Assessment of Nurses' Knowledge toward Infection Control Measures for Hepatitis B Virus in Hemodialysis Units

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الخلاصـــة:

الهـــدف: تقييم معارف الممرضين العاملين في وحدات الديلزة الدمويّة تجاه مقاييس السيطرة لعدوى التهاب الكبد الفيروسي نوع B، وتحديد العلاقة بين هذه المعارف والصفات الديموغرافيّة للممرضين.

المنهجيّـــة: أجريت دراسة وصفيّة في وحدات الديلزة الدمويّة في مستشفيات بغداد التعليميّة للفترة من **٥ كانون الأول ٢٠٠٧** ولغاية **٩ تشرين الأول ٢٠٠٨**. اختيرت عيّنة غير احتماليّة "غرضيّة" من (٥١) ممرض وممرضة يعملون في وحدات الديلزة الدمويّة في مستشفيات بغداد التعليميّة. جُمِعَت المعلومات من خلال استخدام استبانة مصمّمة و مكوّنة من جزئين، جزء شمل صفحة البيانات الديموغرافيّة و يحتوي (١٠) فقرات وجزء شمل صفحة معارف الممرضين المتكوّن من (٦) أجزاء فرعيّة تحتوي على (٧٩) فقرة، وتمّ جَمع المعلومات بطريقة المقابلة المباشرة مع الممرضين. حُدّدت مصداقيّة استمارة الاستبانة من خلال عرضها على (١١) خبير من ذوي الاختصاص وحُدّدت ثباتيّتها بإعتماد الاختبار وإعادة الاختبار (الدراسة المصغرة) و التي أجريت للفترة من ١٤- نيسان ٢٠٠٨ و لغاية ٥- آيار ٢٠٠٨. استخدمت إجراءات التحليل الإحصائي الوصفي (التكرارات، النسبة المئويّة، الوسط الحسابي) و إجراءات التحليل الاستنتاجي (معامل الارتباط ومعامل التوافق) في تحليل البيانات.

النتائـــج: أظهرت نتائج الدراسة أنّ هناك نقصاً وقلة في معلومات الممرضين في بعض الجوانب المتعلقة بمقاييس السيطرة على العدوى في وحدة الديلزة الدمويّة. كما وأظهرت النتائج عدم وجود علاقة معنويّة بين معارف الممرضين وبين (الجنس، الحالة الزوجيّة وسنوات الخدمة في المستشفى)، بينما أظهرت النتائج وجود علاقة معنويّة بين معارف الممرضين وبين (العمر، المستوى التعليمي، سنوات الخدمة في الديلزة الدمويّة، المشاركة في الدورات التدريبيّة والمدّة الزمنيّة للدورة التدريبيّة التي شارك الممرضين فيها.

التوصيات: أوصت الدراسة بضرورة إعداد وتصميم برنامج خاص لتدريب الممرضين في وحدات الديلزة الدمويّة وإصدار كتيب يَدويّ (فيما يتعلق بالمقاييس العالمية للسيطرة على العدوى التي يجب أن تطبّق في وحدة الديلزة الدموية)، بالإضافة إلى إجراء دراسة جديدة والتي من الممكن أنْ تقيّم ممارسات الممرضين فيما يتعلق بمقاييس السيطرة على العدوى في وحدات الديلزة الدمويّة.

Abstract

Objectives: to assess nurses' knowledge toward infection control measures for hepatitis B virus in hemodialysis units and to determine the relationship between nurses' knowledge and their demographical characteristics.

Methodology: A descriptive study was carried out at hemodialysis units of Baghdad Teaching Hospitals started from December 5th, 2007 to October 9th, 2008.
A non-probability "purposive" sample of (51) nurses, who were working in hemodialysis units were selected from Baghdad teaching hospitals. The data were collected through the use of constructed questionnaire, which consists of two parts (1) Demographic data form that consists of 10 items and (2) Nurses' knowledge form that consists of 6 sections contain 79 items, by means of direct interview technique with the nurses. The validity of the questionnaire was determined through presenting it to (11) specialist expert and its reliability was determined through a pilot study which was carried out through the period from April 14th, 2008 until May 5th, 2008. Descriptive statistical analysis procedures (frequency, percentage, mean of score) and inferential statistical analysis procedures (person correlation coefficient, contingency coefficient) were used for the data analysis.

Results: The findings of the study indicated that there is a knowledge deficit of nurses in some aspects relative to infection control measures. No significant relationship was found between nurses' knowledge and their gender, marital status and years of experience in hospital, while a significant relationship was found between nurses' knowledge and their age, level of education, years of experience in hemodialysis unit, sharing in training sessions and duration of training session that the nurses were engaged in it.

Key words: Infection control, HBV, Hemodialysis, Nurse

Introduction:

Hepatitis B Virus (HBV) infection has been became a worldwide health problem. It is associated with many serious manifestations and complications including acute and chronic hepatitis, cirrhosis, hepatocellular carcinoma (HCC), and hepatic failure [1,2]. So, viral hepatitis type B is a major health hazard for patients and staff in dialysis centers [3,4]. Chronic hemodialysis patients are at high risk for infection, because the process of hemodialysis requires vascular access for prolonged periods. In an environment where many

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patients receive dialysis concurrently; repeated opportunities exist for person to person transmission of infectious agents, directly or indirectly via contaminated devices, equipment and supplies, environmental surfaces, or hands of personnel. Furthermore, hemodialysis patients are immunosuppressed which increases their susceptibility to infection, and they require frequent hospitalization and surgery which increase their opportunities for exposure to nosocomial infection [1,5].

