Nursing Staffs' Knowledge and Practice Regarding Prevention of Hepatitis (C) Virus Transmission in Hemodialysis Units

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ABSTRACT

Aims and objectives. To assess nursing staffs' knowledge and practice regarding the prevention of hepatitis C virus (HCV) transmission in hemodialysis units (HDUs). **Design.** A descriptive exploratory study was utilized to fulfill the aim of the study. **Subjects.** A convenient sample consisted of all hemodialysis nurses (55 nurses) in three HD units at Cairo University Hospital, Egypt. **Tools.** Two instruments were designed to collect data pertinent to the study: a) Self-administered questionnaire to assess the subjects' level of knowledge, and b) Observational checklist, used to assess subjects' level of practice. **Results.** Showed that (54.5%) of the studied subjects have got a satisfactory level of knowledge regarding prevention of HCV transmission, while all of them (100%) have got an unsatisfactory level of practice related to prevention of HCV transmission in HD units. **Recommendations**. In-service training program should be designed and implemented regularly to all hemodialysis nurses.

Key words: Nurses' knowledge, Practice, Hepatitis C virus prevention, Hemodialysis units.

INTRODUCTION

Hepatitis C virus HCV has been estimated to infect approximately 2–3% of the world's population (130–170 million people are chronically infected with HCV), with highest prevalence rates occurring in low and middle income regions including Africa and Southeast Asia (**Bianco et al., 2013; Averhoff, Glass & Holtzman, 2012**). Chronic HCV infection is a major cause of liver disease and hepatocellular carcinoma all over the world, it accounts for more than 350 000 deaths each year (**Bianco et al., 2013**). Moreover, World Health Organization WHO (2014) and Centers for Disease Control and Prevention **CDC (2010)** reported that about 75-85 % of newly infected persons develop chronic disease and 60–70% of chronically infected people develop chronic liver disease;

5–20% develop cirrhosis and 1–5% die from cirrhosis or liver cancer. In 25 % of liver cancer patients, the underlying cause is hepatitis C.

As regard Egypt, **Sievert et al. (2011),** reported in "a systematic review of HCV epidemiology in Asia, Australia, and Egypt", based on Egypt Demographic and Health Survey (EDHS) report that the estimated prevalence was 14.9% for the sampled population of 11 126 aged 15–59 in 2008. The Egyptian Ministry of Health used a national probability sample in 2008 and reported an incidence of 6.9/1000 persons per year infected with HCV based on regression modeling (**Miller & Abu-Raddad, 2010**).

Hepatitis C virus infections are a potential devastating complication of hemodialysis (HD) treatment. Current

evidence suggests that the burden of these infections is substantial in this setting (Lincoln, 2011). Prevalence of HCV among hemodialysis patients in Egypt reached 48%, and as high risk as 87.5% among them (**Mohmoud and Abu-Raddad 2011**). Chronic HD patients are at high risk for HCV infection because the process of HD requires vascular access for prolonged periods and because of their immunosuppressed status (**Elamin & Abu-Aisha, 2011**). They explained that in the HD setting, cross-contamination to patients via environmental surfaces, supplies, equipment, multiple-dose medication vials and staff members is mainly responsible for both HBV and HCV transmission.

Prevention of HCV in HD units, according to Kidney Disease Improving **Global Outcomes KDIGO (2008**) guidelines, can be achieved by ensuring implementation of, and adherence to, strict infection-control procedures designed to prevent transmission of blood-borne pathogens. Utilizing the skills and knowledge of nursing practice, nurse can facilitate patient recovery while minimizing complications related to infections (**Benson and Powers 2011**). According to the **Community and Hospital Infection Control Association (2009);** infection prevention and control must be made up of evidence-based knowledge, and up-to-date skills and implementation practices. However; little information is available regarding the frequency with which hospitals have adopted knowledge and practices for preventing HCV infection among HD patients. The aim of this study was to assess nursing staffs' knowledge and practice regarding prevention of hepatitis C virus transmission in HD units in Egypt.

