# Nursing Staffs' Knowledge and Practice regarding Prevention of Hepatitis C Virus Transmission in Hemodialysis Units

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**Abstract:** *Egypt has one of the highest hepatitis C virus (HCV) prevalence in the world, WHO reported that the prevalence of HCV among patients in Egypt reached 48%, which is alarming and should taken seriously. Hemodialysis precautions are essential in preventing the transmission of HCV in hemodialysis units. Therefore, it is important to assess nurses' knowledge and practice regarding prevention of HCV in hemodialysis units. Aim: The aim of the study was to assess nursing staffs' knowledge and practice regarding the prevention of hepatitis C virus transmission in hemodialysis units. Study design: A descriptive exploratory study was utilized to fulfill the aim of the study. Sample: A convenient sample of all hemodialysis nurses (60 nurses) in two hemodialysis units at Ain Shams University Hospital, Egypt. Tools: Two tools were designed to collect data pertinent to the study: a) self- administered questionnaire to assess nurses' level of knowledge and b) Observational checklist used to assess nurses' level of practice. Results: showed that (55.6%) of the studied nurses have a satisfactory level of knowledge regarding prevention of HCV transmission, while majority of them (91.1%) have unsatisfactory level of practice regarding prevention of HCV transmission in hemodialysis units. Recommendations: Nursing guidelines program should be designed and implemented to all hemodialysis nurses to enhance their knowledge and practice regarding prevention of HCV transmission in Hemodialysis units.*

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## I.    Introduction

Hemodialysis (HD) is one of several renal replacement therapies (RRTs) used in the treatment of renal failure to remove excess fluids and waste products and to restore chemical and electrolyte imbalances. Hemodialysis today moves towards innovative techniques, biomaterials and devices with an absolute need for solid evidence around every new treatment or technology (Shimokura et al., 2011). The number of patients being treated for end stage renal disease ESRD globally was estimated to be 2,786,000 at the end of 2011 and, with a 6-7% growth rate, continues to increase at a significantly higher rate than the world population. Of these 2,786,000 ESRD patients, approximately 2,164,000 were undergoing HD treatment (Fresenius Medical Care, 2012).

The hemodialysis procedure started as an external vascular circuit through which the patients' blood is transferred into polyethylene tubing to the dialysis filter or membrane (dialyzer) via a mechanical pump. The patients' blood then passes through the dialyzer on one side semi-permeable membrane and is returned to the patient. The dialysate solution, which consists of purified water and electrolytes, is pumped through the dialyzer counter current to the flow of blood on the other side of the semi-permeable membrane. In most cases, systemic anticoagulation (with heparin) is used to prevent clotting of the hemodialysis circuit. (Jones, Brenda, 2009; & Longo, 2012).

Hepatitis C virus has been estimated to infect approximately 2-3% of the world's population (estimated that 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 (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.

Prevalence of HCV has been shown to have a worldwide distribution, occurring among people of all ages, genders, races and regions of the world. It has been estimated to infect approximately 2-3% of the world's population. Central and East Asia and North Africa/Middle East are estimated to have high prevalence(>3.5%); South and Southeast Asia, sub-Saharan Africa, Andean, Central, and Southern Latin America, Caribbean,

Oceania, Australasia, and Central, Eastern, and Western Europe have moderate prevalence (1.5%-3.5%) ; whereas Asia Pacific, Tropical Latin America, and North America have low prevalence (<1.5%) (WHO, 2014; Mohd Hanafiah, Groeger, Flaxman, & Wiersma, 2013)

Hepatitis c virus is a small single-stranded, enveloped virus belonging to the Hepacivirus genus within the Flaviviridae family (Pozzetto, Memmi, Garraud, Roblin, & Berthelot, 2014; Preciado et al., 2014). HCV components are both structural and nonstructural. The nonstructural genes encode various enzymes including a polymerase responsible for replication of HCV. Different patient isolates are grouped into seven genotypes and more than 100 subtypes (Prakash et al., 2014; Nakano, GMG Lau, GML Lau, Sugiyama & Mizokami, 2012; Doerrbecker et al., 2011). Genotypes 1a and 1b are found worldwide and cause approximately 60% of all cases of infection. This diversity has distinct consequences; as different genotypes vary in their responsiveness to treatment and their tendency to cause insulin resistance, steatosis, and progression to cirrhosis, fibrosis and hepatocellular carcinoma (Zhang, Gwinn, & Hu, 2012).