Dialysis staff members may become infected with HBV through accidental needle puncture or breaks in their skin or mucous membranes due to their frequent and continuous contact with blood and blood contaminated surfaces in the unit. So, dialysis patients may acquire HB infection in the unit, through internally contaminated dialysis equipment such as venous pressure gauges or filters, through injections if its site is contaminated with HBV, or through breaks in skin or mucous membrane when there is a contact with contaminated objects. However, dialysis staff may physically carry HBV from infected to susceptible patient via contaminated hands, gloves, and other objects [4].

Hepatitis B virus is presented extraordinarily high titers in blood and other body fluids of infected patients. Because the virus survives well in the environment, blood contaminated surfaces that are not routinely cleaned and disinfected represent a reservoir for transmission of HBV. Dialysis staff can transfer virus to patients from contaminated surfaces by their hands or through using contaminated equipment and supplies [6].

The nurse plays a critical role in preventing and controlling infection. This role begins with early detection and surveillance techniques [7]. Nurses, as the largest human resource element of healthcare system have a major role in providing ongoing and high-quality care to patients [8].

Methodology:

A descriptive study was carried out in order to achieve the early stated objectives. The study was initiated from December 5th, 2007 through October 9th, 2008. The study has been conducted on the Nursing staff who are working in Hemodialysis Units at Al-karama Teaching Hospital (6 nurses), Al-yarmook Teaching Hospital (8 nurses), Al-kadhimiyia Teaching Hospital (8 nurses), Al-kindy Teaching Hospital (11 nurses), Surgical Specialisties Hospital (11 nurses), and Baghdad Teaching Hospital (7 nurses) in Baghdad city.

A purposive "non-probability" sample of (51) nurses who have been working in hemodialysis units. The samples has been selected based on the following criteria: (1) Those who have been working in hemodialysis units. (2) Those that should have one year of experience in hemodialysis. (3) Those who are (21) years of age and older.

A questionnaire was designed and constructed by the researcher to measure the study variables. Such a construction was employed through the review of literature and related studies. The questionnaire consisted of 2 parts:

Part I: Demographic Data Form:

A demographic data sheet, consists of (10) items which included gender, age, marital status, level of education, years of experience in hospital, years of experience in hemodialysis units, sharing in training sessions concerned to hemodialysis which established by the hospital, sharing in training sessions concerned to hemodialysis which established by other hospitals, sharing in training sessions related to hemodialysis which established by other institutions, and duration of the training session.

Part Π: Nurses' knowledge form:

The second part of the questionnaire was comprised of (79) items that are concerned with nurses' knowledge toward infection control measures for hepatitis B virus in hemodialysis units which included six sections as following: Section one which includes (5) items presented the nurses' knowledge relative to the Surveillance—Serologic Testing. Section two includes (6) items presented the nurses' knowledge relative to the Record Keeping in patients' hemodialysis record.

Section three includes (7) items presented the nurses' knowledge relative to the Education "about control of hepatitis B virus infection" for all hemodialysis staff and patients in hemodialysis units.

Section four, this section includes (43) items presented the nurses' knowledge relative to the Control and Prevention measures for hepatitis B virus infection. Section five, this section includes (11) items presented the nurses' knowledge relative to the Cleanliness of the hemodialysis units. Section six, this section includes (7) items presented the nurses' knowledge relative to the Sterilization and Disinfection.

The items have been rated and scored according to the following patterns:

1. Three point likert scale is used for rating the items as know, uncertain, and don't know [9].
2. The three point type likert scale is scored as 3 for know, 2 for uncertain, and 1 for don't know.
3. The higher grade scoring of the questionnaire (MS) the greater knowledge toward infection control measures for hepatitis B virus in hemodialysis unit.

Content validity for the early developed instrument was determined through the use of panel of experts (who have had more than 5 years of experience in the job field) to investigate its clarity, relevancy, and adequacy in order to achieve the present study's objectives. A preliminary copy of the questionnaire was designed and presented to (11) experts.

A pilot study was conducted on purposive sample of (8) nurses which was selected from the AL-Yarmook Teaching Hospital in hemodialysis unit prior to the original study. The pilot study was conducted from April 14th, 2008 until May 5th, 2008.

Determination of reliability of the questionnaire was based on the test-retest method. The reliability coefficient of the nurses' knowledge as a whole of the questionnaire was ($r = 0.947$). The data have been collected through the use of a questionnaire and by means of the interview technique with the nurses who work in hemodialysis units (the study sample). The data collection process has been performed from May 15th, 2008 until June 7th, 2008. Each nurse spends approximately (25-30) minute to respond to the interview.

Data were analyzed through the use of statistical package of social sciences (SPSS). The statistical procedures which were applied for the data analysis and assessment of the results, included the following:

a. Descriptive statistics:
   - -Frequency (F) and Percentage (%).
   - -Mean of Score [9].
   - -Graphical presentation by Bar-charts (Appendix D).

b. Inferential statistics:

Such analysis was performed through the application of the following procedures:

b.1. Pearson correlation coefficient: it was used to estimate the scale (test-retest) reliability.

b.2. Contingency table structure: It was used in order to accept or reject the statistical hypothesis. It was depending on the distribution of the observed frequencies among different levels of the two factors which had been used or included. Whichever that got frequencies in each cell recorded the individuals responded to that recorded specific level of response on the measurement scale by the 1st factor and with the level of response of the measurement scale by the 2nd of the same cell. The other usefulness of the contingency table in addition to that can be summarized by testing the correlation value through the contingency coefficient according to the presence of constraint(s) effects which were assigned the impertinence from the random state of the observed frequencies distribution among the two independent factors [10, 11].