Methods

Aims and research questions

The aim of this study was to assess nursing staffs' knowledge and practice regarding prevention of hepatitis C virus transmission in HD units. To achieve the aim of the study, the following research question was formulated:

1. What is nursing staffs' level of knowledge regarding prevention of HCV transmission in HD units?

2. What is nursing staffs' level of practice regarding prevention of HCV transmission in HD units?

3. Is there a relationship between nurses' knowledge and practice regarding prevention of HCV transmission in HD units?

Design

A descriptive exploratory research design was utilized in the study.

Setting and participants

The study was conducted in all HD units at a University Hospital in Cairo. There were three units. The first unit was the Kasr Al-Aini Center …Nephrology – Dialysis – Transplantation (KAC-NDT) in the 2nd floor, the second unit was the King Fahd unit and the third unit was that in New Kasr El Aini Teaching Hospital. A Convenient sample of all HD nurses (n=55), 20 of them were males and 35 were females, providing direct patients care and agreed to participate in the study.

Instrumentation

Knowledge Assessment Questionnaire

A modified arabic version of a standardized self-administered questionnaire was developed by the investigator guided by the original instrument developed by Bianco et al. (2013). It consists of two main parts:

the first includes personal and background data sheet; and the second includes knowledge about HCV infection, to assess nurses' knowledge regarding prevention of HCV transmission in HD units. It is consisted of 29 true/false questions as follows:

a) Knowledge related to HCV infection (true/false questions) and include transmission patterns and prevention strategies (29 questions)

b) Knowledge related to preventive practices against HCV infection, practices about usage and replacement of gloves, practices about handling of nondisposable items and practices about use of personal protective equipment (35 question).

A total score of 29 grades; each correct answer has got one grade. The total scores were classified. Scores less than 22 (< 75%) was considered as unsatisfactory knowledge level, and scores equal to or more than 22 (> 75%) was considered as satisfactory knowledge level.

Practice Observational Checklist

It was designed to assess nurses' practices regarding prevention of HCV in HD units. Data pertinent to this item was collected based on Kidney Disease Improving Global Outcomes KDIGO (2008) guidelines for prevention of HCV transmission in HD units. The designed instrument comprised 19 procedures, divided into four main categories: Hygienic precautions (8 procedures), Equipment management (7 procedures), Waste management (3 procedures) and compliance to isolation precautions (1 procedure).

Each procedure categorized into either done correctly "took three grades" or not done "took zero grade" except the last item graded as complied "took one grade" or not complied "took zero grade'. The total scores

of the checklist were 55 grades. The scoring system was classified as follows; scores equal or more than 49.5 ($\geq$ 90%) was considered as a satisfactory practice level, and scores less than 49.5 (< 90%) was considered as an unsatisfactory level of practice. The checklist was carried out three times by the investigator and the average mean was taken for each nurse.

Validity of the instruments was done to identify the degree to which the used instruments measure what was supposed to be measured. Content and face validity of the instruments were tested through subjecting it to a panel of seven expert academics. Reliability of the instruments was tested using the weighted-kappa which showed satisfactory test-retest reliability for the questionnaire score (kappa scores > 0.7).

Techniques for data collection

1. Personal interview was utilized to collect data about nurse's knowledge regarding prevention of HCV transmission in HD units to fulfill the Self-administered Questionnaire. Interview was done for each nurse separately for about 15-20 minutes, in all shifts of working (morning, afternoon and night shifts), during which the investigator was clarifying any obscure questions.

2. Participant observational technique was utilized to fill out practice assessment checklist regarding nursing practice to prevent HCV transmission in HD units. Each subject was observed (after informing them) during the initiation of HD session and in the intra-dialytic period and at the end of the dialysis process for three times to fulfill the Practice Observational Checklist. The data collection phase was between February to June, 2014.

3.

Ethical Consideration

For ethical reasons, a primary permits was granted from the research ethical committee at faculty of nursing as well as the hospital administrators. The investigator emphasized that participation in the study is entirely voluntary, and anonymity and confidentiality were assured through coding the data. Written consent form was collected from each subject who agreed to participate in the study.

Results

Participants

About two thirds of the studied subjects (63.6%) were females. More than half (53%) of the study subjects' age was in the early adulthood. As regards to educational level; the majority of the studied subjects (80%) were graduates of secondary nursing schools. Concerning years of experience in nursing and in HD, (36.4%) were having experience of more than fifteen years in the field of nursing and between 5-10 years in the field of HD (Table 1).

