Knowledge and Practice of Nurses toward Preventive Measures of Elderly Patients with Viral Hepatitis B and C in the Dialysis Unit

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ABSTRACT

Background: Compliance with hemodialysis (HD) precautions is essential in preventing the transmission of viral hepatitis C Virus (HCV) and hepatitis B (HBV) in hemodialysis units. **Aim of study**: the study aimed to assess knowledge and practice of nurses toward Preventive measures of elderly patients with viral hepatitis B and C in the dialysis unit in Beni-Suef governorate. **Research design**: A descriptive design was used to achieve the aim of the current study. **Setting**, Beni-Suef university hospital and Elwasta general hospital **Sample**: A convenient sample of all hemodialysis nurses (76 nurses) in two hemodialysis units at Beni–suef and Elwasta general hospital, Egypt; include 42 nurses, form Beni-Suef university hospitaland 34 nurses, fromElwasta general hospital .**Tools:** one tool were designed to collect date pertinent to the study: Self-administered questionnaire to assess the subjects' level of knowledge, and observational checklist, used to assess subjects' level of practice. **Results**: More than half of nurses have fair level of total knowledge. Less than three quarters of nurses were incompetent regarding general preventive practices related to dialysis unit. **Conclusion**: Less than half of nurses have satisfactory of total knowledge about preventive measures of elderly patients with viral hepatitis B&C in dialysis unit. More than half of nurses have unsatisfactory regarding practices toward patient care.**Recommendations:** Conducting standards educational program that emphasize on improving knowledge level regarding prevention of viral hepatitis B&C transmission in dialysis units in order to raise awareness and correct misconceptions.

Keywords Nurses' knowledge, Practice, Hepatitis C&B virus, prevention, Hemodialysis.

INTRODUCTION:

The pace of population ageing is much faster than in the past. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%. In 2050, 80% of older people will be living in low- and middle-income countries. People worldwide are living longer. Today most people can expect to live into their sixties and beyond {1}

Every country in the world is experiencing growth in both the size and the proportion of older persons in the population. By 2030, 1 in 6 people in the world will be aged 60 years or over. At this time the share of the population aged 60 years and over will increase from 1 billion in

2020 to 1.4 billion. By 2050, the world's population of people aged 60 years and older will double (2.1 billion). The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million {2}.

While this shift in distribution of a country's population towards older ages – known as population ageing – started in high-income countries, it is now low- and middle-income countries that are experiencing the greatest change. By 2050, two-thirds of the world's population over 60 years will live in low- and middle-income countries. People worldwide are living longer. Today most people can expect to live into their sixties and beyond. Every country in the world is experiencing growth in both the size and the proportion of older persons in the population {3}.

At the biological level, ageing results from the impact of the accumulation of a wide variety of molecular and cellular damage over time. This leads to a gradual decrease in physical and mental capacity, a growing risk of disease and ultimately death. These changes are neither linear nor consistent, and they are only loosely associated with a person's age in years. The diversity seen in older age is not random {4}.

Chronic kidney disease is a global health burden with a high economic cost to health systems and is an independent risk factor for cardiovascular disease (CVD). All stages of CKD are associated with increased risks of cardio-vascular morbidity, premature mortality, and/or decreased quality of life. Advanced chronic kidney disease (CKD) progresses at a relatively slower rate in the elderly. The elderly population also experiences high rates of non-CKD related mortality {5}.

Transmission of HCV and HBV involves direct exposure to contaminated blood and is associated with intravenous drug use, iatrogenic exposures, tattooing, body piercing and, less frequently, through vertical transmission and high risk sexual behavior. Iatrogenic routes of transmission implicated in HCV and HBV infection include blood transfusions, surgical and dental procedures, acupuncture, needle stick injury, use of unsterilized needles and dialysis {6}.

Bloodstream infections are a potential devastating complication of hemodialysis (HD) treatment. Current evidence suggests that the burden of these infections is substantial in this setting .international recommendations regarding prevention of hepatitis (HBV) and (HCV) transmission in HD centers", that chronic HD patients are at high risk for infection because the process of HD requires vascular access for prolonged periods and because of their immunosuppressed status{7}.

As the aging population continues to grow, nurses who specialize in the care of the elderly will find expanding career possibilities. Geriatric nurses provide patient-focused care to a vulnerable population with the ability to greatly improve their patients' quality of life. Geriatric nurses work with doctors and other healthcare professionals to care for the physical, mental, and emotional well-being of elderly patients, helping them maintain independence and quality of life. These registered nurses (RNs) possess specialized knowledge and skills to treat common health issues affecting the elderly population {8}.

Nurses are in a unique position and frequently asked to provide care for HD patients. Nurses as members of the healthcare team lead the rest of the team in practicing prevention strategies to protect the patient from infection. Utilizing the skills and knowledge of nursing practice, nurse can facilitate patient recovery while minimizing complications related to infections **{9}.**

Significance of the study:

Based on the fact that there are various evidence-based guidelines published for the prevention of transmission of viral hepatitis in all HD settings in order to globalize and share the evidence. However, the incidence of HBV&HCV among HD patients is increasing dramatically. This might be due to lack of nurses' knowledge and practice about viral hepatitis infection transmission and prevention. Moreover, little information is available regarding the frequency with which hospitals have adopted evidence-based practices for preventing viral hepatitis infection among HD patients. Therefore, it is very important to assess nurses' knowledge and practice regarding preventive measures of viral hepatitis in HD units.