Confidence Level of the cause's correlation ships of the contingency coefficients proposed within not less than 75% interval should be meaningful {P- value ≤ 0.25} [11].

The formula for Contingency Coefficient is [12]:

Results:

Table 1. Distribution of nurses by their demographic characteristics.

Gender	Frequency	Percent	Cumulative %
Female	26	51.0	51.0
Male	25	49.0	100.0
Total	51	100.0	
Age	F	%	Cum. %
21-25	11	21.6	21.6
26-30	22	43.1	64.7
31-35	8	15.7	80.4
36-40	1	2.0	82.4
41-45	2	3.9	86.3
46 & more	7	13.7	100.0
Total	51	100.0	
Marital status	F	%	Cum. %
Married	29	56.9	56.9
Single	22	43.1	100.0
Total	51	100.0	
Level of education	F	%	Cum. %
Secondary nursing school graduate	2	3.9	3.9
Nursing institute graduate	41	80.4	84.3
Nursing college graduate	8	15.7	100.0
Total	51	100.0	
No. of years of experience in hospitals	F	%	Cum. %
1-5 yrs.	26	51.0	51.0
6-10 yrs.	11	21.6	72.5
11-15 yrs.	5	9.8	82.4
16-20 yrs.	5	9.8	92.2
21 yrs. & more	4	7.8	100.0
Total	51	100.0	
No. of years of experience in hemodialysis units	F	%	Cum. %
1-5 yrs.	29	56.9	56.9
6-10 yrs.	15	29.4	86.3
11-15 yrs.	2	3.9	90.2
16-20 yrs.	2	3.9	94.1
21 yrs. & more	3	5.6	100.0
Total	51	100.0	
Sharing in training sessions concerned to hemodialysis which established by the hospital	F	%	Cum. %
Yes	18	35.3	35.3
No	33	64.7	100.0
Total	51	100.0	
Sharing in training sessions concerned to hemodialysis which established by other hospitals	F	%	Cum. %
Yes	18	35.3	35.3
No	33	64.7	100.0
Total	51	100.0	

Sharing in training sessions concerned to hemodialysis which established by other institutions	Frequency	Percent (%)	Cumulative %
Outside the country	5	9.8	9.8
Inside the country	6	11.8	21.6
Not sharing	40	78.4	100.0
Total	51	100.0	
Duration of the training session	F	%	Cum. %
Not sharing	25	49.0	49.0
Less than one month	15	29.4	78.4
One month	8	15.7	94.1
Two months	2	3.9	98.0
Six months	1	2.0	100.0
Total	51	100.0	

Table (1) indicated that the majority of the study sample (51.0%) were female and the remaining were male, most of them were (26- 30) years old and accounted for (43.1%). Only 1 nurse was within the age group of (36- 40) years and accounted for (2%). In regard to the subject marital status, the majority of the sample were married and they accounted for (56.9%) of the whole sample.

Relative to their level of education, the greater number of them were nursing institute graduate and they accounted for (80.4%) of the sample and (3.9%) of them were secondary nursing school graduate. Concerning number of years of experience, the majority of the sample (51%) having 1-5 years of experience in hospitals, while (56.9%) having 1-5 years of experience in hemodialysis units.

The same results of the sample (64.7%) had no opportunity to be involved in training session which established by the hospital and by other hospitals.

With respect to the subjects sharing in training sessions concerning hemodialysis which established by other institutes, the majority of the sample were not sharing and they accounted for (78.4%) of the whole sample.

In regard to the duration of the training session, the majority of the study sample (49.0%) was not sharing in any training session and they did not have any time of training session related to hemodialysis and infection control measures.

Table 2. Knowledge of the nurses with 3 points level scale by total frequencies, mean score and comparative significant

List	Items	M.S	C.S
1	**Surveillance-Serologic testing**		
	1.1 surveillance-serologic testing for the health team, patients, and candidates for hemodialysis and potential employees	2,823	H.S
	1.2 duration of serologic test every month, every two months, every three months, and annually	2,823	H.S
	1.3 types of test methods used for HBsAg and Anti-HBs detection were:		
	1.3.1 radioimmunoassay	1,215	N.S
	1.3.2 reverse passive hemaglutination	1,431	N.S
	1.3.3 enzyme immunoassay	2,647	H.S
2	**Record keeping in patient's hemodialysis record that related to:**		
	2.1 lot number of blood or blood product given to the patient	3	H.S
	2.2 all mishaps, such as blood leaks, blood spills, and dialysis machine malfunction	2,686	H.S
	2.3 the name or number and location of the machine used for dialysis	2,725	H.S
	2.4 the name of the staff member who connect and disconnect the patient to and from the machine	2,784	H.S
	2.5 all hepatitis serologic test results including liver function test for patients and staff	2,941	H.S
	2.6 any accidental needle punctures and other accidents for both patients and staff (including time, place, patient and staff)	2,745	H.S

Table 2. (Continued)

