterior superficial of an HD appliance, it would be gutted distinctly previously smearing the antiseptic explanation. In such cases, it is suggested to usage and transitional-equal antiseptic or tuberculocidal cause (with exact brand dues for HBV and HIV) or a 1:100 watering of a hypochlorite solution (Shimokura et al, 2012).

If expenditure antiseptic spreads, one spread must be used to wholly hygienic the blood dye shadowed by additional spread(s) for sterilization. All exterior exteriors of the appliance, particularly the regularly affected obverse board, counting the intravenous opposite, the side, back and improper, would be methodically prepared and sterile using resistance and be permissible to air dry (Edel et al, 2012). All used towels or spreads and gloves that are dirtied with lifeblood must be rejected in a biohazard discarded ampule, and hand hygiene achieved later glove exclusion (Lin et al, 2010).

2.4.4 Disinfection of the Internal Fluid Pathway of Hemodialysis Machines

The CDC and APIC strategies do not recommend the decontamination of interior liquid ways of “single-pass” HD equipment among patient usages, excluding once a blood escape occasion happens. Routine sterilization and cleaning is suggested at the commencement or completion of the day (or as suggested by the device’s producer) (Tordoir et al, 2014). The EBPG indorses routine sterilization of the HD-proportioning device later respectively dialysis gathering also by heat or a chemical mediator (Rutala et al, 2013).

Chemical sterilization proprietary to patient use is suggestions for standby device, which might be inefficient, for changing duration of time and possibility expand bacterial development, The chemical sterilization organizer, should be award to the device industrialist suggestions, inclusive the condensation and dwell time (Shimokura et al, 2013).

2.4.5 Cleaning And Disinfection Of Auxiliary Equipment

Auxiliary tools utilized, in HD may inclusive reusable pitcher for blending bicarbonate settlement, reusable wick pail and exterior compression transducers. As per suggestions, any reusable clause must be wash out and sterilization proprietary to existence used on other patient, and exterior compression transducers must be varied amidst patients’ uses (Tordoir et al, 2014)

Nowadays, numerous units have transfer to utilize the more healthy automated operation of blending bicarbonate dust, in cartouche on the person device, eliminating the use of reusable bicarbonate pitcher. If bicarbonate resolution in a pitcher is applied, any “leftover” settlement must be outcast and opened pitcher must not be applied after 24 h in order to sodium bicarbonate settlement fashion a good media for bacterial development (Rutala et al, 2011).

Reusable wick pail are now hardly utilized as most dialysis corporation contain a handy elementary gathering handbag in each tuft of antiseptic bloodline collection and also with pre-attached exterior compression transducers (Edel et al, 2012). With amended and best technology in several of the fresh models of HD instrument, elementary gathering bags or transducer keeper are not even demand, because discharge of wick solutions can be done by connecting the bloodline to a drainage port in the machine and blood pressure sensors are completely non-invasive without using transducer connections and protectors (Siegel et al, 2014).

3. METHODOLOGY

3.1 Study Design

The study was planned with descriptive design.

3.2 Study Setting

The study was conducted at Dr. Bassam Medical Center is a dialysis centers in Riyadh Region at Saudi Arabia, it is provide hemodialysis care for all patients undergo kidney disease. It is consist from five central nursing station hemodialysis care, and operation center among kidney Transplant. The Dr. Bassam Medical Center that contain for each central nursing station 25 beds with full equipment, and Out-Patient Clinics that contain with seven clinic (General Medicine Clinic, Nephrology Clinic, General Surgery Clinic, Vascular Surgery Clinic, Transplantation, Interventional radiology, Dental Clinic). The daily shift hours among this center it is divided into two shift (morning and night shift), for each shift 12 hours with 20 nurses. For each week around 170 – 200 patients treated with hemodialysis with different age. To prevent language barriers between nurses and patients during treatment the center provides three specialist translator for each shift.

3.3 Sample Selection

The study were performed on the hemodialysis nurses who work in the Dr. Bassam Medical Center. A total of 150 nurses work in the Dr. Bassam Medical Center. 20 nurse's refuse to join our study with different reasons. So the total sample who accept to participate it were 130 hemodialysis nurses. In this center they have nurses with multi nationality such as (Philippines, India, Saudi Arabia and Arabic countries), the distribution of them regarding their nationality it was (44 Philippines, 25 India, 61 Saudi Arabia and 20 from Arabic countries). All of the nurses who work in this center they use the English language as first language to commutation between them during work. The patient- nurse's ratio were 2:1. No sample size selection were performed among this study we cover all nurses who work in hemodialysis unit.

