Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Impact of the Awareness and Practices of Infection Control Standard among Health Care Workers at the Primary Health Care in Makkah City at Saudi Arabia 2022

Ali Mohammed A Alharbi[1], Ahmad Abdulaziz M. Almehmadi[2], Salihah abdulghani A Qasem[3], Khalid Mohammed Ibrahim Khawaji[4], Fahad Humaid Brik Al-Saedi[5], Naif Mohsen S Alsaadi[5], Fawaz Abdullhameed H Felimban[5], Abdullah Abdulghani A Qasem[6], Mamdooh Eiss Alzahery[7], Mohammad Talal F Alsaedi[8], Faisal Fahad F alsaedi[8], Ahmed Ali Alsaadi[9], Yasir Hamoud N Alsaedi[10], NAJI Odah AlHaly[3], Alaa Abdullah I Kaki[11]

[1]Register - Family Medicine, Ibn Seena Hospital, Saudi Arabia.
[2]Geniral Practice, King Abdulaziz hospital in Makkah, Saudi Arabia.
[3]Nursing, King Abdulaziz Hospital, Makkah, Saudi Arabia.
[4]Specialist-Health and hospital admin, King Abdulaziz Hospital Makkah, Saudi Arabia.
[5]Nursing technician, King Abdulaziz Hospital in Makkah Al Mukarramah, Saudi Arabia.
[6]Medicine and surgery, Alsharaie7 health center, Makkah healthcare cluster, Saudi Arabia.
[7]Technical, Poison Control Center and Forensic Medicinal Cemistry, Makkah, Saudi Arabia.
[8]Nursing, Hera General Hospital, Saudi Arabia.
[9]Nursing technician, Ibn Sina Hospital, Saudi Arabia.
[10]Specialist-socilogy, King Abdulaziz hospital in Makkah Almukarrmah, Saudi Arabia.
[11]Specialist laboratory, King Abdullaziz Hospital, Saudi Arabia.

Abstract

Background

Healthcare acquired infections (HCAIs) otherwise call nosocomial infection is associated with increased morbidity and mortality among hospitalized patients and predisposes healthcare workers (HCWs) to an increased risk of infections. Healthcare workers (HCWs)-associated infections lead to considerable morbidity, health-care workers infections contribute to increase of higher mortality and higher health-care costs. Prevention and control of infections among primary health-care workers is a critical public health concern. This study assessed Impact of the awareness and practices of infection control standard among health care workers at the primary health are level in Makkah City at Saudi Arabia 2022. Healthcare workers have lost their lives in significant numbers in the discharge of their duties as a result of a breach in Infection Prevention and Control (IPC)

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

procedures. The increasing incidence of emerging and re-emerging diseases complicates this burden.

Aim of study: To Assessment the knowledge and practices of infection control standard among health care workers at the primary health are level in Makkah City at Saudi Arabia 2022.

Methods: This cross sectional study included (200) health care professionals in Makkah City at Saudi Arabia 2022. (doctors, nurses, lab workers) from primary healthcare (PHC) centers an self-administrated questionnaire was constructed by the researcher and was used for data collection. Divided in to 3 parts and contains 29 items i.e., socio-demographic characteristics, knowledge questions about infection control and statements about practice of health care providers regarding infection control.

Results: there were 200 participants, shows the majority of participant (62.0%) have high of the Knowledge about standard precautions of infection control, followed by (27.5%) of participant average while Range(4-16) and Mean ±SD(11.945±2.981), while regarding the practice the majority of participant (38.0%) have high of the practice about standard precautions of infection control, followed by (36.0%) of participant average while weak were(25.5)while Range(1-13) and Mean ±SD(8.415±2.762).

Conclusion: Gaps have been identified in awareness and practice of infection control among health care worker hence, it will be beneficial for all HCW to receive formal and periodic refresher trainings.

Keywords: awareness, practices, infection control, standard, (HCWs) primary, health care, Makkah.

Introduction .

Background

Infection prevention and control is a central component of safe and high quality service delivery at the facility level (1).With an inadequate practice of infection prevention, the risk of acquiring infections through exposure to blood, body fluids or contaminated materials in healthcare facilities is substantial (2). In connection with that, contracting an infection while in a healthcare setting challenges the basic idea that healthcare is meant to make people well (3). Obviously, lack of compliance with infection prevention and control measures has a number of consequences (4). Poor awareness and compliance could be associated with untold consequences among health care workers and patients. Such consequences include prolonged duration of hospitalization, increased severity of the primary illness, increased cost of care with unquantifiable impact on their quality of life and that of their families. (5) Healthcare workers are an indispensable component of the health system and they play cardinal roles in infection control precautions, which invariably contribute to

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

the quality of patient care and management.(6) Infection in the HCWs can result in low quality of life, or even reduce life expectancy of the infected person, as well as incur considerable costs in the long run (7) . For example, the risk of Healthcare-associated infections following a needle-stick injury with needle from an infected source patient was 0.3% for HIV, 3% for hepatitis C and 6–30% for hepatitis B (8). A total of 3 million out of 35 million HCWs worldwide experienced percutaneous exposure to blood borne pathogens (BBPs) each year; 2 million of those were to HBV; 0.9 million to HCV; and 0.17 million to HIV (9). The annual economic impact of HAIs in the US alone was approximately US$ 6.5 billion (10). HAIs have also been reported to contribute to serious mental health disorders, including anxiety, depression, adjustment disorder, panic attacks, and post-traumatic stress disorder(11). Poor awareness and false practices of infection control standard claimed many lives health care workers at the primary health are level lives in KSA , although most infectious diseases can be treated or prevented. According to reports published by the MOH, brucellosis, chickenpox, and amoebic dysentery are the most chronic infections most easily transmitted among health care workers in KSA(12). Simple practical procedures that are part of the components of standard precautions against Healthcare-associated infections have been found to be effective in reducing the Healthcare-associated infections. Simple hand hygiene when performed well can reduce the prevalence of Healthcare-associated infections substantially.(13), Improved compliance in hand hygiene with standard alcohol-based rub can reduce the rate of nosocomial infections by as much as 40%.(14) Perception of HCW about hand hygiene when improved through appropriate education and enlightenment has been shown to improve compliance to hand hygiene among medical personnel.(15) The prevention of Healthcare-associated infections perhaps requires a multi-targeted approach. When properly conducted, it can also affect other aspects of medical practice.(16)