3	**Education "about control of hepatitis B virus infection" for all hemodialysis staff and patients**		
	3.1 importance of the institution of educational program in hemodialysis unit	2,960	H.S
	3.2 the educational program includes appropriate training to control the infection for both staff and patients	2,823	H.S
	3.3 importance of educating the patients and nursing staff on the principles and practice of aseptic techniques	2,921	H.S
	3.4 the educational program instituted in a regular refresher courses	2,784	H.S
	3.5 the educational program explain "how involved by hepatitis" and once introduced to the hemodialysis unit will transmitted to both patients and staff	2,843	H.S
	3.6 the educational program explain how to control the spread of hepatitis in the dialysis unit, or in home with those who HBsAg +ve	2,960	H.S
	3.7 No. of educational program that are instituted in the unit monthly, every six months, and annually	2,274	S
4	**Knowledge concerning how to control, and preventive measures toward hepatitis virus infection**		
	4.1 the nurse plays a role as an officer with authority within the hemodialysis unit	3	H.S
	4.2 the patient who was HBsAg positive isolated in a separated room or unit designated for them only	2,980	H.S
	4.3 specific nurse was assigned to care for HBsAg positive patients, and another nurse to care for HbsAg negative during the same shift	2,882	H.S
*	4.4 change gloves and laboratory coats after caring for all patients, but not after each patient when care for more than one patient	2,313	S
*	4.5 washing hands after the connection of all patients when care for more than one patient	1,882	S
	4.6 be sure that no cross contamination occurs between area of dialysis unit when care for both HBsAg positive and seronegative patients during the same shift	2,843	H.S
*	4.7 using hemodialysis equipments for both HBsAg positive and seronegative patients too	2,784	H.S
	4.8 assigning specific number for dialysis chairs or beds and machines	2,803	H.S
*	4.9 cleaning and disinfecting chairs and beds after the last use	1,431	N.S
*	4.10 Changing the linen used on chairs and beds after the last use	1,431	N.S
	4.11 assigning specific supply tray for the patient (containing touniquit, marking pencils, antiseptic, and blood pressure cuff)	2,725	H.S
	4.12 using clamps, scissors, and other nondispossible items for one patient	2,450	S
	4.13 wearing gloves for your protection when taking blood pressure, injecting saline or heparin, or touching dialysis machine knobs to adjust flow rate	2,843	H.S
	4.14 wearing a fresh pair of gloves with each patient	2,843	H.S
	4.15 wearing gloves when handling blood specimen	2,803	H.S
	4.16 wearing protective eye glasses and surgical type mask during dialysis procedure	2,333	S
	4.17 wearing gowns or scrub suits all the times while working in the unit	2,647	H.S
	4.18 discard the gown used at the end of each day	2,686	H.S
	4.19 wearing a laboratory coat over your uniform when going to other area inside the hospital	2.764	H.S
*	4.20 cleaning and disinfecting or sterilizing non-disposable equipments after the last use	1,294	N.S
	4.21 wearing gloves during the cleaning procedure for your own protection	2,960	H.S
*	4.22 smoking, eating, or drinking is possible in hemodialysis unit	2,803	H.S
*	4.23 the patient shares smoking, eating, or drinking during dialysis with other patient or staff	2,960	H.S

Table 2. (Continued)

	4.24 cleaning the affected surface with appropriate disinfectant when a blood spill on floors, walls, equipments, or other surface	3	H.S
*	4.25 using the cleaned equipments and materials that are specified to hemodialysis unit in another area inside the hospital	2,686	H.S
	4.26 wearing gloves when cleaning the affected area of blood spill	3	H.S
*	4.27 increasing the number of staff and patient in hemodialysis unit (crowding inside hemodialysis unit)	2,156	S
	4.28 labeling of blood specimen of HBsAg positive person	2,980	H.S
*	4.29 the station of each patient with it's attendant equipments near from the neighboring station of other patient	2,137	S
	4.30 flags the charts of individuals with HBsAg positive distinguishing them from seronegative individuals	2,960	H.S
	4.31 testing the patients and staff for HBsAg before joining dialysis unit	3	H.S
*	4.32 returning the patients and nursing staff to hemodialysis unit after the treatment of HBV infection	1,745	S
*	4.33 it is possible to admit the patient to another hemodialysis unit for emergency treatment	2,568	H.S
	4.34 screening the patient and staff for other laboratory blood tests such as liver function test (including S.GOT, S.GPT, TSB, and others)	2,803	H.S
	4.35 giving the patient transfusion of blood or plasma in hemodialysis unit	2,882	H.S
	4.36 screening of the donor blood for HBsAg before given to the patient	2,901	H.S
	4.37 testing the blood of the patient, who received blood or plasma, for HBsAg monthly for a period of six months	2,803	H.S
	4.38 giving HBV vaccine to the patients and their relatives at a regular schedule	2,921	H.S
	4.39 giving HBV vaccine to the medical and nursing staff at a regular schedule	2,941	H.S
*	4.40 giving the anticoagulant (heparin) to the patients in hemodialysis unit together from one heparin vial	2,294	S
	4.41 training the patients and their relatives intensively in dialysis techniques including the care of the fistula puncture	2,607	H.S
	4.42 be sure that the patient's relatives are free from HBV infection when their patients are infected by HBV infection	2,921	H.S
	4.43 separate the toilet facilities of staff from toilet facilities of the patients and their relatives	2,941	H.S
5	**Knowledge about the cleanliness of hemodialysis unit**		
	5.1 the housekeeping remove the soil and waste regularly from hemodialysis unit	3	H.S
	5.2 the number of housekeeping must be enough according to the need of hemodialysis unit	2,941	H.S
	5.3 there is an adequate space in which the housekeeper can work	2,803	H.S
	5.4 the housekeeper is placing the disposable items in bags strong enough to contain the weight of discarded dialyzer and other items	2,921	H.S
	5.5 the bags that contain blood contaminated items should not leak	2,941	H.S
	5.6 the housekeeper use double bagging when filled with blood contaminated items	2,823	H.S
*	5.7 compacting the content of the bag by hands of the employee to make room for additional waste when it was overfilled	2,627	H.S
	5.8 putting or discard the needle and syringe in puncture proof containers after use	3	H.S
	5.9 covering the needle by needle cover directly after use to prevent injury before discarded it in the puncture proof container	3	H.S
	5.10 incinerating the disposable items or disposed of properly	2,921	H.S
	5.11 the linen bagged properly when containing potentially infected agents	2,803	H.S