3.4 Study Tools

A questionnaire that was developed by (Omar 2013). Reliability coefficient was 0.83. The questionnaire contained 2 sections. The first section regarding for demographics characteristics of nurses and included 9 questions. Nursing characteristics data were collected using a characteristics data sheet. Characteristics data included age, gender, nationality, level of education, experience and receiving infection control training, is there any infection control nurse and manual. The second section consisted 29 questions regarding the Infection control -Practices Tool. The 29 items of the Infection control -Practices Tool with different statement such as (practices, preventions), with rated using a 5- point Likert scale with scores ranging from never to always, the Never answer present number (1), Rare (2), Sometime (3), Most of the time (4), Always (5). In additional, Never answer reflect the lowest percentage, always answer reflect the highest percentage. There were two items (26, 28) reflect the negative statements. To calculate Infection control -Practices compliance, the researcher sum all answer were selected in always option and divided by total items number and multiple by one hundreds presents, Total practice scores range from 29 to 145, with higher total scores reflecting greater compliance with standard IC practices (Omar 2013; Paudyal et al, 2008).

3.5 Data Collection

A pilot study will performed on ten nurses. After the pilot study, questionnaire was revised for clarity. Before distribute the survey the researcher explain the nurse's aim of study and why conducted this study and inform them all data will keep confidential, also they have right to withdrawal from study without explanations the reasons. After agreed from who will attended the researcher started to collected data in October 2018. The researcher inform them after completion to put the questionnaires inside box. The box were found in nurse's station, also to be the data more secret, the box were locked and the key only with researcher. The researcher took three weeks to collect all questionnaires. All voluntary nurses will reject from study. Completion of the questionnaire will take almost 20 minutes.

3.6 Analysis of data/results:

For analyzing data, data was analysis with statistical specialist. The methods used to analyze the data include an analysis of descriptive statistic variables such as frequency and percentages for the categorical variables. The (ANOVA) test was done to determine the differences. When findings statistic was significant, t h e chosen level of significance is $p < 0.05$.

3.7 Ethical Aspect

After approval from the Near East Institutional Reviews Board (IRB) of Near East University Hospital (Appendixes 4) and approval from author via email to use his tool (Appendixes 5), and approval from Dr. Bassam Medical Center to conduct the study (Appendixes 3).

4. FINDINGS

Table 4. 1 Sociodemographic Characteristics of the Hemodialysis Nurses

Nurses characteristics	N	%
Gender		
Female	78	62.3
Male	52	37.3
Nationality		
Philippines	44	29.8
India	25	15.2
Saudi Arabia	61	46.9
Arabic countries	20	8.1
Age group		
20–30	36	27.6
31–40	82	63.4
41–50	12	9.0
Level of education		
Diploma	17	8.4
Bachelor	105	87.7
Master	8	3.9
Experience		
<2 years	14	7.3
≥2 years and <5 years	88	75.9
≥5 years and <10 years	28	16.8
Receiving infection control training inside the units?		
Yes	99	82.3
No	31	17.7
Receiving infection control training outside the hospital (Saudi health care provider center)		
Yes	44	33.8
No	86	66.2
Is there any infection control nurse in the units??		
Yes	115	92.4
No	15	7.6
Do you have an infection control manual in the unit?		
Yes	87	82.1
No	43	17.9

In Table 1. The final total rating sample were 85%, with mean age 27.4 years, most of nurses were female 62.3%. The Saudi Arabia nurses were the highest participate with 46.9%, followed by Philippines 29.8%. The majority of the nurses receive bachelor's 87.7%. Regarding level of experience most of them in groups 2-5 with rate 75.9%, more than two third of them receiving training inside the hospital, only 33.8% gotten training outside. Finally, approximately 92.4% of overall knew there is infection control manual and nurse 82.1% in the hospital.

Table 4. 2 Percentages of Infection Practices by Hemodialysis Nurses

Items	Never		Rare		Sometime		Most of the time		Always	
	N	%	N	%	N	%	N	%	N	%
I wash my hand before and after giving care to patient	0	0	0	0	6	2.1	26	16.8	98	81.1
I wash my hand before and after using gloves	0	0	0	0	11	3.3	48	38.6	71	58.1
I wash my hand after dealing with blood, body fluid, body secretions and contaminated tools	5	2.0	7	2.3	13	5.7	40	24.6	65	50.0
I wash my hand with antiseptic solution contains Iodine after performing nursing interventions that may lead to spread of blood or body fluids	15	9.3	5	2.0	46	36.7	19	15.4	45	36.6
I wash my hand with antiseptic solution after removing gloves after giving nursing care to patients who are under contact precautions	2	0.1	9	3.9	31	24.8	40	32.7	48	38.6
I use eye protection to protect my eyes when I perform activities or nursing care that may lead to the spout of blood and body fluids	66	52.9	12	7.4	20	17.1	25	20.3	7	2.3
I use surgical mask when I perform activities or nursing care that may lead to spray of blood and body fluid	13	5.7	7	2.3	4	1.8	48	38.6	58	51.6
I use surgical mask when giving care to patients who are under droplet precaution with a distance not more than 90 cm	4	1.8	5	2.0	4	1.8	38	26.6	77	67.8
I use surgical mask when I enter patients room who are infected with Chickenpox and measles	0	0	0	0	5	2.3	15	6.1	110	91.6
I use isolation gown when giving care or performing activities that may lead to spout of blood and body fluid	2	0.1	5	2.0	4	1.8	24	20.1	95	76.0
I use isolation gown when entering patients rooms who are under contact precautions	0	0	5	2.0	5	2.0	15	6.1	105	89.9
I use two pairs of gloves (Double Gloving) when doing procedures and nursing activities for patients infected with contagious diseases through the blood such as hepatitis type 'B' and AIDS	4	1.8	7	2.3	13	5.7	48	38.6	58	51.6
I use gloves when I enter isolation rooms for patients who need contact precautions and take the gloves off before leaving the room	11	3.3	9	2.6	25	20.3	31	24.8	54	49.0
I use gloves before touching any different body wounds of patients	20	17.1	5	2.0	6	2.1	28	21.8	71	57.0
I use gloves before contact with any mucus membrane	4	1.8	7	2.3	13	5.7	58	51.6	48	38.6
I inform other departments before transfer patients who need droplet precautions	0	0	0	0	5	2.0	10	3.1	115	94.9