Nurses' knowledge

The study findings revealed that (54.5%) of the studied subjects have got a satisfactory level of total knowledge (Figure 1).

As regards the knowledge related to transmission and prevention patterns of HCV infection, results showed that the majority of the studied subjects answered correctly questions regarding to the commonest patterns of HCV transmission (see Table 2).

As regards the knowledge related to preventive practices against HCV infection, results showed that the majority of the studied subjects (90.9, 87.3%) reported that they always wear gloves when putting

patients on dialysis and when taking patients off dialysis respectively. However; considerable percentages (29.1% and 38.2%) do not know that they should wear gloves whenever preparing the machine and when touching care equipment respectively (Table 3).

Nurses' practice

The study findings revealed that (100 %) of the studied subjects have got an unsatisfactory level of practice (Figure 2).

As regards the practice procedures related to hygienic precautions, results showed that (7.9% and 13.9%) of studied subjects observed to wash hands before and after contact with patient respectively. Less than quarter of them (16.4%) wear disposable gloves when touching any potentially contaminated surfaces (Table 4).

As regards the practice procedures related to equipment management, results revealed that all disinfection procedures related to non-disposable items and potentially contaminated surfaces were not done totally. Dedication to single patient items that cannot be disinfected easily was not applied. As regard waste management; investigator noted the insufficient number of sharp containers, which were often kept opened. Concerning isolation precautions, none of the studied subjects was complied with isolation policy (Table 5).

Relationships existed

No significant statistical relationships have existed between nurses' knowledge and practice and the designated socio-demographic variables except positive relationship between practice scores and gender (female nurses) as well as the working areas (nurses who works at New Kasr El Aini Teaching Hospital HD unit) (Tables 6, 7).

Discussion

The current study findings related to nurses' knowledge were consistent with **Cekin, Cekin and Ozdemir (2013)** study which had a total of 206 healthcare professionals including medical laboratory technicians (54) and nurses (152). Results showed that health care workers have a moderate level of knowledge toward HBV/HCV infections and the hepatitis knowledge levels of about half of participants were found to be satisfactory.

On the other hand, in a study of medical groups, done by **Setia et al. (2014)** showed that the level of awareness regarding the modes of transmission and vaccination was unsatisfactory. The investigator may interpret that result due to the rareness of the disease there; since the population prevalence of HCV infection in India is only 1% **(Quarterly Newsletter from the National Centre for Disease Control NCDC, 2014).**

All of the studied subjects have got unsatisfactory total practice level. The current study findings were consistent with **Bakey (2014)** study 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 by **Mashragi et al. (2014)** 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 investigator may interpret this deficit in practice level to be 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 by **Kale, Gholap, and Shinde (2014)** study, which confirmed that lack of established protocols, and an absence of performance appraisal and nursing audit all are reasons for poor performance.

Regarding compliance with isolation policy -considering isolation might be only applied as an additional optional measure in those centers with a high HCV prevalence- it is noteworthy that despite the majority of the studied subjects believe that isolation policy is recommended; the investigator observed complete lacking of its implementation in the three units. If the "isolation" referred to by them dialyzing anti-HCV positive patients on dedicated machines by the same staff, it would seem odd; since available evidence suggests that the nosocomial transmission of HCV in HD units occurs as a result of environmental contamination rather than through the internal pathway of the HD machines (**Elamin & Abu-Aisha, 2011**).

As regard relationships among the studied variables, no significant statistical relationships existed between knowledge scores and practice scores. This finding is supported by **Kale, Gholap, and Shinde (2014)** 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.

Conclusions

Approximately half of the hemodialysis nurses at Cairo University hospital have a satisfactory knowledge level, but all of them have unsatisfactory level of practice regarding the main concerned topic.

Recommendations:

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

- Initiation of infection control training programs that should be tailored to HD units is crucial to prevent the spread of HCV.

- Conducting frequent refreshing training programs to upgrade and reinforce practical skills for the enrolled and newly appointed nurses through applying latest skills using updated electronic media.