Table 2. (Continued)

6	**Knowledge about sterilization and disinfection**		
*	6.1 disinfect or sterilize equipments and materials that are usable for more than one times before cleaning	1,313	N.S
*	6.2 using the disinfectant more than the sterilants materials	2,196	S
	6.3 cleaning the environment of the hemodialysis unit before sterilization and	3	H.S
	disinfection (including try, dialysis machine surface, surface of the patient table, etc.)		
*	6.4 using a physical method of sterilization like steam, boiling water only	2,588	H.S
	6.5 using chemical method of sterilization like ethylene oxide gas, formalin, sidex, etc.	2,705	H.S
	6.6 wearing gloves, gown, mask, protective eye glasses, during sterilization and disinfection	2,921	H.S
*	6.7 sterilization and disinfection are taken place within a limited and short time without the need of specific and enough time to finish those processes completely	2,431	S

M.S=Mean Score, C.S=Comparative Significant, H.S=Highly Significant, S=Significant, N.S=Non Significant, *= Converted score

Results related to nurses' knowledge toward infection control measures for hepatitis (B) virus in hemodialysis units were presented in table (2). These results were categorized and sorted to the major component of their control measures which includes Surveillance-Serologic testing, Record Keeping in patient's hemodialysis record, Education about control of hepatitis B virus infection, Knowledge concerning Control and Preventive measures toward Hepatitis virus infection, Knowledge concerning to Cleanliness of HD units, and Knowledge concerning Sterilization and Disinfection.

Table 3. Causes Correlation of the Contingency Coefficients and Significant Levels among Demographical Characteristics and Nurses' Knowledge (those working in Hemodialysis "HD" units)

Demographical Characteristics	Nurses' Knowledge		C.S
Gender	**C.C.**	**0.008**	**N.S**
	P-value	**0.952**	
	Confidence level	**0.048**	
Age	**C.C.**	**0.350**	**S**
	P-value	**0.212**	
	Confidence level	**0.788**	
Marital Status	**C.C.**	**0.060**	**N.S**
	P-value	**0.670**	
	Confidence level	**0.330**	
Level of Education	**C.C.**	**0.248**	**S**
	P-value	**0.189**	
	Confidence level	**0.811**	
Number of years of experience in hospital	**C.C.**	**0.281**	**N.S**
	P-value	**0.357**	
	Confidence level	**0.643**	
Number of years of experience in hemodialysis units	**C.C.**	**0.320**	**S**
	P-value	**0.214**	
	Confidence level	**0.786**	
Sharing in training sessions concerned to hemodialysis which established by the hospital	**C.C.**	**0.202**	**S**
	P-value	**0.142**	
	Confidence level	**0.858**	

Table 3. (Continued)

Sharing in training sessions concerned to hemodialysis which established by other hospitals	**C.C.**	**0.202**	**S**
	P-value	**0.142**	
	Confidence level	**0.858**	
Sharing in training sessions concerned to hemodialysis which established by other institutions	**C.C.**	**0.249**	**S**
	P-value	**0.186**	
	Confidence level	**0.814**	
Duration of the training session	**C.C.**	**0.327**	**S**
	P-value	**0.190**	
	Confidence level	**0.810**	

C.C= Contingency Coefficient, P-value= probability level of Contingency Coefficient

This table shows that there is a no significant relationship between nurses' knowledge and their gender, marital status and number of years of experience in hospital; while the table indicated that there is a significant relationship between nurses' knowledge and their age, level of education, number of years of experience in hemodialysis units, sharing in training sessions which established by the hospital- by other hospitals- by other institutions, and duration of the training session.

Discussion:

Throughout the course of the present study, it has been noticed in table (1) that approximately half of the study sample (51%) were females. The highest proportion (43.1%) of them was 26-30 years old. This finding comes along with a study which showed that the majority (82%) of the nurse staff in hemodialysis were female, their mean age was 24 years (range: 21-26 years) [13]. But these findings were disagreed with another study which reported that the majority of nurses in hemodialysis unit were male, with age group (21-30) years [14]. In regard to marital status, the majority (56.9%) of the sample were married. Concerning the level of education, most of them (80.4%) were nursing institute graduates. This result is consistent with the study which showed that more than half of the nursing staff in hemodialysis and peritoneal dialysis had graduated from institute [14], while in a study which was conducted to investigate knowledge of and practices towards universal precautions among health care workers and medical students in two university hospitals in Mazandaran Province, Islamic Republic of Iran, showed that the majority (64.3%) had bachelor degree in nursing [15]. Regarding years of experience in hospitals, more than half of the study sample had (1-5) experience years in hospitals that represented (51.0%). In a cross-sectional study, which was conducted at the hemodialysis units of University of the East Ramon Magsaysay Memorial Medical Center (UERMMMC) to determine the prevalence of HBV and HCV infection among hemodialysis patients and nursing staff, showed that the majority of the nursing staff had an average of 6 months (range: 0-24 months) years of experience in medical field in hospital [13], while it was showed that the majority (40.6%) of the nursing staff had 0-5 years of experience in hospital [15]. Regarding years of experience in hemodialysis units, most of them had (1-5) experience years in hemodialysis unit who accounted (56.9%), and this finding comes in agreement with the study which reported that the majority of the nursing staff had 20 months (range: 7-36 months) years of experience in hemodialysis units [13]. It was reported that (82.5%) of nurses had (1-3) years of experience in hemodialysis and peritoneal dialysis units [14]. The findings indicated that more than half of the study sample (64.7%) had no opportunity to be involved in training sessions concerning hemodialysis which were established by the hospital, and the same percent (64.7%) had no opportunity to be involved in training sessions concerning hemodialysis which were established by other hospitals, and the majority (78.4%) of the study sample had no opportunity to be involved in training sessions concerning hemodialysis which were established by other institutions neither