Items	Never		Rare		Sometime		Most of the time		Always	
	N	%	N	%	N	%	N	%	N	%
I put on face mask for patients with diseases spread by droplets or spray during the process of their movement or transfer	4	1.8	7	2.3	11	3.3	24	20.1	84	72.5
I separate patients with diseases spread by droplets or aerosols away from each other a distance of not less than 1.5m	4	1.8	5	2.0	15	6.1	22	19.8	82	70.3
I isolate patients with diseases spread by droplets or spray in private rooms	0	0	3	0.4	18	11.4	19	15.1	90	73.5
I isolate patients with diseases transmitted through the air (Airborne Spread Disease) in private rooms equipped with negative pressure system	6	2.1	3	0.4	17	7.4	22	19.8	82	70.3
Permanently, I close doors of rooms of patients with diseases transmitted through the air	9	2.6	7	2.3	24	20.1	35	25.1	55	49.9
I inform other departments before transfer patients who need Airborne precautions	11	3.3	9	2.6	25	20.3	31	24.8	54	49.0
I put on face mask for patients with diseases spread by air during the process of their movement or transfer	2	0.1	5	2.0	5	2.0	15	6.1	105	89.9
I isolate patients who are under contact isolation in a special isolation room	4	1.8	5	2.3	8	2.8	12	3.6	101	89.5
I inform other units before transferring patients who are under contact precautions	7	2.3	4	1.8	13	5.7	48	38.6	58	51.6
I use patients' tools and equipment with other patients who need contact precautions*	71	57.0	28	21.8	6	2.1	5	2.0	20	17.1
I sterilize all shared equipment that used among patients who need contact precautions	7	2.3	12	7.4	25	20.3	20	17.1	66	52.9
I perform needle recapping for needles and blade before discarding it*	77	67.8	38	26.6	4	1.8	5	2.0	4	1.8
I protect myself with Hepatitis B virus vaccine if it is available free of charge at the hospital.	15	9.3	5	2.0	45	36.6	19	15.4	46	36.7

Table 2 showed infection control practice, Majority of nurses answered that they always wash their hands before and after giving care to patients 81.1%. Half of them 50.0% wash their hands after dealing with blood, body fluid. Related using surgical mask when I enter patient's room who are infected with chickenpox and measles with rate 91.6%. About two third 76.0% using isolation gown when their performing activities that may lead to spout of blood and body fluid, of nurses 94.9% always inform other departments before transfer patients who need droplet precautions, around one fourth 20.1% most of the time put on face mask for patients with diseases spread by droplets or spray during the process of their movement or transfer. 67.8% reported never perform needle recapping for needles and blade before discarding it. 20.3% of them answer sometime sterilize all shared equipment that used among patients who need contact precautions.

Table 4.3 Association between Nurses Education and Infection Control Practices

	Yes	No	t (df)	p value
	M \pm (SD)	M \pm (SD)		
Receiving infection control training inside the units?	55.4 \pm 4.7	22 \pm 2.3	2.9 (129)	0.91
Receiving infection control training outside the hospital	33.2 \pm 2.8	57 \pm 5.7	1.7(122)	0.05
Is there any infection control nurse in the units?	58 \pm 5.9	6 \pm 1.2	3.1 (129)	0.87
Do you have an infection control manual in the unit?	54 \pm 4.4	33 \pm 2.6	2.7 (128)	0.77

In Table 3 (T test). Nurses reported who getting training inside the hospital that get higher score than other group 55.4 SD = \pm 4.7, while, nurses who not receive training outside the hospital reported higher score than others groups with statistical difference 57, SD = \pm 5.7, $p=0.11$. Regarding knowing among infection control nurse that they showed highest score 58, SD = \pm 5.9. Also related found an infection control manual they report 54, SD = \pm 4.4, without statistical difference.