Literature review

Online searching for studies exploring the knowledge and practical towards standard infection control precautions among primary healthcare workers yielded relatively few studies as most studies conducted in this field were among healthcare workers in hospitals and future health care workers. In addition, relatively limited studies were carried out in Saudi Arabia .(17)

Many studies have shown disparity in knowledge of infection control based on a cadre of HCW and their years of experience.(18), Studies have also found differences in terms of actual knowledge of infection transmission and control, its interpretation and application by HCW.(19)

Similarly, several studies have shown the benefits of effective infection control measures span wide from improving morbidity and mortality, prevention of disease transmission to enhancing a cost

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

effective healthcare.(20) In Ethiopia (2019) Beyamo et al assessed the compliance of health care workers with standard precaution practices and identified its determinants in public health institutions. The study included 250 HCWs. Nearly two-thirds (65%) of them had complied with standard precaution practices. Factors significantly associated with compliance to standard precaution practices were experience of ≤5 years, training on standard precaution, having good hand hygiene and availability of (personal protective equipment's)(21)

In Al-Kharj, Alotaibi et al assessed the knowledge of as well as compliance of health care students with standard precautions. Results revealed that among surveyed 353 students, 70% had previously attended an infection control course. The knowledge and compliance with SPs levels were high. The commonest source of information self-learning while the current curriculum was the least reported one. Female students were more knowledgeable and compliant with SPs compared to males. Student`s specialty and academic level were significantly associated with knowledge and compliance regarding SPs .(22)

In Al-Qassim (2018), Al Ra'awji et al evaluated in a multicenter cross-sectional study among 354 HCWs the knowledge, attitudes, and practices regarding guidelines of hand hygiene. The average knowledge score was 63%. Health-care workers aged over 30 years had higher scores than those younger than 30 years. Those at tertiary care hospitals had higher scores than those at secondary hospitals. Almost all had positive attitudes toward hand hygiene as well as adhering to the guidelines regularly. This study concentrated on only hand hygiene as a component of standard precautions .(23)

In Makkah, Alkot et al (2016) assessed the knowledge, attitude, and practice of health care workers toward Middle East respiratory syndrome coronavirus (MERS-CoV) among HCWs in primary health-care centers after an interventional education program. The level of satisfactory knowledge, positive attitude, and good practice of studied HCWs were significantly improved after exposure to the program, as it increased from 43.3%, 45%, and 57.4% before intervention to 67.9%, 63.8%, and 64.8% after intervention, respectively ($P < 0.001$). Older age, previous training, and experience were positively correlated with higher scores of knowledge.(24)

Rationale

Even with regular infection control training in the health care, gaps have been identified in awareness and practice of infection control among health care worker. This underscores the need for continued refresher training and measures to compel implementation of infection control. With the recent emergence of during Covid-19 disease in Saudi Arabia and other endemic transmissible viral diseases, it becomes imperative to adopt strict measures of infection control in primary health

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

care and hospital in Saudi Arabia

Aim of the study

To Assessment awareness and practices of infection control standard among health care workers at the primary health Care in Makkah City at Saudi Arabia 2022

General objective:

The study aim to assessment awareness and practices of infection control standard among health care workers at the primary health Care in Makkah City at Saudi Arabia 2022**.**

Materials and methods .

Study design:

This study is descriptive cross-sectional study

Study sitting:

The study has been carried out in the city of Makkah Al-Mokarramah PHC centers in in Makkah City at Saudi Arabia Region. There are 40 primary health care centers belonging to Ministry of health (MOH) distributed as North (20) and South(20)

Study population:

MOH PHC health care professionals (n=200) distributed as follows: 50 physicians,64 nurses and 22 laboratory technicians, Dental assistant 26 ,Dentist38

Study duration: August 20221st December 2022-

Sample size:

Sample size was calculated using open Epi online sample size calculator at 95% confidence level with bound on error of 5% regarding standard infection control precautions max sample size required is 200 participants.

Sample technique:

Sample technique was two stage.

At first stage: simple random sampling method will be used to select primary health care centers. At second stage: all the doctors, nurses and laboratory technicians within the selected PHCCs enrolled in the study. There are total primary health care centers . Expected numbers of HWs per each center are 10. So, we need 20 centers to collect the sample size.

Inclusion criteria:

Primary health care workers (doctors, nurses, laboratory technicians) in PHC center male and female, Saudi and non-Saudi, all ages, those who agreed to participate in the research.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Exclusion criteria:

Pharmacists, dentists, dental assistant . Those who have Vacation, disabled and absent during the data collection period **.**

Data collection tool and technique:

Data were collected by self-administrated questionnaire.

First part of the questionnaire includes questions about Demographic data of the physicians (gender, age, nationality, job title)

Second part about awareness, and practice of standard precautions which including hand will be assessed covering hand hygiene obtained from WHO injection safety, and protective equipment utilization with barriers of adherence to standard infection control precaution. Score was created for the participants` responses to knowledge questions and statements, Right answers were given a score of 1 whereas wrong answers were given a score of 0. Total score and its percentage were computed. The mean of the score percentage was estimated for each of the subscales and well as the overall awareness. Participants who scored at or above the mean score percentage for each subscale as well as for the overall were considered having "adequate knowledge" and those who scored below the mean score percentage were considered having inadequate awareness.