outside the country nor inside the country. Concerning duration of training session, the majority (49.0%) of the study sample did not share in any training sessions, therefore they did not have a specific time or duration of training session. It was stated that there was no continuous targeted educational program for the nursing staff in hemodialysis unit, but showed the importance of regular training and education of the staff is required [16]. This result was agreed with the study which reported that (95%) of the nursing staff had no training sessions after graduation. Based on the researchers' point of view, all nursing staff in hemodialysis units should be enrolled in training sessions to improve their knowledge and skills concerning infection control measures toward HBV [14].

The results indicated that there was no significant comparison relative to sub-item 3 (1.3.1., and 1.3.2) which was concerned with types of test methods used for HBsAg and Anti-HBs detection, that in sub-item 1.3.1. showed that 42 nurses did not know about radioimmunoassay test and in sub-item 1.3.2. showed that 38 nurses did not know about reverse passive hemaglutination test, (Table 2). It was stated that detection of HBsAg has evolved from immunodiffusion methods to reversed passive hemagglutination assays and to more sensitive enzyme immunoassays and radioimmunoassay, which can detect HBsAg at concentrations of $\geq$ 0.1 ng/ml and all patients and staff in hemodialysis units should make this diagnostic test in order to determine their infectivity status [17].

The findings also indicated that nurses who were working in HD units had adequate knowledge concerning record keeping in patient's dialysis record in HD units. On the other hand, those nurses needed to keep and develop their knowledge to be up-to-date of any new knowledge related to HD (Table 2). It was stated that at each dialysis visit the minimum recorded data needs to include: History, Physical exam, Appearance of access site, Character of pulse, Static and dynamic venous pressures, Standardized rates, Flow rates, Arterial pressure or venous pressure, and any special concerns that may be a predictor of a possible problem, such as excessive bleeding and/or declining blood flow rate, even if adequate on that day [18].

The results indicated that there was a highly significant comparison related to items 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 respectively and a significant comparison related to item 3.7. (Table (2). It was recommended to implementing continuous educating programs directed to nurses, doctors and patients in HD units was important [16]. It was stated that all nursing personnel be provided with a copy of information booklet that may help them in independent learning to improve their knowledge regarding responsibilities in patients' care and integrate it into their practice [19]. It was revealed that both nurse tutors and practitioners should have access to continuing education to enable them to take up a clinical teaching role, as well as to maintain competency in clinical nursing practice [20]. It was showed in a study which has been conducted to investigate nurses' knowledge about HCV and their practice in HD units in King Faisal Specialist Hospital and Research Center in Saudi Arabia that the majority (54%) of nurses received their education by a senior nurse or nurse educator [21].

Table (2) also indicated that there was no significant comparison related to items 4.9, 4.10, and 4.20 respectively. It was showed that only 33% of the nurses routinely cleaned the surface of machines, tables and the chairs among patients. Thus, the majority either never did the cleanliness, or did so only if they saw blood stains on the surface [16]. It was stated that after each patient treatment, cleaning environmental surfaces at the dialysis station must take place; including the dialysis bed or chair, counter top, and external surfaces of the dialysis machine [22]. It was clarified that after each dialysis, changing linen, and cleaning and disinfecting dialysis bed/chair and non-disposable equipment are very important (especially control knobs and other surface touched by gloved hands) [23]. It was stated that only 58% of nurses in high prevalence units clean the machine and table surface after each treatment, and this is a significant deviation from the CDC recommendations and may well responsible for the high prevalence in those units [21].

The results indicated that there was a highly significant comparison related to all items included in section five which showed that those nurses had adequate information about knowledge concerning HD unit's cleanliness and housekeeping and that those nurses should apply this knowledge to meet HD unit's needs and optimizing nursing actions and care toward patients in HD units in order to decrease the incidence of transmission of infection in the unit among the personnel (Table 2). It was stated that crowding patients or overtaxing staff may facilitate cross-contamination, and to avoid clutter, allocate adequate space to facilitate cleaning and house keeping, and shows that there is also new data about sterilizing and disinfecting techniques and manufactures are developing new uses for hemodialysis equipment, in addition to the need to update the clinical knowledge base [23].