Table 4.4 Association of Nurses Characteristics Data with their Infection Control Practices

	Characteristics data		
Mean & SD Infection Control Practice points			p value
1	Gender		
	Female	55.1 ± 4.5	0,96
	Male	42.9 ± 3.2	
2	Age group		
	20–30	33.6 ±2.7	0,74
	31–40	61.4 ±5.7	
	41–50	45.7 ±3.9	
3	Level of education		
	Diploma	24.1 ± 1.5	0,15
	BSN	47.6 ± 4.1	
	MSN	34.4 ± 2.9	
4	Experience		
	<2 years	45.5 ±3.7	0,45
	≥2 years and<5 years	65.4 ± 6.4	
	≥5 years and<10 years	55.1 ± 4.5	

Table 4 showed compare between demographic data and infection control practices, Kruskal–Wallis test were performed. Female nurses reported higher score than male nurses 55.1, SD= ±4.5. Related Age group, 31–40 group showed higher score than other age groups 61.4, SD = ±5.7. Although diploma nurses were repot lower score 24.1, SD = ±1.5, p= 0, 15. Among experience groups, nurse within 2 and 5 years that get highest score 65.4, SD = ±6.4.

Table 4.5 Association between the Levels of Education, Experience, Age group with general knowledge on Infection Control Practice

	Level of education				Experience				Age group												
	Diploma		BSN	MSN		<2 years	≥2 years and<5 years	≥5 years and<10 years	20–30	31–40	41–50										
	Always				Always				Always												
	N	%	N	%	N	%	P Value	N	%	N	%	N	%	P Value							
I wash my hand before and after giving care to patient	15 (22.1)		57 (45.2)		7 (13.8)		.004	9 (11.1)		72 (48.3)		17 (21.6)		.234	23 (15.4)		42 (45.8)		33 (19.9)		.112
I use surgical mask when I enter patients room who are infected with Chickenpox and measles	23 (33.1)		80 (52.1)		7 (6.4)		.210	45 (51.1)		39 (23.4)		26 (17.1)		.,023	11 (23,3)		43 (30.1)		56 (38,2)		.87
I use isolation gown when entering patients rooms who are under contact precautions	21 (29.3)		76 (53.3)		8 (7.3)		0.11	22 (15.5)		37 (31.6)		46 (42.5)		.031	12 (19,2)		55 (40,6)		38 (29.9)		.102
I inform other departments before transfer patients who need droplet precautions	16 (17.9)		77 (55.7)		22 (21.3)		.123	9 (11.2)		35 (31,7)		71 (52.1)		.022	10 (9.4)		75 (55.2)		30 (30.3)		.110

Table 5 Pearson Chi-Square test. shows that there were statistically significant differences between always options of some statements on infection control practice and educational degree, years of experience and age groups, the nurses who had bachelor degree get higher score 55.7% than another groups , in item “I inform other departments before transfer patients who need droplet precautions”, the master degree nurses received low score in item “I wash my hand before and after giving care to patient” 13.8 % with statistically significant (P **,004**). The nurse s with ≥5 years and<10 years received low rate 17.1% with statistically significant (P**., 023**) in item “I use surgical mask when I enter patients room who are infected with Chickenpox and measles”, there were no statistically significant in age group among all items.

Table 4. 6 Relationship between Infection Control Practice Tool and Nationality

Nationality	Mean & SD	p value
Philippines	51.1 ± 4.5	.0,66
India	41.9 ± 1.8	.0,047
Saudi Arabia	77.3± 7.8	.0,89
Arabic countries	26.1 ± 1.5	.0,041

Table 6. (ANOVA test). Show the difference knowledge of nurses among Infection Control Practice, that report Saudi Arabia nurses had highest score than others groups 77.3, SD = ± 7.8, followed by the Philippines nurses 51.7, SD= ± 4.5, while there were statistical significance in the India nurses 41.9 ± SD=1.8, p= .0,047, Arabic countries 26.1 ± SD =1.5, p= .0,041.

5. DISCUSSION

The aim of current study was determination the practices of infection control practices among hemodialysis nurses, the study was conducted on 130 nurses with vary age, experience and level of education. Regarding age, the study revealed that most frequent age group was 31–40, 63.4% and mean ages of the participants were 27.4 years. Majority of the participants were female, and had bachelor degree. According to years of experiences, two third of them had an experience less than five years that lead to most of nurse's participants had fresh graduated and new employee.

Education of the nurses on hemodialysis complication's inhibition problems containing risk factors, nursing care, and treatment is main to enhance their infection control practice. Findings of the current study revealed that more one third of the nurses had not get infection control course. Nurses who gotten infection control training reported the inside the hospital as the resource with higher percentage. Practices of the nurses should be constantly improved via courses, in-service educations and scientific congress, workshops. This result is important in terms of representing the responsiveness of practices insufficiency and readiness to attendance to learning courses of infection control on hemodialysis.

Infection control clinical guidelines that are a frontline for nurses to obtain clinical practice build up evidence base practice, also they are systematic designed to enhance decisions making regards care to provide nursing interventions outcomes. In another hand, they regulate precaution and highlight falling problems and offer an alteration through training. However, in the current study, all of the nurses stated that they had infection control guideline and/or protocol of during their work experience.

In the present study, the average infection control practice that were 60.8, which was low when compared with Italian healthcare providers that reported 86% (Nobile et al, 2012), and 78% among intensive care unit in Jordan (AL- Rawajfah 2014), and in Hong Kong among registered nurses that found 83% (Chan et al., 2002), and in China 85% among RNs (Chan et al, 2014).