Aim in the thesis

To assess knowledge, and practice of nurses toward preventive measures of elderly patient with viral hepatitis C and B virus transmission in HD units.

Research Question

Q1: What is the knowledge of nurses about preventive measures of elderly patients with viral hepatitis in the dialysis unit?
Q2: What is the level of practice of nurses about preventive measures of elderly patients with viral hepatitis in the dialysis unit?
Q3: is there any relation between knowledge and practices of nurses about preventive measures of elderly patients with viral hepatitis in the dialysis unit?

Subjects and method

Research design: -
A descriptive research design used to fulfill the aim of the study.
Setting: -
The study was conducted in two HD units at a university hospital and Elwasta general hospital in Beni-Suef governorate.

Subjects:
Sample type:
A convenient sample was used.
Sample size:
A convenient sample of all hemodialysis nurses (76 nurses), 22 of them were males and 54 of them were females, providing direct patients care and agreed to participate in the study. Their mean age (23.45 ± 2.71 SD) in the field of hemodialysis.

Tools for data collection:
A structured interview questionnaire sheet was used to assess knowledge, and practice of nurses toward preventive measures of elderly patient with viral hepatitis C and B

virus transmission in HD units.

Part I: Socio-demographic characteristics questionnaire sheet.

To assess socio-demographic characteristics that includes: Personal and background data ; age, gender, educational level, years of experience in nursing practice and in dialysis units , previous attendance of in-service training program about infection control.

Part II: knowledge of the dialysis nurses.

To assess nurses knowledge, about viral hepatitis C and B virus for elderly patient in the dialysis unit.

Part III: dialysis nurses Practice.

To assess dialysis nurses Practice toward viral hepatitis for elderly patient in the dialysis unit.

Scoring system:

The questionnaire was contained of 54 questions, the total scores of the questionnaire were 108 grades, the Complete correct answer was scored as a two point, the incomplete correct answer was scored as a single point and the wrong answer or don't know was scored as a zero point. These scores were summed and were converted into a percent score. It was classified into three categories:
- **Good** knowledge if score ≥ 75%.
- **Fair** knowledge if score 50-<75%.
- **Poor** knowledge if score from <50%.

Tools Validity and reliability:

Tool validity was done to identify the degree to which the used tools measure what was supposed to be measured. Content and face validity of the tools were tested through subjecting the tools to a panel of five community health nursing expert form faculty of nursing in Beni-Suef University members. Each expert was asked to examine the instrument for content coverage, clarity, and whether the included items are suitable to achieve the aim of the current study.

The revision of the tools for clarity, relevance, comprehensiveness understanding and applicability was done by a panel of five community health-nursing experts from faculty of nursing to measure the content validity of the tools and the necessary modification was done.

Ethical Consideration:

Prior study conduction, ethical approval was obtained from the scientific research ethical committee of the Faculty of Nursing, Beni-Suef University. The researcher met director of Beni-Suef University hospital, Elwasta General Hospital to clarify the aim of the study and take their approval. The investigator also met nurses to explain the purpose of the study and obtain their approval to participate in the study. They were reassured about the anonymity and confidentiality of the collected data, which was used only for the purpose of the scientific research. The nurses' right to withdraw from the study at any time was assured.

II: Operational Design:

The operational design for this study included three phases namely; preparatory phase, pilot study, and field work.

Preparatory phase:

This phase started with a review of current and past, national and international related literature concerning the subjects of the study, using textbooks, articles, journals, and websites. This review was helpful to the investigator in reviewing and developing the data collection tools, and then the investigator tested the validity of the tool through the expertise to test the content, knowledge, accuracy, and relevance of questions the tools.

Pilot study:

Pilot study was carried out on 10% of the total study sample (8nurses) to evaluate the applicability, efficiency, clarity of tools, assessment of feasibility of fieldwork, beside to detect any possible obstacles that might face the investigator and interfere with data collection. Modifications were done so the pilot sample included in the study subjects. The pilot sample was included in the main study sample.

Field work:

The nurses who agreed to participate in the study were received the Self-administered Questionnaire to collect data about nurse's knowledge regarding prevention of viral hepatitis transmission in HD units. It took about minutes for each nurse separately in all shifts of working during which the researcher was clarifying any obscure questions

Then participant observational checklist was utilized to fill out practice assessment checklist regarding nursing practice to prevent HCV transmission in HD units. Each potential nurse was observed directly by the researcher for three times during giving care to patients; this required attending for all HD shifts to achieve this objective

Data collections of the study take five months. Data collection of the study was started at the beginning of January 2022, and completed by the end of May 2022. The investigator attended in HD unit at Beni-Suef university hospital, and Elwasta general hospital, Three days per week from 9am to12pm for nurses. Each hospital one day every weak.

III- Administrative Design:

An official letter requesting permission to conduct the study was directed from the dean of the Faculty of Nursing Beni-Suef University to Beni-Suef University hospital, Elwasta General Hospital to obtain their approval to carry out this study. This letter included the aim the study and photocopy from data collection tools in order to get their permission and help for collection of data.