Data analysis:

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) software, version 26. Descriptive analysis was carried out as the mean and standard deviation (SD) were calculated for quantitative variables, frequency and proportion were calculated for categorical variables.

For comparisons, chi-square and t-test was used for categorical and quantitative variables respectively. p –value ≤ 0.05 was considered significant for all inferential analysis.

Ethical approval:

- The ethical approval was taken from the Regional Research Ethics committee. A permission letter was obtained from the regional director of the city of Makkah Al-Mokarramah Makkah MOH before starting the data collection.
- A written Informed consent was obtained from each participant from commencing the data collection.
- The researcher preserved the confidentiality of the participants at all steps of the study for the data collection, analysis and result.

Budget: Self-funded.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Result

Table 1Socio-demographic characteristics of Personal characteristics of the participants (n=200)

	N	**%**
Age		
<30 years	50	25
30-40 years	68	34
40 -50years	44	22
<60	38	19
Gender		
Female	70	35
Male	130	65
Nationality		
Non-Saudi	24	12
Saudi	176	88
Position		
Physician	50	25
Dentist	38	19
Nurse	64	32
Lab technician	22	11
Dental assistant	26	13
Qualification		
PhD/MD/equivalent	16	8
Master	44	22
Bachelor	76	38
Diploma	64	32
Experience in PHC		
<5 years	30	15
5-10 years	66	33
>10 years	104	52

Table 1 shows there were 200 participants, and the majority age was(34.0%) in (30-40)years,

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

while the age(<30)were(25.0%), the majority of them were males (65.0%) while female(35.0%), regarding the Nationality most of participants Saudi were(88.0%), regarding Position the majority of participant are nurse were(32.0%)followed by Physician were(25.0%) followed by dentist were(19.0%),

also regarding the Qualification most of participants Bachelor were(38.0%) followed by diploma were(32.0%), Regarding the Experience in PHC the majority of participant >10 years were (52.0%) followed by 5-10 years were(33.0%)

Table 2: Awareness of the healthcare workers regarding infection control element of standard precautions .

Statements statements/questions	TRUE		FALSE		Chi-Square	
	N	%	N	%	X^2	P-value
Dirty needle and sharp materials can transmit disease causing agents (TRUE)	190	95	10	5	162.000	0.000
Standard precautions should be practiced on all patients and laboratory specimen serology irrespective of diagnosis (TRUE)	132	66	68	34	20.480	0.000
Sharps should never be recapped (TRUE)	130	65	70	35	18.000	0.000
Needles should be bent or broken after use (FALSE)	64	32	136	68	25.920	0.000
When you have a patient who vomited in dressing room or clinic, the first step in infection control procedure is to isolate infected area (TRUE)	132	66	68	34	20.480	0.000
Sharp containers are utilized for used injection needles (TRUE)	170	85	30	15	98.000	0.000
Hepatitis B causing agent can be transmitted with dirty needles and sharps (TRUE)	190	95	10	5	162.000	0.000
Hepatitis C causing agent can be transmitted with dirty needles and sharps (TRUE)	150	75	50	25	50.000	0.000
HIV/AIDS causing agent can be transmitted with dirty needles and sharps (TRUE)	192	96	8	4	169.280	0.000

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Tetanus (Clostridium tetani) causing agent can be transmitted with dirty needles and sharps (TRUE)	176	88	24	12	115.520	0.000
Malaria causing agent (Plasmodium spp) can be transmitted with dirty needles and sharps (FALSE)	150	75	50	25	50.000	0.000
Tuberculosis causing agent (M. tuberculosis) can be transmitted with dirty needles and sharps (FALSE)	142	71	58	29	35.280	0.000
Type of isolation with pulmonary tuberculosis is airborne precaution (TRUE)	136	68	64	32	25.920	0.000
There is treatment for MERS-CoV (coronavirus) (FALSE)	76	38	124	62	11.520	0.001
The best disinfecting material to clean exposed skin after contamination is soap (TRUE)	170	85	30	15	98.000	0.000
The appropriate immediate action after pricking finger by I.V. line needle is dressing wound and inform infection control supervisor(TRUE)	136	68	64	32	25.920	0.000

Table 2 shows the awareness of the participants about infection control regarding (the Dirty needle and sharp materials can transmit disease causing agents, Standard precautions should be practiced on all patients and laboratory specimen serology irrespective of diagnosis, Sharps should never be recapped)the majority of participant have true information respectively (95.0%, 66.0%, 65.0%) while is a significant relation were P-value=0.000 X2 respectively (162.000, 20.480, 18.000).

Regarding the When you have a patient who vomited in dressing room or clinic, the first step in infection control procedure is to isolate infected area, Sharp containers are utilized for used injection needles , Hepatitis B causing agent can be transmitted with dirty needles and sharps. Hepatitis C causing agent can be transmitted with dirty needles and sharps. HIV/AIDS causing agent can be transmitted with dirty needles and sharps. Tetanus (Clostridium tetani) causing agent can be transmitted with dirty needles and sharps the majority of participant have true information respectively (95.0%,75.0%, 96.0%) while is a significant relation were P-value=0.000 X^2 respectively (162.000,50.000,169.280,115.520). Regarding the Type of isolation with pulmonary tuberculosis is airborne precaution , The best disinfecting material to clean exposed skin after contamination is soap , The appropriate immediate action after pricking finger by I.V. line needle is dressing wound and inform infection control supervisor the majority of participant have true

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

information respectively (68.0%,85.0%, 68.0%) while is a significant relation were P-value=0.000 X^2 respectively (25.920, 98.000,169.280, 25.920).