- Joint committee should be established collaborating experts from the teaching hospital HD units and the faculty of nursing to conduct the training of HD nurses in the available skill laboratories in the faculty.

References

Averhoff, F. M., Glass, N., & Holtzman, D. (2012). Global burden of hepatitis C: considerations for healthcare providers in the United States. Clinical Infectious Diseases, 55(suppl 1), S10-S15.

Bakey, S. J. (2014). Evaluation of Nurses' Practices throughout Hemodialysis Treatment for Patients in hemodialysis unit at Baghdad teaching hospitals. Kufa Journal for Nursing Sciences| مجلة الكوفة للعلوم التمريضية, 2(2).

Benson, S., & Powers, J. (2011). Your role in infection prevention. Nursing made incredibly easy, 9(3), 36-41.

Bianco, A., Bova, F., Nobile, C. G., Pileggi, C., Pavia, M. & the Collaborative Working Group. (2013). Healthcare workers and prevention of hepatitis C virus transmission: exploring knowledge, attitudes and evidence-based practices in hemodialysis units in Italy. BMC infectious diseases, 13(1), 76.

Cekin, A. H., Cekin, Y., & Ozdemir, A. (2013). The level of knowledge of, attitude toward and emphasis given to HBV and HCV infections among healthcare professionals: Data from a tertiary hospital in Turkey. International journal of occupational medicine and environmental health, 26(1), 122-131.

Centers for Disease Control and Prevention CDC (2010). Hepatitis C, General Information, available @ http://www.cdc.gov/hepatitis/hcv/pdfs/hepcgeneralfactsheet.pdf.

Community and Hospital Infection Control Association (2009). Online Basic Infection Prevention & Control Course. Available at http://meds.queensu.ca/cpd/che/online_courses/infection_control.

Elamin, S., & Abu-Aisha, H. (2011). Prevention of hepatitis B virus and hepatitis C virus transmission in hemodialysis centers: review of current international recommendations. Arab journal of nephrology and transplantation,4(1):35-47.

Kale, M., Gholap, M., & Shinde, M. (2014). Knowledge and Practices of Universal Precautions among Basic B. Sc. Nursing Students. International Journal of Science and Research (IJSR), 3(6), 1862-1870.

KDIGO Clinical Practice Guidelines for the prevention, diagnosis, evaluation, and treatment of Hepatitis C in chronic kidney disease within the UK. Kidney Int. 2008; 73 (Suppl 109); S1-S99

Lincoln, M. (2011). Preventing catheter-associated bloodstream infections in HD centers: The facility perspective. Nephrology Nursing Journal, 38(5), 411-415.

Mashragi, F., Bernstein, R. S., Al-Mazroa, M., Al-Tawfiq, J. A., Filemban, S., Assiri, A., ... & Memish, Z. A. (2014). HIV transmission at a Saudi Arabia hemodialysis unit. Clinical Infectious Diseases, ciu373.

Miller FD, Abu-Raddad LJ. Evidence of intense ongoing endemic transmission of hepatitis C virus in Egypt. Proc Natl Acad Sci USA 2010; 107: 14757–62.

Mohamoud, Y. A., & Abu-Raddad, L. J. (2011, November). The Prevalence of Hepatitis C Virus in Egypt: A Systematic Review. In Qatar Foundation Annual Research Forum Proceedings (No. 2011). Bloomsbury Qatar Foundation Journals.

Quarterly Newsletter from the National Centre for Disease Control NCDC. (2014). Hepatitis in India: Burden, Strategies and Plans. Volume 3, Issue 1. Available @ http://ncdc.gov.in/writereaddata/linkimages/NewsLtr0103_20146480274026.pdf.

Setia, S., Gambhir, R. S., Kapoor, V., Jindal, G., & Garg, S. (2014). Attitudes and Awareness Regarding Hepatitis B and Hepatitis C Amongst Health-care Workers of a Tertiary Hospital in India. Annals of medical and health sciences research, 3(4), 551-558.

Sievert, W., Altraif, I., Razavi, H. A., Abdo, A., Ahmed, E. A., AlOmair, A., ... & Negro, F. (2011). A systematic review of hepatitis C virus epidemiology in Asia, Australia and Egypt. Liver International, 31(s2), 61-80.