IV- Statistical Design:

The collected data were coded and entered into the statistical package for the social science (SPSS 26.0). Data were presented and suitable analysis was done according to the type of data obtained for each parameter. Data were presented using descriptive statistics in the form of frequencies and percentages for categorical variables, and means and standard deviations for continuous quantitative variables. Person and spearman correlation was used to examine the correlation between quantitative and qualitative variables. Statistical significance was considered at the 5% level (P-value < 0.05).

Results:

Table (1): Frequency distribution of the dialysis nurses according to their socio-demographic characteristics **(n=76).**

Socio-demographic characteristics	No.	%
Age (year)		
20-<25	39	51.3
25-<30	18	23.7
30-<35	12	15.8
≥ 35	7	9.2
Mean SD 23.45 ± 2.71		
Gender		
Male	22	28.9
Female	54	71.1
Number of years of experiencein nursing field		
2 – 5	37	48.7
5 – 7	15	19.7
8 – 10	15	19.7
> 10	9	11.9
Number of years of experiencein dialysis unit		
2 – 5	44	57.9
5 – 7	16	21.0
8 – 10	10	13.2
> 10	6	7.9
Know the infection control standards for dialysis patients		
Yes	70	92.1
No	6	7.9
If yes, where did you get these standards? (n=70).		
Scientific meeting	50	71.4
Conference	14	20.0
Book	4	5.7
Scientific journals	2	2.9
Is there a training program for new nurses		
Yes	68	89.5
No	8	10.5
If yes, had you attended this program? (n=58)		
Yes	51	87.9
No	7	12.1
Is there any training program for improving nursing skills?		
Yes	64	84.2
No	4	5.3
I don't know	8	10.5
If yes, did you participate in which of them? (n=64)		
Yes	53	82.8
No	**7**	10.9
I don't care	4	6.3
If yes, how many training programs did you attend? (n=53)		
One	18	34.0
Two	29	54.7
Three	4	7.5
More than three	2	3.8

Table (1) shows that, (51.3%) of the dialysis nurses their age ranged between 20-<25 years, the Mean SD of age is 23.45 ± 2.71 years. As regard to gender, (71.1%) of them are female. Also, (52.6%) of the dialysis, nurses have technical institute. Also, (48.7%) of the dialysis, nurses have 2-5 years of experience in nursing field. Moreover, (57.9%) of the dialysis nurses have 2-5 years of experience in dialysis unit. Furthermore, (76.1%) of them attend program for new dialysis nurses. Also, (84.2%) of the dialysis nurses attend training programs for improving nursing skills, (54.7%) of them attend two programs. Moreover, (60.5%) of them don't have the opportunity to view the courses and medical journals. In addition, (72.4%) of the dialysis nurses don't participate in scientific conferences for dialysis and kidney disease during the last 5 years.

Part (II): Nurses' knowledge about viral hepatitis B & C for elderly patients in the dialysis units.
1-Nurses' knowledge about elderly and viral hepatitis.
Table (2): Frequency distribution of the dialysis nurses according to their knowledge about dialyzed elderly **(n=76).**

Items	Complete correct answer		Incomplete correct answer		Incorrect answer	
	No.	%	No.	%	No.	%
The changes that occur to the elderly	16	21.0	60	79.0	0	0.0
Causes of renal failure for elderly	17	22.4	59	77.6	0	0.0
Method to monitor excess fluid in the body of patients with renal failure	20	26.3	56	73.7	10	13.2
Health education about controlling excess fluid for patients with renal failure	25	32.9	45	59.2	6	7.9
Health education for patients with renal failure when the patient's skin is dry	21	27.6	46	60.5	9	11.9
Health education for patients about safety of arteriovenous fistula	18	23.7	45	59.2	13	17.1
Causes of skin dryness for elderly	16	21.1	47	61.8	13	17.1
One of the basic kidney functions	18	23.7	50	65.8	8	10.5
Medications that elderly patient with renal failure should be careful when using	15	19.7	51	67.1	10	13.2
Elderly patient with renal failure should stick to the daily meal plan system	15	19.7	53	69.8	8	10.5
Hemodialysis helps the elderly patients to	22	29.0	46	60.5	8	10.5
The problems that face the elderly patients during dialysis	25	32.9	42	55.3	9	11.8
Time that disequilibrium syndrome for elderly can happen	16	21.1	32	42.1	28	36.8
Factors affecting the efficiency of dialysis	45	59.2	0	0.0	31	40.8
Uremic patient suffers from difficulty of breathing during sleep, distended neck veins, hypertension it's probably so	23	30.3	0	0.0	53	69.7
According to fluid over load what is the first action to be done in this case	22	28.9	0	0.0	54	71.1
Actions to avoid arteriovenous fistula complication for dialysis patient	25	32.9	51	67.1	0	0.0

Table (2) displays that, (79.0%% and 77.6%) of the dialysis nurses have incomplete correct knowledge about the changes that occur to the elderly and the causes of renal failure for elderly, respectively. Also, (73.7% and 67.1%) of them have incomplete correct knowledge about the method to monitor excess fluid in the body of patients with renal failure and the medications that elderly with renal failure should be careful when using, respectively

2-Dialysis Nurses' knowledge about preventive measures of infection control in dialysis unit.
Table (3): Frequency distribution of the dialysis nurses according to their knowledge about general knowledge about preventive measures of infection control in dialysis unit **(n=76).**