Regarding the Needles should be bent or broken after use, The best disinfecting material to clean exposed skin after contamination is soap , Malaria causing agent (Plasmodium spp) can be transmitted with dirty needles and sharps, Tuberculosis causing agent (M. tuberculosis) can be transmitted with dirty needles and sharps the majority of participant have false information respectively (68.0%,75.0%, 62.0%) while is a significant relation were P-value=0.000 X^2 respectively (25.920, 50.000,169.280, 11.520)

Table 3: Practice of the healthcare workers regarding infection control element of standard precautions .

practice statements/questions	**Correct answer**	
	Number	**Percentage**
Using routinely an alcohol-based hand rub for hand hygiene (Yes)	172	86
The main route of cross-transmission of potentially harmful germs between patients in a health-care facility (Health-care workers' hands when not clean)	132	66
Which of the following hand hygiene actions prevents transmission of germs by following the 5 moment for the hand hygiene?		
-Before touching a patient (Yes)	166	83
-After touching a patient (Yes)	174	87
-Immediately after a risk of body flew were uid exposure (Yes)	172	86
-After exposure to the immediate surroundings of a patient. (Yes)	152	76
-Immediately before a clean/aseptic procedure (Yes)	136	68
Which of the following statements on alcohol-based hand rub and hand washing with soap and water are true?		
-Hand rubbing is more rapid for hand cleansing than hand washing (True)	158	79
-Hand rubbing is more effective against germs than hand washing (False)	130	65
-Hand washing is recommended after hand rubbing (False)	132	66
-Hand washing and hand rubbing are recommended to be performed in sequence (True)	156	78
The minimal time needed for alcohol-based hand rub to kill most germs on your hands (20-30 seconds)	138	69

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

The minimal time needed for hand washing to kill most germs on your hands (40-60 seconds)	140	70

Table 3 show regarding the Using routinely an alcohol-based hand rub for hand hygiene majority of the participants correct answer were(86.0%). While (66.0%) knew correctly that the main route of cross-transmission of potentially harmful germs between patients in a health-care facility is health-care workers' hands when not clean. Regarding Which of the following hand hygiene actions prevents transmission of germs by following the 5 moment for the hand hygiene. The majority of the participants after touching a patient correct answer were(87.0%), followed by iImmediately after a risk of body flew were uid exposure were(86.0%), While before touching a patient were(83.0%).

Regarding the following statements on alcohol-based hand rub and hand washing with soap and water are true. Most of the HCWS (79.0%) knew that hand rubbing is more rapid for hand cleansing, than hand washing while (65.0%) of them knew that hand rubbing is not more effective against germs than hand washing. Followed by Hand washing and hand rubbing are recommended to be performed in sequence were (78.0%) but The minimal time needed for hand washing to kill most germs on your hands (40-60 seconds) were(70.0%).

Table 4: Distribution of awareness and practice of the healthcare workers about standard precautions of infection control .

				Score	
		N	**%**	**Range**	**Mean±SD**
Awareness	**Weak**	21	10.5	4-16.	11.945±2.981
	Average	55	27.5		
	High	124	62.0		
Practice	**Weak**	51	25.5	1-13.	8.415±2.762
	Average	73	36.5		
	High	76	38.0		

This table 4 shows the majority of participant (62.0%) have high of the awareness about standard precautions of infection control, followed by (27.5%) of participant average while Range(4-16) and Mean ±SD(11.945±2.981), while regarding the practice the majority of participant (38.0%) have high of the practice about standard precautions of infection control, followed by (36.0%) of

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

participant average while weak were(25.5)while Range(1-13) and Mean ±SD(8.415±2.762).

Figure (1): Distribution of knowledge the healthcare workers about standard precautions of infection control .

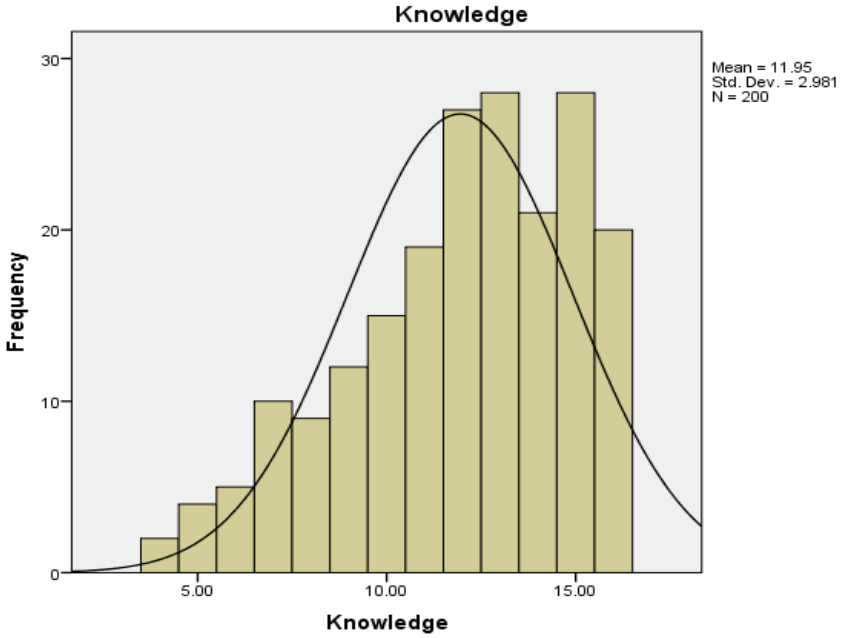

Figure (2): Distribution of practice the healthcare workers about standard precautions of infection control .