A low score indicates that Saudi Arabia nurses deficiency the sufficient knowledge among infection control, which can be established by the lack of special training regarding main topic in Saudi Arabia.

Findings from this study found several safe and unsafe infection control practices among hemodialysis nurses, regarding safe infection control practices; it revealed 81.1% always wash their hands, it is similarly with studies that conducted by (Garba, 2018), to evaluate the practice of hand washing among healthcare workers in a tertiary hospital in Nigeria that found 73.4% of them wash their hands, in Germany study the overall mean of hand washing it was 73% (Wetzker et al, 2016).

Regarding to using surgical mask with patients infected with Chickenpox and measles that reported 91.6%, which high when compared with semi-structured interview study conducted among health care provider in Iran that found 60.7% (Askarian et al, 2005). In Jordan that found 52.6% (AL-Rawajfah, 2014).

In another hands, 89.9 % of our participant's that reported always using isolation gown with patients under contact precautions, that agreed with study held in Hong Kong to examined compliance with isolation precautions and infection control guidelines among nurses that present 78.8% of nurses wearing isolation gown. (Chau et al, 2010). This may be associated to the good of steady post teaching on subjects of universal precautions. Universal precautions are regularly communal in the nurses teaching of hemodialysis unit.

Regarding unsafe infection control practices, such as; half of our participant's preformed always wash their hands after dealing with blood, body fluid, body secretions and contaminated tools, that not compatible with study that found 80.2% protect them self when they dealing with body fluids (Kermode et al, 2005). Regarding item wash hand with antiseptic solution, nurses reported sometimes 36.7% using Iodine solution after performing nursing interventions, that un-agreed with study in king khalid hospital in Saudi Arabia, that found 82% of nurses they always washing hands with antiseptic solution (Nahid, 2017). Among 52.9% never using eye protection to protect their eyes that none agreed with study to measure the quality of nursing care to aseptic techniques that reveled 94.6% of nurses wears protective when dealing with the patient, and recommend constant supervision and upgrading nursing staff skills is essential. (Agnieszka et al, 2015).

Eye protection safety is checked in the procedure of viral testing which means checking the ease of microorganism transfer. Personal protection equipment should defend healthcare professionals against blood, body fluids, secretion, excreta or contaminated instruments.

Related item close doors of rooms of patients with diseases transmitted through the air, nurses present 49.9% always preformed this item that compatible with study descriptive, and cross-sectional study that reported Isolating patients with known blood borne diseases 7.8% (Mohammed et al, 2018). In another hand, half of our nurses 52.9 % that always sterilize all shared equipment that used among patients that un agreed with study in GAZA, that found 98.2 use of a sterile set of equipment for each patient (Tabash et al, 2018). This is due to the malpractice of the infection control unit and their desire to increase the spread of infection among service providers and patients. Non-compliance with infection control practices poses a serious risk of transmission of infectious diseases to patients receiving chronic infection.

6. CONCLUSION AND RECOMMENDATIONS

Based on the findings of this study, it can be concluded that hemodialysis nurses in Dr. Bassam Medical Center is a dialysis centers in Riyadh region at Saudi Arabia, showed a moderate practice towards Infection control – Practices. Implementation of interventional behavioral hand hygiene program is important for improving the compliance to hand hygiene guidelines and improves physical environmental fitness needed to satisfy and performs the standard IPC protocol.

Dialysis units should re-evaluate their compliance with dialysis center precautions, and where necessary improve the precautions to be taken in the care of all patients and nurses.

Providing nurses teaching and preparation courses, founding actual investigation organizations and applying guidelines in the hospitals should help advance contamination prevention.

Recommendations

Based on the result of this study following recommendations were made:

- ✓ Continues education programs are necessary to improve nurses' knowledge on hospital acquired infection prevention.
- ✓ Following and implementation the new guidelines and protocols on hospital acquired infection prevention.
- ✓ National and institutional regulations are necessary to prevent barriers of hospital acquired infection prevention.
- ✓ Further experimental studies related to educational interventions for nurses may be useful for Evidence-based practices.

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Appendix 1 Infection control -Practices Tool

	Demographic data			
1	Gender	Female	male	
2	Age group	20–30	31–40	41–50
3	Level of education	diploma	BSN	MSN
4	Experience	<2 years	≥2 years and <5 years	≥5 years and <10 years
5	Receiving infection control training inside the hospital	Yes	NO	
6	Receiving infection control training outside the hospital	Yes	NO	
7	Is there any infection control nurse in the hospital?	Yes	NO	Not sure
8	Do you have an infection control manual in the unit?	Yes	NO	Not sure
9	Nationality			