Items	correct answer		Incomplete answer		Incorrect answer	
	No.	%	No.	%	No.	%
General precautions for infection control in dialysis unit						
You have information about infection control associated with work in dialysis unit.	76	100.0	0	0.0	0	0.0
Usage of gloves in dialysis unit.	22	28.9	54	71.1	0	0.0
Time that hands should be washed.	16	21.1	47	61.8	13	17.1
Cases that dialysis nurses must always change gloves.	40	52.6	36	46.4	0	0.0
Daily infection control practices for dialysis nurses during daily work.	34	44.7	42	55.3	0	0.0
The area for preparing medication for the patient	67	88.2	0	0.0	9	11.8
Specific precautions for infection control in dialysis unit						
Methods of viral hepatitis transmission in dialysis unit	15	19.7	0	0.0	61	80.3
Nursing actions share in the transmission of viral hepatitis helps to transmission of viral hepatitis	16	21.1	60	78.9	0	0.0
Methods and supplies of infection control in the dialysis unit	42	55.3	34	44.7	0	0.0
Use protective barriers to limit the spread of infection when connect or disconnect dialysis patient	16	21.1	45	59.2	15	19.7
Isolation of dialysis machine for certain patients	18	23.7	58	76.3	0	0.0
Time that the dialysis machine sterilized.	28	36.8	48	63.2	0	0.0
The disinfectant that used when sterilizing machines.	46	60.5	0	0.0	30	39.5
Personal protective Equipment used to prevent splashing of blood during dialysis session.	20	26.3	56	73.7	0	0.0

Table (3) demonstrates that, (52.6%% and 88.2%) of the dialysis nurses have correct knowledge about the cases that dialysis nurses must always change gloves and the area for preparing medication for the patient, respectively. Also, (71.1% and 61.8%) of them have incomplete knowledge about the usage of gloves in dialysis unit and time that hands should be washed, respectively. Moreover, (55.3% and 60.5%) of the dialysis nurses have correct knowledge about the methods and supplies of infection control in the dialysis unit and the disinfectant that used when sterilizing machines, respectively. Also, (78.9% and 76.3%) of them have incomplete knowledge about the nursing actions share in the transmission of viral hepatitis helps to transmission of viral hepatitis and the isolation of dialysis machine for certain patients, respectively.

Table (4): Frequency distribution of the dialysis nurses according to their knowledge about practices toward viral hepatitis B&C in dialysis unit **(n=76).**

Items	Apply		Not apply		Applied partial	
	No.	%	No.	%	No.	%
Involve the routine blood test result for viral hepatitis (B&C) in the patents medical file.	68	89.5	0	0.0	8	10.5
Perform routinely viral hepatitis (B&C) test before starting dialysis to the patient for the first time.	70	92.1	0	0.0	6	7.9
Doing a test for viral hepatitis (B&C) periodically for the dialysis patients.	42	55.3	12	15.8	22	28.9
Insert patient history for hepatitis infection and vaccination in medical records.	65	85.5	5	6.6	6	7.9
Isolate patients with viral hepatitis in separate room	70	92.1	0	0.0	6	7.9
Special Dialysis machine and equipment are used for patients with viral hepatitis	70	92.1	0	0.0	6	7.9
Dispose of any single used supplies after used.	76	100.0	0	0.0	0	0.0

Table (4) reveals that, (92.1%% and 100.0%) of the dialysis nurses have correct knowledge about perform routinely viral hepatitis (B&C) test before starting dialysis to the patient for the first time and dispose of any single used supplies after used, respectively. Also, (92.1%) of them have correct knowledge about the isolate patients with viral hepatitis in separate room and special dialysis machine and equipment are used for patients with viral hepatitis, respectively.

Table (5): Frequency distribution of the dialysis nurses according to preventive practices related to viral hepatitis in dialysis unit **(n=76).**

Items	Done		Not done	
	No.	%	No.	%
The patient had been screened for hepatitis viruses and AIDS before entering the dialysis unit at 1st time	68	89.5	8	10.5
Routinely screened dialysis patient each 3 months for hepatitis viruses and AIDS	64	84.2	12	15.8
The nurse did not start dialysis treatment for this patient until determining their current hepatitis and HIV status.	68	89.5	8	10.5
If the patient was HBs-Ag+, the patient was dialyzed in a separate room and a special machine.	76	100.0	0	0.0
The nurse administers hepatitis B vaccine to all patients in the early stages of their treatment.	65	85.5	11	14.5
The nurse was not assigned to both HbsAg+ and sero-negative patients during the same shift.	62	81.6	14	18.4
If the nurse must care for both HbsAg+ and sero-negative patients, she changed gowns between patients, washed hands and changed gloves to prevent cross infection.	56	73.7	20	26.3
The nurse provides each patient with their own thermometer.	66	86.8	10	13.2

Table (5) reveals that, (89.5% and 100.0%) of the dialysis nurses screened the patient for HIV, HBs Ag and HBs Ab before entering the dialysis unit at 1st time and if the patient was HBs-Ag+, the patient was dialyzed in a separate room and a special machine, respectively. While, (89.5%% and 86.8%) of them did not start dialysis treatment for patient until determining their current hepatitis and HIV status and provides each patient with their own thermometer, respectively.