The findings showed that there was no significant comparison related to item 6.1 and this result disagreed with literatures which explain and emphasis on the importance of cleaning any items and equipments used in HD units before disinfection or sterilization in order to reduce any dirt such as blood clot …etc, in these equipment before being sterilized or disinfected. It was stated that there were problems with HD machine disinfection in Tripoli HD units in Libya, that there was an occasion when the machines' specific sterilization solution was not available and the nurses had to use saline rinse only among patients [16]. It was stated that establishing of a written protocols for cleaning and disinfection of surfaces and equipment in the dialysis unit, including careful mechanical cleaning before the disinfection process [22].

Table (3) presented the relationship between nurses' knowledge and their demographic characteristics. It showed that there was no significant relationship at p-value (0.952) level between nurses' knowledge and their gender. It was showed in a study which was carried out to evaluate the effectiveness of information booklet on the knowledge of the nurse that there was no significant association between nurses' knowledge and their age [19].

Table (3) also showed that there was a significant relationship at p-value (0.212) level between nurses' knowledge and their age. This result was disagreed with the study which revealed that there was no significant relationship between nurses' knowledge and their age [19]. It was showed that knowledge was highest in 30-40 years old age group and lowest in the > 50 years group of the staff [15].

Table (3) presented that there was no significant relationship at p-value (0.670) level between nurses' knowledge and their marital status, this relationship within less than (75%) interval of confidence level should be meaningless. That means nurses (regardless of their marital status) work in the same circumstances in hospitals of Baghdad city; therefore, they had the same level of knowledge concerning infection control measures for HBV in HD units.

Table (3) showed that there was a significant relationship at p-value (0.189) level between nurses' knowledge and their level of education. This result was agreed with the finding of a study which reported that many authorities in education emphasized that the level of education has positive effect on the quality and quantity of knowledge and skills acquired by the recipient of education [24]. It was showed that there was significant associations between nurses' knowledge and their level of education as the graduate nurses have scored better than diploma nurses [19].

Furthermore, Table (3) presents that there was no significant relationship at p-value (0.357) level between nurses' knowledge and years of experience in hospital. This finding was agreed with the study which stated that there was no significant association between nurses' knowledge and length of clinical experience [19].

Regarding years of experience in HD units, table (3) showed that there was a significant relationship at p-value (0.214) level between nurses' knowledge and years of experience in HD units. Based on the researchers' point of view, years of experience in HD unit provide many opportunities to the nurses in order to improve their knowledge and practices and acquiring new information and to focus their efforts toward developing and optimizing their actions in HD units.

Relative to training sessions, tables (3) indicated that there were significant relationships between nurses' knowledge and sharing in training sessions in hospital at p-value (0.142), between nurses' knowledge and sharing in training sessions in other hospitals at p-value (0.142), and between nurses' knowledge and sharing in training sessions in other institutions at p-value (0.186) respectively. National Kidney Foundation has presented that there was a higher rate of infection in hemodialysis patients when new or inexperienced dialysis staff manipulates the patient's vascular access, because of this, all dialysis staff should be trained in infection control procedures [25]. These findings come along with the study which showed that previous training was found as having a significant effect on knowledge of a bloodborne infection in hemodialysis units that knowledge of universal precautions and methods of safe disposal were significantly higher among previously trained workers compared with untrained workers [26].

Table (3) also indicated that there was a significant relationship at p-value (0.190) level between nurses' knowledge and duration of the training sessions. It was showed that online education was available 24 h/day, 7 days/week, and eliminates the need for classrooms or commuting and scheduling specific class time; furthermore, the more the content can be related to the investigator's clinical experiences, the less time was needed to learn the information [27].

Recommendations:

1. Special training sessions should be designated and presented to all hemodialysis nurses that include specific education concerning serologic test that should be used to diagnose hepatitis B virus in hemodialysis units, specific education concerning cleaning, sterilization and disinfection procedure that should be followed in hemodialysis units.
2. Training session should be designated as a regular refresher courses and including the updated information about infection control measures.
3. A booklet should be designated and distributed to all nurses who work in hemodialysis units that include standard infection control measures that must be applied and followed in hemodialysis units.
4. Nurses who have the highest educational level should be assigned and worked in hemodialysis units.
5. Further studies are necessary in order to assess nurses' practice toward infection control measures in HD units and to demonstrate the outbreaks that occur in HD units which are responsible for increasing incidence of hepatitis infection.

References:

1. Karkar, A.; Abdelrahman, M.; Ghacha, R. and Malik, T.: Pervention of Viral Transmission in HD Units: The Value of Isolation, **Saudi J kidney Dis Transplant**, 2006, 17, 2, P.P.183-188.

2. Ping-Nam, W.; Siu-ka, M. and Kiu-Man, W.: Management of Chronic Hepatitis B Infection in Patients with End-Stage Renal Disease and Dialysis, Hepatitis B Annual, Kalinga Gastroenterology Foundation, Hong Kong, China, **Medknow Publications**, 2006, 3(1), P.P.76-105.

3. Foege, W.; Brachman, P.; Maynard, J.; Leger, R. and Petersen, N.: Control Measures for Hepatitis B in Dialysis Centers, CDC: Division of Healthcare Quality Promotion **(DHQP)**, 1997, 41.

4. Mayor, G.; Hourani, M.; Greenbaum, D. and Patterson, M.: Prevalence of Hepatitis B in 27 Michigan Hemodialysis Centers, **AJPH**, June 1979, 69 (6), P.P.581-584.

5. Koplan, J.; Hughes, J.; LeDuc, J.; Thacker, S.; Ward, J. and Hewitt, S.: Recommendations for Preventing Transmission of Infections among Chronic Hemodialysis Patients, CDC: U.S. Department of Health and Human Services, Atlanta: GA30333, **MMWR**, 2001, 50, No. RR-5.