	Item	Never	Rare	Sometime	Most of the time	Always
1	I wash my hand before and after giving care to patient					
2	I wash my hand before and after using gloves					
3	I wash my hand after dealing with blood, body fluid, body secretions and contaminated tools					
4	I wash my hand with antiseptic solution contains Iodine after performing nursing interventions that may lead to spread of blood or body fluids					
5	I wash my hand with antiseptic solution after removing gloves after giving nursing care to patients who are under contact precautions					
6	I use eye protection to protect my eyes when I perform activities or nursing care that may lead to the spout of blood and body fluids					
7	I use surgical mask when I perform activities or nursing care that may lead to spray of blood and body fluid					
8	I use surgical mask when giving care to patients who are under droplet precaution with a distance not more than 90 cm					
9	I use surgical mask when I enter patients room who are infected with Chickenpox and measles					
10	I use isolation gown when giving care or performing activities that may lead to spout of blood and body fluid					
11	I use isolation gown when entering patients rooms who are under contact precautions					
12	I use two pairs of gloves (Double Gloving) when doing procedures and nursing activities for patients infected with contagious diseases through the blood such as hepatitis type 'B' and AIDS					
13	I use gloves when I enter isolation rooms for patients who need contact precautions and take the gloves off before leaving the room					
14	I use gloves before touching any different body wounds of patients					
15	I use gloves before contact with any mucus membrane					
16	I inform other departments before transfer patients who need droplet precautions					
17	I put on face mask for patients with diseases spread by droplets or spray during the process of their movement or transfer					

	Item	Never	Rare	Sometime	Most of the time	Always
18	I separate patients with diseases spread by droplets or aerosols away from each other a distance of not less than 1·5m					
19	I isolate patients with diseases spread by droplets or spray in private rooms					
20	I isolate patients with diseases transmitted through the air (Airborne Spread Disease) in private rooms equipped with negative pressure system					
21	Permanently, I close doors of rooms of patients with diseases transmitted through the air					
22	I inform other departments before transfer patients who need Airborne precautions					
23	I put on face mask for patients with diseases spread by air during the process of their movement or transfer					
24	I isolate patients who are under contact isolation in a special isolation room					
25	I inform other units before transferring patients who are under contact precautions					
26	I use patients' tools and equipment with other patients who need contact precautions*					
27	I sterilize all shared equipment that used among patients who need contact precautions					
28	I perform needle recapping for needles and blade before discarding it*					
29	I protect myself with Hepatitis B virus vaccine if it is available free of charge at the hospital.					

Appendix 2 Association between the Levels of Education, Experience, Age group with general knowledge on Infection Control Practice

		Level of education				Experience				Age group			
		Diploma		BSN	MSN		<2 years	≥2 years and<5 years	≥5 years and<10 years	20–30	31–40	41–50	
		Always				Always				Always			
		N %	N %	N %	P Value	N %	N %	N %	P Value	N %	N %	N %	P Value
1	I wash my hand before and after giving care to patient	15 (22.1)	57 (45.2)	7 (13.8)	.004	9 (11.1)	72 (48.3)	17 (21.6)	.234	23 (15.4)	42 (45.8)	33 (19.9)	.112
2	I wash my hand before and after using gloves	22 (17.3)	66 (54.1)	15 (9.3)	.112	33 (44.1)	23 (19.2)	22 (17.3)	0.55	12 (8.1)	45 (40.1)	31 (17.3)	0,56
3	I wash my hand after dealing with blood, body fluid, body secretions and contaminated tools	12 (9.8)	55 (41.1)	24 (18.8)	0,66	24 (18.5)	71 (48.3)	21 (16.5)	0.88	21 (17.7)	39 (21.5)	55 (48.1)	0,77
4	I wash my hand with antiseptic solution contains Iodine after performing nursing interventions that may lead to spread of blood or body fluids	23 (33.1)	80 (52.1)	7 (6.4)	.110	12 (19.2)	55 (40,6)	38 (29.9)	0.99	25 (19.4)	45(33.1)	28 (21.1)	0,96
5	I wash my hand with antiseptic solution after removing gloves after giving nursing care to patients who are under contact precautions	11 (23,3)	43 (30.1)	56 (38,2)	.87	22 (17.3)	71 (48.3)	12 (8.1)	0.88	11 (5.7)	33 (23.4)	51 (44.1)	0,71
6	I use eye protection to protect my eyes when I perform activities or nursing care that may lead to the spout of blood and body fluids	15(9.3)	45 (36.6)	19 (15.4)	0.23	12 (19.2)	22 (17.3)	48 (38.6)	0.44	24 (20.1)	45 (40.1)	28 (21.1)	0,79
7	I use surgical mask when I perform activities or nursing care that may lead to spray of blood and body fluid	11 (7.3)	15(9.3)	84 (72.5)	0.11	15 (9.3)	24 (18.5)	71 (48.3)	0.23	12 (9.8)	38 (26.6)	77 (67.8)	0.54