Table (6): Frequency distribution of the dialysis nurses according to their practices toward machine &equipment, environment and safe waste management **(n=76).**

Items	Done		Not done	
	No.	%	No.	%
Practices toward machine &equipment				
The nurse used a clean machine to start dialysis	76	100.0	0	0.0
The nurse clean the machine during dialysis session as needed.	37	48.7	39	51.3
The nurse use 150 ml chloride solution followed by a 30-minute rinse with water and then heating.	33	43.4	43	56.6
Practices toward the environment				
There is a special area for staff to eat and drink.	55	72.4	21	27.6
There are separate bathroom/toilets for staff and patients.	76	100.0	0	0.0
There is air conditioning inside the unit.	72	100.0	0	0.0
Clean equipment is not used in other areas outside the unit.	25	32.9	51	67.1
The nurse cleans equipment used by more than one patient (e.g. Sphygmomanometer) with disinfectant before taking it to or using it with other patients.	40	52.6	36	47.4
The nurse prepares and distributes medications from a centralized area..	65	85.5	11	14.2
The nurse cleans or supervises cleaning of machine surfaces, patient chairs, and other surrounding furniture and equipment such as infusion pump, with sodium hypochlorite following each patient treatment.	42	55.3	34	44.7
The nurse changed or supervised changing linens and bellows between each patient.	42	55.3	34	44.7
The nurse transfer used linens and bellows in a vehicle intended for that and the vehicle was covered.	66	86.8	10	13.2
Practices toward safe waste management				
The dialysis nurses places waste products in separate large plastic bags labeled with the unit name	64	84.2	12	15.8
The nurse ensures that large waste bags are sent to the designated place for it verbally	40	52.6	36	47.4
The nurse ensures that waste bags are not filled more than three quarter full.	17	22.4	59	77.6
The nurse is able to verbalize hygiene systems methods and materials used and the role of each officer	45	59.2	31	40.8
The nurse can verbalize awareness regarding the seriousness of the infection and name 2 ways of preventing infection in hospitals.	51	67.1	25	32.9
The nurse washes and disinfect well all equipment before storing.	32	42.1	44	57.9
Sharps containers located as close as practical to the use area	57	75.0	19	25.0
Garbage collection and transfer limited duration consistent with the circumstances and the volume of work.	60	78.9	16	21.1
Cleaning of garbage receptacles after disposal of the waste occur regularly	27	35.5	49	64.5
Daily cleaning routines followed with the correct use of detergents and disinfectants	52	68.4	24	31.6
There allocation and discrimination of the cleaning equipment and tools for each region e.g. Red buckets and tools for bathrooms, and other blue for patient rooms.	15	19.7	61	80.3

Table (6) displays that, (100.0%) of the dialysis nurses use a clean machine to start dialysis and, respectively. While, (56.6%) of them did not use 150 mL chloride solution followed by a 30-minute rinse with water and then heating .Also, (100.0%) of the dialysis nurses reported that, there is separate bathroom/toilets for staff,

patients and air-conditioning inside the unit, respectively. Also, (85.5%% and 86.8%) of them prepare and distribute medications from a centralized area; a medication supply cart that moves from patient to patient is prohibited and use linens and bellows in a vehicle intended for that and the vehicle was covered, respectively. Furthermore, (84.2% and 78.9%) of the dialysis nurses place waste products in separate large plastic bags labeled with the unit's name and there is garbage collection and transfer limited duration consistent with the circumstances and the volume of work, respectively. While, (77.6%% and 73.7%) of them ensure that waste bags are not filled more than three quarter full and HIV status and participate in agenda cleaning such as a special cleanliness date, respectively.

Table (7): Frequency distribution of the dialysis nurses according to their total practices towards viral hepatitis B & C for the elderly patients in the dialysis units **(n=76).**

Items	Competent		Incompetent	
	No.	%	No.	%
General preventive practices related to dialysis unit	22	28.9	54	71.1
Preventive practices related to viral hepatitis in dialysis unit	68	89.5	8	10.5
Practices toward machine & equipment	36	47.4	40	52.6
Practices toward the environment	42	55.3	34	44.7
Practices toward safe waste management	28	36.8	48	63.2
Total Practice	36	47.4	40	52.6

Table (**7**)shows that, (89.5% and 55.3%) of the dialysis nurses were competent regarding preventive practices related to viral hepatitis in dialysis unit and practices toward the environment, respectively. Also, (71.1% and 52.6%) of them were incompetent regarding general preventive practices related to dialysis unit and practices toward machine & equipment, respectively. Moreover, (63.2%) of them were incompetent regarding toward safe waste management. Furthermore, (52.6%) of the dialysis nurses were incompetent regarding practices towards viral hepatitis B & C for the elderly patients in the dialysis units..

Part (IV): Relationship between the studied variable.