6. Hendricks, K.; Sehulster, L.; Bell, R.; Cousins, J.; MacNeeley, W.; Payne, A.; and Others: Outbreaks of Hepatitis B Virus Infection among Hemodialysis Patients—California, Nebraska and Texas, CDC, **MMWR**: 1996, 45 (14), P.P.285-289.

7. Taylor, C.; Lillis, C.; LeMone, P. and Lynn, P.: **Fundamentals of Nursing: The Art and Science of Nursing Care**, 6th ed., Philadelphia: Lippincott William and Wilkins Company, by Wolters Kluwer business, 2008, P.P.706-722.

8. Nayeri, N.; Nazari, A.; Salsali, M. and Ahmadi, F.: Iranian Staff Nurses' Views of their Productivity and Human Resource Factors Improving and Impeding It, **BioMed Central, Human Resources for Health,** 2005, 3 (9) available from http://www.human-resources-health.com/content/3/1/9.

9. Polit, D. and Hungler, B.: **Nursing Research: Principles and Methods**, 6th ed., Philadelphia, Lippincott Williams and Wilkins, 1999, P.P.345-398.

10. Polit, D. and Hungler, B.: **Nursing Research: Principles and Methods**, 5th ed., Philadelphia: J.B. Lippincott Company, 1995, P.P.387-388, 413-414.

١١. النقيب، عبد الخالق: الإحصاء الحياتي، الطبعة الأولى، هيئة التعليم التقني، ١٩٩٢.

12. Stockburger, D.: **Introductory Statistics: Concepts, Models, and Applications**, 2nd ed., Southwest Missouri State University: by Atomic Dog Publishing, 2000.

13. Bernal-Sundiang, M.; Ho-Yu, R. and Ibarra, G.: The Prevalence of Hepatitis B and C among Chronic Hemodialysis Patients and Hemodialysis Staff Members at the UERMMMC, **Phil J Microbiol Infect Dis**, 1995, 24 (2), P.P.54-58.

14. Nihmatolla, R; Al-Barzengi, H. and Al-gersha, K.: Assessment of Infection Control Process at Hemodialysis and Peritoneal Dialysis Units in Kurdistan Region. (Thesis) University of Hawler, College of Nursing, 2005.

15. Motamed, N.; Baba Mahmoodi, F.; Khalilian, A.; Peykanheirati, M. and Nozari, M.: Knowledge and Practices of Health Care Workers and Medical Students towards Universal Precautions in Hospitals in Mazandaran Province, **WHO: Eastern Mediterranean Health Journal**, September, 2006, 12 (5).

16. Buargub, M.: The General Application of Standard Health Precautions in Tripoli Hemodialysis Units, Libya, **Saudi J kidney Dis Transplant**, 2005, 16 (2), P.P 201-205, available from http://www.sjkdt.org.

17. Mahoney, F.: Update on Diagnosis, Management and Prevention of Hepatitis B Virus Infection, **J Clinical Microbiology Reviews**, 1999, 12 (2) P.P.351-363.

18. Smith, D. and Garthwaite, T.: Hemodialysis Access via AV-Fistula, Department of Veterans Affairs; Veterans Health Administration, Washington DC 20240, February 21, 2001.

19. Paul, P.: Nurses' Knowledge of their Legal Responsibilities towards Patients' Care, **The Nursing Journal of INDIA**, 2007, Vol. XCVIII, No. 9.

20. Cheraghi, M.; Salasli, M. and Ahmadi, F.: Iranian Nurses' Perceptions of Theoretical Knowledge Transfer into Clinical Practice: A grounded Theory Approach, **Journal of Nursing and Health Sciences**, 2007, 9, P.P.212- 220.

21. Al-Ghamdi, S.: Nurses' knowledge and Practice in Hemodialysis Units: Comparison between Nurses in Units with High and Low prevalence of Hepatitis C Virus Infection, **Saudi J Kidney Dis Transplant**, 2004, 15 (1), P.P.34-40, available from http://www.sjkdt.org.

22. Alter, M. and Tokars, J.: Preventing Transmission of Infections among Chronic Hemodialysis Patients, **Nephrology Nursing Journal**, CNET Networks, Inc., aCBS Company, October, 2008.

23. Arduino, M.: Emerging and Re-emerging Nosocomial Infection in Hemodialysis, CDC update: Renal Research Institute, **Dialysis Times**, October 1998, 5 (4).

24. Abdul-Kareem S. Al-Mansory. Assessment of Nurses' Knowledge Concerning Peritoitis-Dialysis Associated in Baghdad Teaching Hospitals. (Thesis) University of Baghdad, College of Nursing, 2005. P.P. 78-88.

25. NKF: Guidelines for Vascular Access: Prevention of Complications: Infection, **Infection Control Measures Guidelines** 13-14-15, 2001, available from http://www.nkfAtoZhealthguideitems.htm.

26. Kabbash, I.; El-Sayed, N.; Al-Nawawy, A.; AbouSalem, M.; El-Deek, B. and Hassan, N.: Risk Perception and Precautions Taken by Health Care Workers for HIV Infection n Hemodialysis Units in Egypt, **WHO: Eastern Mediterranean Health Journal**, 2007, 13 (2).

27. Kotzer, A. and Milton, J.: An education Initiative to Increase Staff Knowledge of Institutional Review Board Guidelines in the USA, **Nursing and Health Sciences**, Blackwell Publishing, 2007, 9, P.P.103-106.