		Level of education				Experience				Age group			
		Diploma	BSN	MSN		<2 years	≥2 years and<5 years	≥5 years and<10 years		20–30	31–40	41–50	
		Always				Always				Always			
		N %	N %	N %	P Value	N %	N %	N %	P Value	N %	N %	N %	P Value
8	I use surgical mask when giving care to patients who are under droplet precaution with a distance not more than 90 cm	25 (20.3)	58 (51.6)	19 (15.4)	0.14	9 (3.9)	40 (24.6)	65 (50.0)	0,12	12 (8.1)	39 (21.5)	25 (19.4)	0,47
9	I use surgical mask when I enter patients room who are infected with Chickenpox and measles	23 (33.1)	80 (52.1)	7 (6.4)	.210	45 (51.1)	39 (23.4)	26 (17.1)	.,023	11 (23,3)	43 (30.1)	56 (38,2)	.87
10	I use isolation gown when giving care or performing activities that may lead to spout of blood and body fluid	15 (6.1)	95 (76.0)	13 (5.7)	0,33	6 (2.1)	48 (38.6)	28 (21.8)	0,107	9 (11.1)	72 (48.3)	17 (21.6)	0,44
11	I use isolation gown when entering patients rooms who are under contact precautions	21 (29.3)	76 (53.3)	8 (7.3)	0.11	22 (15.5)	37 (31.6)	46 (42.5)	.031	12 (19,2)	55 (40,6)	38 (29.9)	.102
12	I use two pairs of gloves (Double Gloving) when doing procedures and nursing activities for patients infected with contagious diseases through the blood such as hepatitis type ‘B’ and AIDS	31 (24.8)	54 (49.0)	15 (9.3)	0,14	12 (19,2)	71 (48.3)	23 (19.2)	0,49	20 (17.1)	51 (44.1)	15 (9.3)	0,47
13	I use gloves when I enter isolation rooms for patients who need contact precautions and take the gloves off before leaving the room	25 (19.4)	45 (33.1)	28 (21.1)	0,22	20 (17.1)	66 (52.9)	12 (7.4)	0,38	10 (9.4)	30 (30.3)	75 (55.2)	0,47


		Level of education				Experience				Age group			
		Diploma	BSN	MSN		<2 years	≥2 years and<5 years	≥5 years and<10 years		20–30	31–40	41–50	
		Always				Always				Always			
		N %	N %	N %	P Value	N %	N %	N %	P Value	N %	N %	N %	P Value
14	I use gloves before touching any different body wounds of patients	19 (15.4)	46 (36.7)	31 (24.8)	0,14	26 (17.1)	56 (38,2)	6 (2.1)	0,97	72 (48.3)	15 (11.1)	9 (6.1)	0,64
15	I use gloves before contact with any mucus membrane	8 (7.3)	42 (45.8)	33 (19.9)	0,25	12 (19,2)	46 (42.5)	26 (17.1)	0,24	13 (5.7)	40 (32.7)	48 (38.6)	0,72
16	I inform other departments before transfer patients who need droplet precautions	16 (17.9)	77 (55.7)	22 (21.3)	.123	9 (11.2)	35 (31,7)	71 (52.1)	.022	10 (9.4)	75 (55.2)	30 (30.3)	.110
17	I put on face mask for patients with diseases spread by droplets or spray during the process of their movement or transfer	6 (2.1)	48 (38.6)	19 (15.4)	0,42	8 (5.8)	58 (51.6)	15 (9.3)	0,84	17 (7.4)	24 (20.1)	84 (72.5)	0,71
18	I separate patients with diseases spread by droplets or aerosols away from each other a distance of not less than 1·5m	28 (21.1)	45 (40.1)	24 (20.1)	0,57	9 (11.6)	15 (6.1)	24 (20.1)	0,17	15 (9.3)	51 (44.1)	20 (17.1)	0,55
19	I isolate patients with diseases spread by droplets or spray in private rooms	25 (20.3)	40 (32.7)	19 (15.4)	0,15	33 (44.1)	23 (19.2)	22 (17.3)	0.51	46 (36.7)	19 (15.4)	9 (11.2)	0,47

		Level of education				Experience				Age group			
		Diploma		BSN	MSN	<2 years	≥2 years and<5 years	≥5 years and<10 years	20–30	31–40	41–50		
		Always				Always				Always			
		N %	N %	N %	P Value	N %	N %	N %	P Value	N %	N %	N %	P Value
20	I isolate patients with diseases transmitted through the air (Airborne Spread Disease) in private rooms equipped with negative pressure system	10 (9.4)	30 (30.3)	75 (55.2)	0.11	25 (19.4)	28 (21.1)	45 (33.1)	0,41	12 (9.7)	48 (51.1)	35 (23.9)	0,78
21	Permanently, I close doors of rooms of patients with diseases transmitted through the air	33 (25.9)	39 (47.1)	15 (9.8)	0.14	13 (5.7)	46 (42.5)	26 (17.1)	0,23	9 (11.2)	35 (31,7)	71 (52.1)	0,14
22	I inform other departments before transfer patients who need Airborne precautions	18 (11.4)	52 (70.3)	22 (14.5)	0,12	12 (19,2)	38 (29.9)	55 (40,6)	0,19	13 (5.7)	95 (76.0)	15 (6.1)	0,45
23	I put on face mask for patients with diseases spread by air during the process of their movement or transfer	11 (7.3)	24 (20.1)	48 (51.1)	0,61	15 (9.3)	66 (54.1)	22 (17.3)	0,47	10 (9.4)	30 (30.3)	75 (55.2)	0,33
24	I isolate patients who are under contact isolation in a special isolation room	46 (42.5)	38 (29.9)	13 (5.7)	0,122	15 (9.3)	58 (51.6)	8 (5.8)	0,17	17 (21.6)	72 (48.3)	9 (11.1)	0,24
25	I inform other units before transferring patients who are under contact precautions	12 (19,2)	38 (29.9)	55 (40,6)	0,24	23 (19.2)	71 (48.3)	12 (19,2)	0,62	48 (51.1)	35 (31,7)	13 (5.7)	0,77