Table (8): Relationship between socio-demographic characteristics of the dialysis nurses and their total knowledge about viral hepatitis B & C for elderly patients in the dialysis units **(n=76).**

Socio-demographic characteristics		Levels of total knowledge						X2	P-Value
		Good (n=25)		Fair (n=42)		Poor (n=9)			
		No.	%	No.	%	No.	%		
Age (years)	20-<25	6	24.0	29	69.0	4	44.5	11.25	0.046*
	25-<30	10	40.0	6	14.3	2	22.2		
	30-<35	4	16.0	5	11.9	3	33.3		
	≥ 35	5	20.0	2	4.8	0	0.0		
Gender	Male	7	28.0	10	23.8	5	55.6	5.341	0.091
	Female	18	72.0	32	76.2	4	44.4		
Education level	Diploma	2	8.0	11	26.2	7	77.8	18.76	0.000**
	Technical Institute	9	36.0	29	69.0	2	22.2		
	Bachelor of Nursing	14	56.0	2	4.8	0	0.0		
Years of experience in nursing field	2 – 5	6	24.0	26	61.9	5	55.6	13.50	0.032*
	5 – 7	8	32.0	5	11.9	2	22.2		
	8 – 10	6	24.0	7	16.7	2	22.2		
	> 10	5	20.0	4	9.5	0	0.0		
Years of experience in dialysis unit	2 – 5	6	24.0	33	78.6	5	55.6	14.01	0.025*
	5 – 7	10	40.0	4	9.5	2	22.2		
	8 – 10	5	20.0	3	7.1	2	22.2		
	> 10	4	16.0	2	4.8	0	0.0		
Training program for new dialysis nurses	Yes	25	100.0	24	57.1	1	11.1	18.11	0.000**
	No	0	0.0	18	42.9	8	88.9		
Training program for improving nursing skills	Yes	25	100.0	28	66.7	0	0.0	18.93	0.000**
	No	0	0.0	3	7.1	4	44.4		
	I don't know	0	0.0	11	26.2	5	55.6		
Opportunity to view the courses and medical journals?	Yes	18	72.0	0	0.0	0	0.0	13.04	0.013*
	No	5	20.0	5	11.9	2	22.2		
	I don't care	2	8.0	37	88.1	7	77.8		
Participate in scientific conferences for dialysis and kidney disease during the last 5 years.	Yes	12	48.0	0	0.0	0	0.0	13.40	0.011*
	No	13	52.0	40	95.2	2	22.2		
	I don't care	0	0.0	2	4.8	7	77.8		

Table (8) shows that, there is highly statistically significant relation between dialysis nurses' knowledge and their education level, training program for new dialysis nurses, training program for improving nursing skills and participate in educational lectures before at (P= <

0.01). Also, there is statistically significant relation with their age, years of experience in nursing field, years of experience in dialysis unit, the opportunity to view the courses and medical journals and participate in scientific conferences for dialysis and kidney disease during the last 5 years at (P= < 0.05). While, there is no statistically significant relation with their gender at (P= > 0.05).

Table (9): Relationship between socio-demographic characteristics of the dialysis nurses and their total practices towards viral hepatitis B & C for the elderly patients in the dialysis units **(n=76).**

Socio-demographic characteristics		Levels of total practices				X2	P-Value
		Competent (n=36)		Incompetent (n=40)			
		No.	%	No.	%		
Age (years)	20-<25	14	38.9	25	62.5	10.91	0.049*
	25-<30	10	27.8	8	20.0		
	30-<35	7	19.4	5	12.5		
	≥ 35	5	13.9	2	5.0		
Gender	Male	14	38.9	8	20.0	3.227	0.120
	Female	22	61.1	32	80.0		
Education level	Diploma	2	5.6	18	45.0	20.07	0.000**
	Technical Institute	18	50.0	22	55.0		
	Bachelor of Nursing	16	44.4	0	0		
Years of experience in nursing field	2 – 5	9	25.0	28	70.0	14.37	0.015*
	5 – 7	10	27.8	5	12.5		
	8 – 10	10	27.8	5	12.5		
	> 10	7	19.4	2	5.0		
Years of experience in dialysis unit	2 – 5	13	36.1	31	77.5	14.88	0.011*
	5 – 7	12	33.3	4	10.0		
	8 – 10	7	19.5	3	7.5		
	> 10	4	11.1	2	5.0		
Training program for new dialysis nurses	Yes	36	100.0	15	37.5	19.63	0.000**
	No	0	0.0	25	62.5		
Training program for improving nursing skills	Yes	36	100.0	17	42.5	21.36	0.000**
	No	0	0.0	7	17.5		
	don't know	0	0.0	16	40.0		
Opportunity to view the courses and medical journals?	Yes	18	50.0	0	0.0	13.04	0.013*
	No	10	27.8	2	5.0		
	don't care	8	22.2	38	95.0		
Participate in scientific conferences for dialysis and kidney disease during the last 5 years.	Yes	12	33.3	0	0.0	15.27	0.001**
	No	22	61.1	33	82.5		
	don't care	2	5.6	7	17.5		
Participate in educational lectures before.	Yes	18	50.0	0	0.0	16.13	0.000**
	No	16	44.4	36	90.0		
	don't care	2	5.6	4	10.0		

No significant at p > 0.05. *Significant at p ‹ 0.05. **highly significant at p ‹ 0.01.

Table (9) displays that, there is highly statistically significant relation between dialysis nurses' practice and their education level, attended training program for new dialysis nurses, training program for improving nursing skills, and participate in scientific conferences for dialysis and kidney disease during the last 5 years at (P= < 0.01). Also, there is statistically significant relation with their age, years of experience in nursing field, years of experience in dialysis unit and the opportunity to view the courses and medical journals at (P= < 0.05). While, there is no statistically significant relation with their gender at (P= > 0.05).

Part (V): Correlation between the studied variable.

Table (10): Correlation between dialysis nurses' knowledge and their practices towards viral hepatitis B & C for the elderly patients in the dialysis units **(n=76).**

Items	Total knowledge
Total practices	r = 0.544 P = 0.000**

r= correlation coefficient test.   P= p-value   **highly significant at p ‹ 0.01.