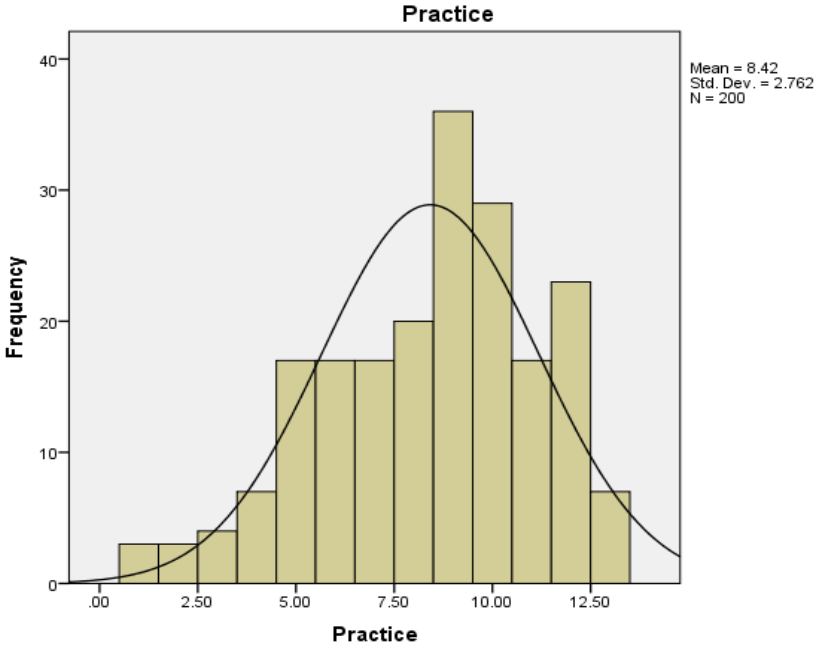

Figure (3): Distribution of knowledge and practice of the healthcare workers about standard precautions of infection control

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

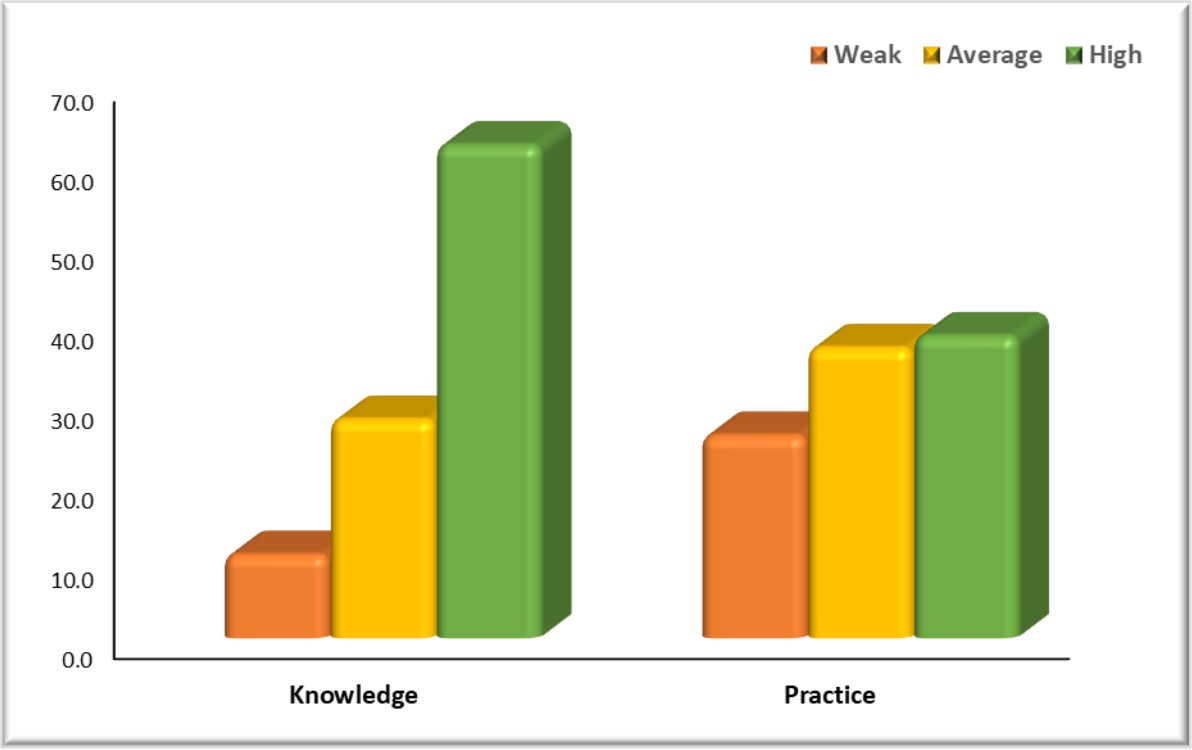

Table (5) Distribution of the relation of the awareness of the healthcare workers about standard precautions of infection control and the demographic data (age, gender, Nationality, Position, Qualification , Experience in PHC)

		N	Awareness	F or T	ANOVA or T-test	
			Mean ± SD		Test value	P-value
Age	**<30 years**	50	8.280 ± 2.532	F	138.423	<0.001*
	30-40 years	68	11.632 ± 1.544			
	40 -50years	44	14.068 ± 1.189			
	<60	38	14.868 ± 0.935			
Gender	**Female**	70	13.557 ± 1.674	T	7.243	<0.001*
	Male	130	11.077 ± 3.169			

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Nationality	**Non-Saudi**	24	15.833 ± 0.381	T	19.769	<0.001*
	Saudi	176	11.415 ± 2.780			
Position	**Physician**	50	14.640 ± 1.139	F	188.266	<0.001*
	Dentist	38	14.211 ± 1.212			
	Nurse	64	11.609 ± 1.190			
	Lab technician	22	8.318 ± 2.191			
	Dental assistant	26	7.346 ± 1.495			
Qualification	**PhD/MD/equivalent**	16	15.438 ± 0.512	F	51.394	<0.001*
	Master	44	14.227 ± 1.217			
	Bachelor	76	11.868 ± 2.625			
	Diploma	64	9.594 ± 2.537			
Experience in PHC	**<5 years**	30	10.533 ± 3.893	F	12.935	<0.001*
	5-10 years	66	11.076 ± 3.130			
	>10 years	104	12.904 ± 2.175			