Nursing staff must take adequate precautions and implement appropriate practices that will substantially reduce the risk of workplace transmission of blood borne infection to patients and staff within the dialysis units. Various evidence-based guidance have been published for the prevention of healthcare-associated infections (HAI) in all HD settings in order to globalize and share the evidence, as CDC recommendations, APIC guide to the elimination of infections in HD (2010) and KDIGO Clinical Practice Guidelines, by (Elamin, & Abu-Aisha, 2011).

Erasing HCV from hospital environment is essential for preventing its spread to patients. As an enveloped virus, HCV is fragile outside the human body and sensitive to most of the antiseptics and disinfectants, including hydro-alcoholic solutions used for hand disinfection. However, in plasma, it can survive drying and environmental exposure to room temperature for at least 16 hours (on equipment, clothing, and so on); it is why hypochlorite solution should be used as surface disinfectant for blood contaminated spills (CDC, 2013;WHO, 2013).

All equipment, including the front of the dialysis machine, should be considered contaminated after a patient dialysis session. (Papadakis M, McPhee, 2014) emphasized that cleaning and disinfecting non-critical surfaces in patient-care areas are part of standard precautions, and it is important for frequently touched surfaces, especially those closest to the patient, that are most likely to be contaminated (e.g., HD chairs, HD machines, carts, bedrails, bedside tables, commodes, doorknobs, sinks, surfaces and equipment in close proximity to the patient).

During the dialysis session, if the external transducer protector filter becomes wet with blood or fluid, it must be replaced immediately and the transducer inspected. If blood or fluid is visible on the side of the filter that connects to the machine, inspection of the internal hardware of the dialysis machine must be performed prior to use on subsequent patients(Drummer, 2014). A qualified biomedical engineer or a trained and qualified dialysis HCW must inspect the external and internal hardware for blood or fluid intrusion. If the equipment has been contaminated with either blood or fluid, the internal lines and filter must be replaced and the external machine connector port disinfected with an intermediate level disinfectant such as 1:100 bleach solution. (Pozzetto et al., 2014; Lawson, 2012; Zhang et al., 2012; Yu & Chiang, 2010).

Regarding waste management, needles should be disposed of in closed, unbreakable containers that should not be overfilled. A "no touch" technique should be used to drop the needle into the container, as it is likely to have a contaminated surface. If this is difficult due to the design of the container, staff should complete patient care before disposing of needles. The used extracorporeal circuit (bloodlines and dialyzer) should be sealed as effectively as possible before transporting it from the dialysis station in a fluid-tight waste bag or leak-proof container. If it is necessary to drain the circuit, or to remove any components for reprocessing, this should be done in a dedicated area away from the treatment and preparation areas (APIC, 2010).

Nurses must be skilled in renal nursing, maintain a high standard of clinical practice, have excellent communication skills, and develop their individual leadership and management abilities. Nurses should be involved in multi professional discussions where decisions are made about changes in patient treatment. In addition, nurses require the clinical skills and competencies to manage renal patients in different stages of their illness and on particular RRT modalities. (Bouallègue et al., 2013).

Many infection control measures, such as appropriate hand hygiene, consistent use of aseptic technique, cleaning and disinfection practices are simple and of low-cost, but require staff accountability and behavioral change, in addition to improving staff education, reporting and surveillance systems. (Benson & Powers, 2011).