Table **(10)** indicates that, there is highly significant positive correlation between dialysis nurses' knowledge and their practices towards viral hepatitis B & C for the elderly patients in the dialysis units at (P= < 0.01).

Discussion:

Elderly is a natural process, which starts with intrauterine life, continues until death and is caused by irreversible degeneration of cells and systems. Elderly is not a pathological process and it consists of physiological, psychological, sociological and chronological changes **{10}.** At the biological level, ageing results from the impact of the accumulation of a wide variety of molecular and cellular damage over time. This leads to a gradual decrease in physical and mental capacity, a growing risk of disease and ultimately death. These changes are neither linear nor consistent, and they are only loosely associated with a person's age in years. The diversity seen in older age is not random. Beyond biological changes, ageing is often associated with other life transitions such as retirement, relocation to more appropriate housing and the death of friends and partners **{11}.**

Advanced chronic kidney disease (CKD) progresses at a relatively slower rate in the elderly. The elderly population also experiences high rates of non-CKD related mortality. In fact, the risk of ESRD did not surpass the risk of death in those 65–84 years. Viral hepatitis is the most common cause of chronic liver disease in   hemodialysis (HD) patients. The natural history of viral hepatitis B& C virus in HD patients remains unclear because the course of viral hepatitis infection typically extends over decades, although HD patients have higher morbidity and mortality rates compared with those without renal disease, limiting long-term follow-up **{12}.**

Geriatric nurses work with doctors and other healthcare professionals to care for the physical, mental, and emotional well-being of elderly patients, helping them maintain independence and quality of life. These registered nurses (RNs) possess specialized knowledge and skills to treat common health issues affecting the elderly population. All nurses are expected to follow Standard Precautions for infection control. This includes performing hand hygiene, using personal protective equipment or PPE, and following safe injection practices **{13}.**

This chapter provides analysis and comparison of the findings of the current study with other research findings investigating the related area of study. The aim of the study was to assess nursing staffs' knowledge and practice regarding preventive measures of elderly patients with viral hepatitis B & C virus transmission in HDUs.

In the current study, the findings that answered the research question, which was "What is nursing staffs' level of knowledge regarding preventive measures of elderly patient with viral hepatitis transmission in hemodialysis unit", revealed that about more half of the studied nurses subjects (55.3%) have got a good level of total knowledge, with the mean of (20.58 ± 5.16). As regard subtotal knowledge level related to transmission and prevention patterns of Viral infection; about two thirds (65.5%) of the studied subjects have got a satisfactory level, and only (45.5%) of the studied subjects have got a fair level of knowledge related to preventive measures against viral hepatitis infection in HDU. It is worth mentioning that the majority of subjects denoted the coo llrrect responses to the most commonly recognized routes of viral hepatitis transmission.

The current study findings related to nurses' knowledge were consistent with a study done by **{14}** in a tertiary hospital in Turkey. The study had total of (206) professionals with a mean age of 37.0±6.3 years and predominantly females (86%). The study sample included medical laboratory technicians (54) and nurses (152). Results showed that health 54 care workers have a moderate level of knowledge toward HBV/HCV infections and the hepatitis knowledge levels of (51.5%) participants were found to be satisfactory.

Regarding the level of nurses' knowledge related to preventive measures against viral hepatitis (B&C) infection, the study findings revealed that more than two thirds of nurses have good level of knowledge (92.1%% and 100.0%). This represents a major defect since

there is scientific evidence suggests that the environment can serve as a reservoir for infectious virus; as denoted by **{15}.** Since a considerable percent reported that they shouldn't wear gloves whenever preparing the machine and when using equipment respectively; while a large proportion of the studied subjects reported that they should comply with wearing gloves when connecting patients on dialysis and when disconnecting patients off dialysis respectively.

On the same vein, **{16}** study which was done among nurses in the dialysis unit of a University Hospital in Alexandria, Egypt, revealed that less than half of nurses (47.1%) correctly knew that they had to wash their hands before and after caring for a patient. This is may be as a result of absence of continuous education as revealed by the researchers that none of the nurses received any training program about infection control.

Our results are in line with the findings from studies reported majority of nursing staff had correct knowledge on transmission mode in studying hospitals -sectional study showed that nurses had a low level of knowledge about nature of the disease and its complications.

From the researchers' point of view, this is may be due to difference in educational level, as (85%) of the previously mentioned study subjects were university graduates, and this is a significant point that we should pay attention to it, as regarding the educational level in the current study; the finding showed that more than half of the studied nurses were technical institute nurses graduated (52.6%) and this is also the most predominant level of education in HDU.

Several studies tried to show the effect of Heath care workers training on knowledge to viral hepatitis, reported participants who received more education showed considerable improvement in their knowledge levels. Therefore, providing more education course can help health staff to remember the preventative measure. Our study, while having much strength, involved some limitations that should be considered .Only individuals who agreed to complete survey were eligible for participation in the study. In fact, we did not try to encourage non-responder to participate.

Regarding knowledge and practice characteristics that might be determinants of positive attitudes, the current study finding revealed that a large percent of the studied nurses have positive attitude toward preventive measures of Viral hepatitis B&C infection transmission in HDU. The great majority of respondents agreed that evidence-based infection control measures provide adequate protection against transmission of blood borne pathogens among HCWs, and this result is in accordance with **{17}**. study in surveying nurses working in primary care, reported that almost (90%) of respondents agreed that infection-control precautions would protect them from acquiring viral hepatitis.