Table (5) show that is relation between the awareness and demographic data regarding age a significant relation (increase in<60 follow by 40 -50years) were respectively Mean± SD (14.868±0.935 and 14.068 ±1.189%) and P-value=0.001 F 138.423 7.059, regarding Gender a significant relation (increase in Female follow by male) were respectively Mean± SD (13.557± 1.674 and 11.077± 3.169%) and P-value=0.001 T 7.243, regarding Nationality a significant relation (increase in Non-Saudi) were Mean± SD (15.833 ± 0.381) and P-value=0.001 T 19.769, regarding Position a significant relation (increase in Physician follow by Dentist) were respectively Mean± SD (14.640±1.139and 14.211 ± 1.212%) and P-value=0.001 F 188.266, regarding Qualification a

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

significant relation (increase in PhD/MD/equivalent follow by Master) were respectively Mean± SD (15.438 ± 0.512 and 14.227±1.217%) and P-value=0.001 T 51.394, regarding Experience in PHC a significant relation (increase in >10 years follow by 5-10 years) were respectively Mean± SD (12.904± 2.175and 11.076± 3.130%) and P-value=0.001 F 12.935

Table (6) Distribution of the relation of the Practice of the healthcare workers about standard precautions of infection control and the demographic data (age, gender, Nationality, Position, Qualification , Experience in PHC)

		N	Practice	F or T	ANOVA or T-test	
			Mean ± SD		Test value	P-value
Age	**<30 years**	50	6.760 ± 3.074	F	13.216	<0.001*
	30-40 years	68	8.206 ± 2.531			
	40 -50years	44	9.500 ± 2.308			
	<60	38	9.711 ± 1.958			
Gender	**Female**	70	9.457 ± 2.019	T	4.065	<0.001*
	Male	130	7.854 ± 2.947			
Nationality	**Non-Saudi**	24	9.208 ± 2.797	T	1.505	0.134
	Saudi	176	8.307 ± 2.748			
Position	**Physician**	50	9.400 ± 2.286	F	10.492	<0.001*
	Dentist	38	9.500 ± 1.928			
	Nurse	64	8.375 ± 2.498			
	Lab technician	22	7.182 ± 2.788			
	Dental assistant	26	6.077 ± 3.463			
Qualification	**PhD/MD/equivalent**	16	8.875 ± 2.802	F	5.157	0.002*
	Master	44	9.455 ± 1.958			
	Bachelor	76	8.526 ± 2.569			
	Diploma	64	7.453 ± 3.162			
Experience in PHC	**<5 years**	30	8.033 ± 3.045	F	0.912	0.403
	5-10 years	66	8.197 ± 3.004			

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

	>10 years	104	8.663 ± 2.511			

Table (6) show that is relation between the **Practice** and demographic data regarding age a significant relation (increase in<60 follow by 40-50years) were respectively Mean± SD (9.711±1.958 and 9.500±2.308%) and P-value=0.001 F 13.216, regarding Gender a significant relation (increase in Female follow by male) were respectively Mean± SD (9.457 ±2.019 and 7.854 ± 2.947%) and P-value=0.001 T 4.065, regarding Nationality no significant relation (increase in Non-Saudi) were Mean± SD (9.208±2.797) and P-value=0.134 T 1.505, regarding Position a significant relation (increase in Dentist follow by Physician) were respectively Mean± SD (9.500±1.928 and 9.400 ± 2.286%) and P-value=0.001 F 10.492, regarding Qualification a significant relation (increase in Master follow by PhD/MD/equivalent) were respectively Mean± SD (9.455 ±1.958 and 8.875 ± 2.802%) and P-value=0.002 F 51.394, regarding Experience in PHC no significant relation (increase in >10 years follow by 5-10 years) were respectively Mean± SD (8.663 ±2.511and8.197±3.004) and P-value=0.403 F 0.912.

Discussion

This study was conducted to Assessment of the awareness and practices of infection control standard among health care workers at the primary health are level in Makkah City at Saudi Arabia 2022 . The awareness of standard precautions by healthcare workers is an essential step in starting and implementing a successful infection control program in any healthcare facility.(25)

Worldwide, many studies have shown that healthcare workers expressed variable levels of awareness regarding standard precautions of infection control, with relatively limited studies have been carried out in the Kingdom of Saudi Arabia.(26) Therefore, the present study was conducted the present study. One of the most important characteristics of Makkah is its location, which is characterized by proximity to Makkah. In our study showed there were 200 participants, and the majority age was(34.0%) in (30-40)years, while the age(<30)were(25.0%), the majority of them were males (65.0%) while female(35.0%), regarding the Nationality most of participants Saudi were(88.0%), regarding Position the majority of participant are nurse were(32.0%)followed by Physician were(25.0%) followed by dentist were(19.0%), also regarding the Qualification most of participants Bachelor were(38.0%) followed by diploma were(32.0%), Regarding the Experience in PHC the majority of participant >10 years were (52.0%) followed by 5-10 years were(33.0%)(see Table 1)

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

Also showed that most of participants had high awareness regarding infection control but the most of participant weak practices . In Makkah, the level of satisfactory knowledge and weak practice of studied HCWs toward MERS-CoV had improved after an interventional education program. So, we believe that adequate and well prepared training programs are essential in improving awareness regarding standard precautions of infection control(26) (see Table 4) shows the majority of participant (62.0%) have high of the awareness about standard precautions of infection control, followed by (27.5%) of participant average while Range(4-16) and Mean ±SD(11.945±2.981), while regarding the practice the majority of participant (38.0%) have high of the practice about standard precautions of infection control, followed by (36.0%) of participant average while weak were(25.5)while Range(1-13) and Mean ±SD(8.415±2.762)

There were a statistically significant differences regarding participants' knowledge according to their socio-demographic characteristics or their PHC center profile . Compared to previous study that was conducted among Nigerian Health care providers, s, the current awareness status of participants was lower than that (92–97%).(24) In another study from Nigeria good and fair knowledge among participants was reported as 50% and 44% respectively.(21) In Ethiopia, Alzahrani et al (2019. showed that all participants had acceptable knowledge about contaminated needles and sharp materials that transmit disease causative agents, while 70.4% knew that gloves and gowns were required for any contact with patients.(27) In Brazil, Oliveria et al. identified a gap between knowledge of standard precautions and the practical applications among physicians.(28)(see Table 5,6)