		Level of education				Experience				Age group			
		Diploma	BSN	MSN		<2 years	≥2 years and<5 years	≥5 years and<10 years		20–30	31–40	41–50	
		Always				Always				Always			
		N %	N %	N %	P Value	N %	N %	N %	P Value	N %	N %	N %	P Value
26	I use patients’ tools and equipment with other patients who need contact precautions*	23 (19.2)	71 (48.3)	12 (19.2)	0,41	28 (21.1)	45 (40.1)	24 (20.1)	0,25	7 (6.4)	80 (52.1)	23 (33.1)	0,33
27	I sterilize all shared equipment that used among patients who need contact precautions	10 (9.4)	30 (30.3)	75 (55.2)	0,88	46 (42.5)	13 (5.7)	26 (17.1)	0,14	35 (31,7)	13 (5.7)	48 (51.1)	0,73
28	I perform needle recapping for needles and blade before discarding it*	12 (19,2)	71 (52.1)	46 (42.5)	0,24	35 (31,7)	26 (17.1)	9 (11.2)	0,22	11 (5.7)	24 (20.1)	45 (40.1)	0,29
29	I protect myself with Hepatitis B virus vaccine if it is available free of charge at the hospital.	33 (23.4)	51 (44.1)	28 (21.1)	0,57	24 (20.1)	84 (72.5)	17 (7.4)	0,58	28 (21.1)	45 (40.1)	24 (20.1)	,114

Appendix 3 Dr. Bassam Medical Center approval from

Dr. Bassam Medical Center



مركز د. بسام الحوصي الطبي

To: Prof. CANDAN OZTURK
Dean, Faculty of Nursing
Near East University

October 11, 2018

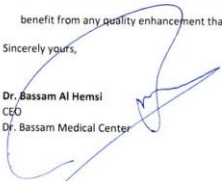
Thank you for your interest in having one of your Master students utilizing the resources of our Center to help him in his Master Thesis. As you know, Dr. Bassam Medical Center is one of the largest private Hemodialysis Centers in Saudi Arabia with a capacity of 40 Hemodialysis beds using the state-of-the-art Hemodialysis Machines.

It is part of our mission to support Academia and it would be our pleasure to support MR. ABDULWAHAB ZAZA in his thesis' data collection and whatever support he needs to allow him to achieve his objectives. We have no objection on using medical data from our center for his study under the condition of fulfilling the followings:

- Any data to be used should have prior approval from us.
- Any data collected should follow standards of privacy & confidentiality.
- Patient's personal data should be anonymous & not to be disclosed during the entire study.
- Surveys if needed should be done at a place and time convenient to all the respondent not interrupting their official duties.
- We want a copy of the results of this research to be given to us in order to analyze and benefit from any quality enhancement that it might provide.

Sincerely yours,


Dr. Bassam Al Hamsi
CEO
Dr. Bassam Medical Center



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Appendix 4 Ethical Approval Near East Institutional Reviews Board (IRB)



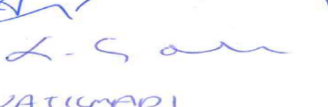
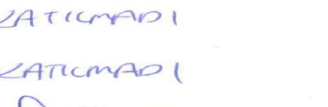


EK: 730-2018


YAKIN DOĞU ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMALAR DEĞERLENDİRME ETİK KURULU

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 18.10.2018
Toplantı No : 2018/62
Proje No : 654

Yakın Doğu Üniversitesi Hemşirelik Fakültesi öğretim üyelerinden Prof. Dr. Candan Öztürk'ün sorumlu araştırmacısı olduğu; YDU/2018/62-654 proje numaralı ve **"Evidence - Based Guidelines Of Infection Control Prevention Precautions Among Nurses In Hemodialysis Unit In Saudi Arabia"** başlıklı proje önerisi kurulumuzca değerlendirilmiş olup, etik olarak uygun bulunmuştur.

1. Prof. Dr. Rüstü Onur	(BAŞKAN) 
2. Prof. Dr. Nerin Bahçeciler Önder	(ÜYE) 
3. Prof. Dr. Tamer Yılmaz	(ÜYE) 
4. Prof. Dr. Şahan Saygı	(ÜYE) 
5. Prof. Dr. Şanda Çalı	(ÜYE) 
6. Prof. Dr. Nedim Çakır	(ÜYE) KATILMADI
7. Prof. Dr. Kaan Erler	(ÜYE) KATILMADI
8. Doç. Dr. Ümran Dal Yılmaz	(ÜYE) 
9. Doç. Dr. Nilüfer Galip Çelik	(ÜYE) KATILMADI
10. Doç. Dr. Emil Mammadov	(ÜYE) 