The current study finding that answered the second research question "What is nursing staffs' level of practice regarding preventive measures of viral hepatitis transmission in HDU?" revealed that majority of the studied nurses have got an unsatisfactory practice level,

with the mean (14.91 ± 2.12) out of 55 grades. The study findings were consistent with {18} study entitled "evaluation of nurses' practices throughout hemodialysis treatment for patients in hemodialysis unit at teaching hospitals" which revealed that there was a deficit in the nurses' practice that should be applied to the patient throughout hemodialysis treatment. It was also agreed with the study {19}at 14 HDUs in Saudi Arabia, which revealed that neither infection prevention and control competencies nor compliance with dialysis standards and guidelines were satisfying.

The researcher may interpret this deficit in practice level regarding preventive measures of viral hepatitis B&C transmission tube due to lack of effective supervision, lack of reward and punishment policy, low educational level of nursing staff, increase patient nurse ratio and misconception or unawareness of the application of isolation policy. These interpretations are also supported {20}study, entitled " knowledge and practices of universal precautions among basic B. Sc. nursing students who reported that lack of established protocols, and an absence of performance appraisal and nursing audit all are reasons for poor performance. Our results are in line with the findings from studies reported more educated worker related with more knowledge toward HBV and HCV.

As regard hygienic precautions, results showed that minority of studied nurses only observed to wash hands before and after contact with patient respectively. The researcher interpreted the poor compliance to hand hygiene may be attributed to lack of continuous and efficient in service training and absence of supervision. Barriers of good compliance also includes unavailability of alcohol rub in the dialysis rooms, increased workload, lack of motivation, weak sense of self-efficacy, absence of leader in their units who takes the lead in education and the promotion of hand hygiene.

On the other hand; a study done by{21} observed patient care across hemodialysis facilities enrolled in the National Opportunity to Improve Infection Control in ESRD (end-stage renal disease) (NOTICE) project in order to evaluate adherence to evidence-based practices aimed at prevention of infection and include thirty-four hemodialysis facilities. Results regarding overall adherence to hand hygiene practice was (72%) and compliance to hand hygiene before and after procedures was high.

The researcher examined the relations between total mean knowledge and total mean practice. The results revealed that there was no significant statistical relationship exists between knowledge and practice scores. This finding is supported by {22} in a study assessed knowledge and practices of universal precautions, which revealed that there was no significant correlation between level of knowledge and level of performance.

The finding of the present study showed that there was highly significant statistical relation between nurses' knowledge scores and their gender, educational level, and years of experience. This finding is supported by a study done by {23} that revealed no significant difference between the hospital units in terms of the attitudes of health care workers (HCWs) toward HBV/HCV infections and their level of education. On the contrary,{24}concluded that

there was a significant relation between knowledge score and age, gender, occupational history, and educational history.

The finding of the present study also, showed a significant statistical relation between practice scores and gender. The finding disagreed with {25 } as his results revealed that there were no significant relation found between nurses' practice and their gender, level of education, and years of experience in hemodialysis units, while significant relationship was found between nurses' practice and their marital. Based on the results of the current study; it can be concluded that:

There was a highly statistically significant relation between dialysis nurses' practice and their education level, attended training program for new dialysis nurses, training program for improving nursing skills, and participate in scientific conferences for dialysis and kidney disease during the last 5 years. There was a statistically significant relation with their age, years of experience in nursing field, years of experience in dialysis unit and the opportunity to view the courses and medical journals. There was a highly significant positive correlation between dialysis nurses' knowledge and their practices towards viral hepatitis B & C for the elderly patients in the dialysis units .While there was no statistically significant relation between total knowledge and their gender, years of experience, and attending training courses.

Conclusion

Based on the results of the current study; it can be concluded that:

There was a highly statistically significant relation between dialysis nurses' practice and their education level, attended training program for new dialysis nurses, training program for improving nursing skills, and participate in scientific conferences for dialysis and kidney disease during the last 5 years. There was a statistically significant relation with their age, years of experience in nursing field, years of experience in dialysis unit and the opportunity to view the courses and medical journals. There was a highly significant positive correlation between dialysis nurses' knowledge and their practices towards viral hepatitis B & C for the elderly patients in the dialysis units .While there was no statistically significant relation between total knowledge and their gender, years of experience, and attending training courses.

Recommendations

Based on the findings of the present study, the following recommendations were made:

- Modification of the ongoing training program regarding infection control to be more applied to hemodialysis units.

- Urgent need for conducting continuous practicing sessions to improve practice level regarding prevention of viral hepatitis B&C transmission in HD units.

- Conducting standards educational program that emphasize on improving knowledge level regarding prevention of viral hepatitis B&C transmission in dialysis units in order to raise awareness and correct misconceptions.

- Reinforce dialysis units with nurses with Bachelor degree and postgraduate studies to serve as models and leaders.

- Involve healthcare workers and nurse aids in training courses, continuous education and evaluation.

- Increase availability of supplies and equipment, especially which concerned With infection control as personal protective equipment, alcohol rub in a dispenser inside the dialysis rooms and close from the point of care ..etc".

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