The present study revealed that younger, none-Saudi healthcare workers and physicians; particularly consultants were more knowledgeable about SPs of infection control compared to their peers. In another Saudi study, being female, holding a postgraduate degree and having more than 5 years of experience in primary healthcare were the significant predictors for having adequate SPs knowledge.(29) In Al-Kharj, 12 female medical students were more awareness and compliant with SPs compared to males and also student`s academic level was significantly associated with knowledge and compliance regarding SPs. In Al-Qassim, health-care workers aged over 30 years and those at tertiary care hospitals were more knowledgeable than younger physicians and those working in secondary care hospitals.(23) In Makkah, older age, previous training, and experience were positively correlated with higher scores of knowledge among HCWs.(30) In Ethiopia (2018), factors significantly associated with compliance to standard precaution practices among HCWs were experience of ≤5 years, training on standard precaution, having good hand hygiene and availability of (personal protective equipment. In another study carried out also in Nigeria, non-availability of the materials was the main factor reported for non-adherence to SPs.(31) In Nigerian,

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

the most important factor influencing standard precautions practice was the lack of provision of adequate protective equipment. Other factors included carelessness, lack of display of standard precautions guidelines, emergency nature of the procedure, insufficient water supply, patient`s perceived to be at low risk of blood borne pathogens, pressure of time and standard precautions equipment interfering with technical skills.[31]

Conclusion .

Overall, the level of HCWs awareness and practices of infection control standard among health care workers at the primary health Care on infection prevention and control seems to be adequate towards standard precautions, hand hygiene, and IPC measures for TB, MRSA, MERS-CoV, and COVID-19, and care pertaining to urinary catheters. There appears to be gaps in some HCWs' knowledge of occupational vaccinations modes of transmission of infectious diseases, the risk of infection, the understanding that needle and sharp safe practices are enough to protect against BBPs, and the CDC guidelines for preventing CVCs-related infections. Barriers to comply with infection prevention and control may include workload, insufficient time, professional category and low patient-to-nurse ratio. It is highly suggested that adopting a multifaceted approach to infection prevention and control improvement intervention strategies has been shown to reduce HAIs and improve compliance among HCWs with infection prevention and control measures.

References.

1. Alhumaid, S., Al Mutair, A., Al Alawi, Z., Alsuliman, M., Ahmed, G. Y., Rabaan, A. A., ... & Al-Omari, A. (2021). Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. *Antimicrobial Resistance & Infection Control*, *10*(1), 1-32.
2. Al-Ahmari, A. M., AlKhaldi, Y. M., & Al-Asmari, B. A. (2021). Knowledge, attitude and practice about infection control among primary care professionals in Abha City, Kingdom of Saudi Arabia. *Journal of Family Medicine and Primary Care*, *10*(2), 662.
3. Huynh, G., Nguyen, T. N. H., Vo, K. N., & Pham, L. A. (2020). Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pacific Journal of Tropical Medicine*, *13*(6), 260.
4. Albahri, A. H., Alnaqbi, S. A., Alnaqbi, S. A., Alshaali, A. O., & Shahdoor, S. M. (2021). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in primary healthcare centers in Dubai: a cross-sectional survey, 2020. *Frontiers in Public Health*, *9*.

5. Hussain, I., Majeed, A., Imran, I., Ullah, M., Hashmi, F. K., Saeed, H., ... & Rasool, M. F. (2021). Knowledge, attitude, and practices toward COVID-19 in primary healthcare providers: a cross-sectional study from three tertiary care hospitals of Peshawar, Pakistan. *Journal of community health*, *46*(3), 441-449.
6. Albarrak, A. I., Mohammed, R., Al Elayan, A., Al Fawaz, F., Al Masry, M., Al Shammari, M., & Miaygil, S. B. (2021). Middle East Respiratory Syndrome (MERS): Comparing the knowledge, attitude and practices of different health care workers. *Journal of infection and public health*, *14*(1), 89-96.
7. Patel, L. N., Kozikott, S., Ilboudo, R., Kamateeka, M., Lamorde, M., Subah, M., ... & Lee, C. T. (2021). Safer primary healthcare facilities are needed to protect healthcare workers and maintain essential services: lessons learned from a multicountry COVID-19 emergency response initiative. *BMJ global health*, *6*(6), e005833.
8. Akhuleh, O. Z., Nasiri, E., Heidari, M., & Bazari, Z. (2019). Frequency of sharp injuries and its related factors among high-risk wards staff. *Journal of Nursing and Midwifery Sciences*, *6*(4), 204.
9. Khan, A., Khan, N., & Shafiq, M. (2021). The Economic Impact of COVID-19 from a Global Perspective. *Contemporary Economics*, *15*(1), 64-76.
10. Denault, D., & Gardner, H. (2021). OSHA Bloodborne Pathogen Standards.
11. Aboelnour, A., & Abuelela, M. H. (2019). Increase adherence to waste management policy at healthcare facility in Egypt. *Bulletin of the National Research Centre*, *43*(1), 1-11.
12. Abdel Wahed, W. Y., Hefzy, E. M., Ahmed, M. I., & Hamed, N. S. (2020). Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. *Journal of community health*, *45*(6), 1242-1251.
13. Baig, M., Jameel, T., Alzahrani, S. H., Mirza, A. A., Gazzaz, Z. J., Ahmad, T., ... & Almurashi, S. H. (2020). Predictors of misconceptions, knowledge, attitudes, and practices of COVID-19 pandemic among a sample of Saudi population. *PloS one*, *15*(12), e0243526.
14. Salem, O. A. (2019). Knowledge and practices of nurses in infection prevention and control within a tertiary care hospital. *Annals of medical and health sciences research*.
15. Asdaq, S. M. B., Alshrari, A. S., Imran, M., Sreeharsha, N., & Sultana, R. (2021). Knowledge, attitude and practices of healthcare professionals of Riyadh, Saudi Arabia towards covid-19: A cross-sectional study. *Saudi Journal of Biological Sciences*, *28*(9), 5275-5282.
16. Alduraibi, R. K., Almigbal, T. H., Alrasheed, A. A., & Batais, M. A. (2020). Knowledge, attitudes, and practices of primary health care physicians regarding the pre-travel

counselling of patients with type 2 diabetes in Riyadh, Saudi Arabia. *BMC Family Practice*, *21*(1), 1-9.