World Health Organization WHO (2014). Egypt steps up efforts against hepatitis C. available @ http://www.who.int/features/2014/egypt-campaign-hepatitisc/en/.

World Health Organization WHO (2014). Hepatitis C, Fact sheet N°164, available @ http://www.who.int/mediacentre/factsheets/fs164/en/.

Table 1 Percentage distribution of the studied subject as regard to the selected sociodemographic variables (n=55)

Subject / Variable	n=55 No	%
Gender		
Male	20	36.4
Female	35	63.6
Age		
20-30	29	52.7
30 – < 40	16	29.1
40 – < 50	09	16.4
50 +	01	01.8
Mean ± SD	31.47 ± 8.064	
Educational level in nursing		
B.Sc. in Nursing	00	00.0
Technical nursing institute diploma	11	20.0
Secondary nursing school diploma	44	80.0
Years of experience in nursing		
< 5 year	10	18.2
5- < 10 years	14	25.5
10-<15 years	11	20.0
15 + years	20	36.4
Mean ± SD	13.56 ± 7.585	
Years of experience in HD		
< 5 year	16	29.1
5- < 10 years	20	36.4
10-<15 years	06	10.9
15 + years	13	23.6
Mean ± SD	10.25 ± 7.829	

Table 2 Percentage distribution of the study subjects' response to the subtotal knowledge items related to transmission and prevention patterns of HCV infection (n=55)

Item	Correct answers		Incorrect answers	
	N	%	N	%
HCV Transmission patterns				
Hugging an HCV-positive individual	49	89.1	06	10.9
Receiving blood from infected donor	52	94.5	03	05.5
Having an infected food	41	74.5	14	25.5
Having sex with an infected partner	20	36.4	35	63.6
Reuse of injections during administration of medication	45	81.8	10	18.2
Kissing an infected patient	50	90.9	05	09.1
Getting a tattoo	37	67.3	18	32.7
The virus may be transmitted from infected mother to her newborn baby	19	34.5	36	65.5
HCV prevention patterns				
Avoid sharing razors or toothbrushes	51	92.7	04	07.3
Avoid pregnancy	42	76.4	31	23.6
Avoid renal transplantation	36	65.5	19	34.5
Use a condom when having sex	16	29.1	39	70.9
Avoiding breast feeding	44	80	11	20

Table 3 Percentage distribution of the study subjects' response to the subtotal knowledge items related to preventive practices against HCV infection in HDU (n=55)

Item	Correct answer		Incorrect answer	
	N	%	N	%
You always wear gloves when:				
Putting patients on dialysis	50	90.9	05	09.1
Taking patients off dialysis	48	87.3	07	12.7
Whenever providing patient care	41	74.5	14	25.5
Preparing the machine	39	70.9	16	29.1
Touching care equipment	34	61.8	21	38.2
You always exchange gloves:				
For each patient	54	98.2	01	01.8
Before administering intravenous medications	38	69.1	17	30.9
Whenever preparing the machine	32	58.2	23	41.8
You always wash your hands:				
Immediately after gloves are removed	46	83.6	09	16.4
Immediately before gloves are worn	37	67.3	18	32.7
Immediately after the machine is prepared	39	70.9	16	29.1
Dealing with nondisposable items and equipment after use on one patient?	52	94.5	03	05.5
Individual Protective Equipment				
Wear mask when splattering of blood onto face is possible.	25	45.5	30	54.5
Wear protective eyewear when splattering of blood into the eyes is possible.	28	50.9	27	49.1
Wear gown when splattering of blood onto clothes is possible.	45	81.8	10	18.2
Wear cap when splattering of blood onto head is possible.	21	38.2	34	61.8

Table 4 Percentage distribution of the study subjects' response to the subtotal practice items related to hygienic precautions that prevent transmission of HCV in HDU (n=55)

Items		Correct practice	
		N	%
	• Hygienic Precautions:		
1.	Wash hands with soap or an antiseptic hand-wash and water, before contact with a patient.	04	07.9
2.	Wash hands with soap or an antiseptic hand-wash and water, after contact with a patient.	07	13.9
3.	Wear disposable gloves when caring for a patient.	38	69.7
4.	Wear disposable gloves when touching any potentially contaminated surfaces at the dialysis station.	09	16.4
5.	Remove gloves when leaving the dialysis station.	49	89.1
6.	Ask patients to clean their hands, or use an alcohol gel rub, when arriving at the dialysis station.	00	00.0
7.	Ask patients to clean their hands, or use an alcohol gel rub, when leaving the dialysis station.	00	00.0
8.	Staff members should wear gowns, face shields, eye wear, or masks to protect themselves when performing procedures during which spurting or spattering of blood might occur (as during initiation and termination of dialysis).	00	00.0

Table 5 Percentage distribution of the study subjects' response to the subtotal practice items related to equipment and waste management that prevent HCV infection implemented in HDU (n=55)

Items		Correct practice	
		N	%
• Equipment management:			
1.	Dispose single-use items required in the dialysis process after use on one patient.	55	100
2.	Disinfect non disposable items (as trays, blood pressure cuffs, stethoscopes and scissors) after use on one patient.	00	00.0
3.	Dedicate to single patient items that cannot be disinfected easily (for example, adhesive tape, tourniquets).	00	00.0
4.	Do not move medications between patients.	55	100
5.	After each session, wipe all potentially contaminated surfaces (chairs, beds, tables, machines…etc.) with a low-level disinfectant if not visibly contaminated.	00	00.0
6.	Disinfect surfaces that are visibly contaminated with blood or fluid with a commercially available tuberculocidal germicide or a solution containing at least 500 p.p.m. hypochlorite.	00	00.0
7.	Follow the manufacturer's instructions for each chemical cleaning and disinfectant agent units regarding appropriate dilution and contact time.	00	00.0
• Waste management			
1.	Sharp containers located as close as possible to the point of generator.	00	00.0
2.	Dispose needles in closed, unbreakable containers that should not be overfilled.	00	00.0
3.	Use a 'no-touch' technique to drop the needle into the container (If this is difficult due to the design of the container, staff should complete patient care before disposing of needles).	55	100
• Compliance with isolation precautions			
		00	00.0

Table 6 Relation between nurses' practice scores and their background characteristics (independent t test relations) (n=55)

Variables	X ± SD	Test of sig.	P value
Gender			
Male	14.85 ± 1.226	t= 0.155	P = 0.042*
Female	14.94 ± 2.508		

Table 7 Relation between nurses' practice scores and their background characteristics (one way ANOVA test) (n=55)

Variables	X ± SD	Test of sig.	P value
Settings			
Kasr Al-Aini Center …Nephrology – Dialysis – Transplantation KAC-NDT unit	14.86 ± 2.282	F = 6.834	P =0.002**
King Fahd HD unit	13.47 ± 1.807		
New Kasr El Aini Teaching Hospital HD unit	15.77 ± 1.773		

Figure 1 Nurses' knowledge level of satisfaction regarding prevention of HCV transmission in HDU (n=55)
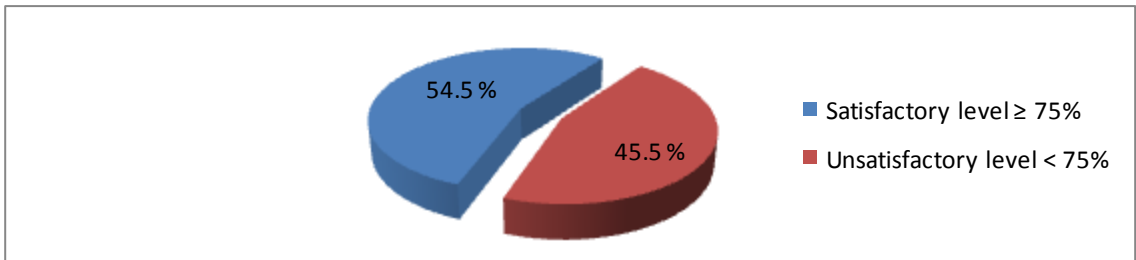

Figure 2 Nurses' practice level of satisfaction regarding prevention of HCV transmission in HDU (n=165)