17. Alkot, M., Albouq, M. A., Shakuri, M. A., & Subahi, M. S. (2016). Knowledge, attitude, and practice toward MERS-CoV among primary health-care workers in Makkah Al-Mukarramah: an intervention study. *Int J Med Sci Public Health*, *5*(5), 952-60.
18. Oladele, D. A., Idigbe, I. E., Musa, A. Z., Gbaja-Biamila, T., Bamidele, T., Ohihoin, A. G., ... & Salako, B. L. (2021). Self-reported use of and access to personal protective equipment among healthcare workers during the COVID-19 outbreak in Nigeria. *Heliyon*, *7*(5), e07100.
19. Iyal, H. A., Ishaku, S. G., Zakari, A., Ibrahim, S., Olasinde, T., Ejembi, C. L., ... & Shuaibu, I. (2021). Knowledge and practice of Kaduna state health care providers on infection prevention and control during COVID-19 pandemic. *Journal of Medical and Basic Scientific Research*, *1*(1), 27-41.
20. Ilesanmi, O. S., Afolabi, A. A., Akande, A., Raji, T., & Mohammed, A. (2021). Infection prevention and control during COVID-19 pandemic: realities from health care workers in a north central state in Nigeria. *Epidemiology & Infection*, *149*.
21. Beyamo, A., Dodicho, T., & Facha, W. (2019). Compliance with standard precaution practices and associated factors among health care workers in Dawuro Zone, South West Ethiopia, cross sectional study. *BMC health services research*, *19*(1), 1-6.
22. Alotaibi, M. M., Almasari, S. M., Alkadam, A. N., Alanazi, Y. A., & Al Gahtani, K. A. (2017). Knowledge and compliance with standard isolation precautions among healthcare students in Al-Kharj Governorate, Saudi Arabia. *J Health Spec*, *5*(3), 162-70.
23. Al Ra'awji, B. A., Almogbel, E. S., Alharbi, L. A., Alotaibi, A. K., Al-Qazlan, F. A., & Saquib, J. (2018). Knowledge, attitudes, and practices of health-care workers regarding hand hygiene guidelines in Al-Qassim, Saudi Arabia: A multicenter study. *International journal of health sciences*, *12*(2), 3.
24. Alkot, M., Albouq, M. A., Shakuri, M. A., & Subahi, M. S. (2016). Knowledge, attitude, and practice toward MERS-CoV among primary health-care workers in Makkah Al-Mukarramah: an intervention study. *Int J Med Sci Public Health*, *5*(5), 952-60.
25. Tan, C., Kallon, I. I., Colvin, C. J., & Grant, A. D. (2020). Barriers and facilitators of tuberculosis infection prevention and control in low-and middle-income countries from the perspective of healthcare workers: A systematic review. *PloS one*, *15*(10), e0241039.
26. ALjohani, H. S., & Sulaiman, A. A. (2021). Assessment of Health Care Workers' Knowledge and Practice Toward Infection Standard Precautions in Primary Health Care

Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 3916 - 3936
Received 08 November 2021; Accepted 15 December 2021.

setting, Buraidah, Saudi Arabia. *Middle East Journal of Family Medicine*, *7*(10), 81.

27. Alzahrani, A. A. A., Rumbo, T. A., Alzahrany, N. A. A., & Tumayhi, Y. M. ASSESSMENT OF THE KNOWLEDGE AND PRACTICES OF INFECTION CONTROL STANDARD AMONG HEALTH CARE WORKERS AT THE PRIMARY HEALTHCARE LEVEL IN MAKKAH CITY AT SAUDI ARABIA. *European Journal of Molecular & Clinical Medicine (EJMCM)*, *6*(01), 2019.
28. Oliveira, A. C., Marziale, M. H. P., Paiva, M. H. R. S., & Lopes, A. C. S. (2009). Knowledge and attitude regarding standard precautions in a Brazilian public emergency service: a cross-sectional study. *Revista da Escola de Enfermagem da USP*, *43*, 313-319
29. Kaushal, P., Sangwan, G., Rana, K., Biswal, M., Kaur, M., & Lakshmi, P. V. M. (2021). Implementation status of national airborne infection control guidelines in the health care facilities of a North Indian State: A mixed method study. *Public Health in Practice*, *2*, 100149
30. Desta, M., Ayenew, T., Sitotaw, N., Tegegne, N., Dires, M., & Getie, M. (2018). Knowledge, practice and associated factors of infection prevention among healthcare workers in Debre Markos referral hospital, Northwest Ethiopia. *BMC health services research*, *18*(1), 1-10.
31. Amin, T. T., Al Noaim, K. I., Saad, M. A. B., Al Malhm, T. A., Al Mulhim, A. A., & Al Awas, M. A. (2013). Standard precautions and infection control, medical students' knowledge and behavior at a Saudi university: the need for change. *Global journal of health science*, *5*(4), 114
32. ElBadry, S., Ghaleb, M. A., & Abou Zeid, N. A. (2019). Healthcare Personnel Opinion and their Implementation Obstacles Regarding the Standard Precautions in Hemodialysis Unit. *Evidence-Based Nursing Research*, *1*(4), 13-13.