Infection control and prevention is the responsibility of the nurse, and represents an integral element of patients' safety program (Liza, Kim, Rose & Stephen, 2012). It encompasses the processes and activities which identify and reduce the risks of acquiring and transmitting endemic or epidemic infections among individuals (David & Famurewa, 2010). Therefore, nurses should have professional and ethical responsibilities to make sure

that their knowledge and skills regarding infection control are up-to-date and they practice safely and competently at all times (Eskander, Morsy & Elfeky, 2013).

## II. Aim of the study

The aim of this study was to assess nursing staffs' knowledge and practice regarding prevention of hepatitis C virus transmission in hemodialysis units.

## III. Research questions

1. What is the level of nursing staffs' knowledge regarding prevention of HCV transmission in hemodialysis units?
2. What is the level of nursing staffs' practice regarding prevention of HCV transmission in hemodialysis units?
3. Is there a relation between nurses' knowledge and practice regarding prevention of HCV in hemodialysis units?

## IV. Material & Methods

**Study design**: A descriptive exploratory study was utilized to fulfill the aim of the study.

**Sample**: A convenient sample of all hemodialysis nurses (60 nurses), 20 of them were males and 40 of them were females, providing direct patients care and agreed to participate in the study. Their mean age (21.9 ± 10.75 SD) and (70%) of them have diploma. (36.7%) of them were having experience between 5to10 years in the field of hemodialysis.

**Setting**: the study was conducted in all hemodialysis units at Ain Shams University Hospital, Egypt. There were two units in the second floor.
* The first unit consisted of one mean unit for the HCV and HBV negative patients (14 machines) and HCV and HBV positive patients (4 machines). The nurse patient ratio was nearly 1:2 or 1:3.
* The second unit consisted of one main unit for the HCV and HBV negative patients (10 machines) and HCV and HBV positive patients (4 machines). The nurse patient ratio was nearly 1:2 or 1:3.
  **Tools**: Two tools were designed to collect data pertinent to the study: a) self- administered questionnaire to assess nurses' level of knowledge and b) Observational checklist used to assess nurses' level of practice.
  I. Knowledge Assessment Questionnaire (TOOL1):
* A modified Arabic self- administered questionnaire was developed by the researcher guided by the original tool developed by (Bianco et al., 2013) and reviewing literatures (Alpers, 2009; Eid and Abd el-Aziz, 2013; Hussein & Mooij, 2010; Jeong et al., 2014; and WHO, 2014; Radha, 2012; Setia et al., 2014). It consisted of two main parts:

**1. Part one:** concerned with demographic characteristics of nurses which includes: age, gender, educational level, and years of experience in nursing practice and in hemodialysis units.
**2. Part two:** it concerned with nurses' knowledge regarding prevention of HCV transmission in hemodialysis units. It consisted of 29 true/false questions and 12 questions in a form of Likert scale as follows:
**A) Knowledge related to HCV infection** (13 true/false questions) and includes**:**
1. Transmission patterns (8 questions)
2. Prevention strategies (5 questions)
**B) Knowledge related to preventive practices against HCV infection** (16 questions)
1. Practices about usage and replacement of gloves and hand washing (11 questions)
2. Practices about handling of non-disposable items (1 question)
3. Practices about use of personal protective equipment (4 questions)

**c) Knowledge and practice characteristics might be determinants of positive nurses' attitude** (12 Likert scale questions).

*Scoring system:* a total score of 29 grades; each correct answer has got one grade. The total scores were classified as follows:
o Scores less than 22 (≥ 75%) was considered as unsatisfactory knowledge level.
o Scores equal to or more than 22 (≤75%) was considered as satisfactory knowledge level.

**II. Nurses' practice Observational Checklist (TOOL 2):**
* 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 tool comprised 19 steps, divided into four main categories:

**a) Hygienic precautions:** (8 steps)
• As washing hands with soap and water before and after contact with a patient, wearing disposable gloves when caring for a patient and removing gloves when leaving the dialysis station ...etc.

**b) Equipment management:** (7 steps)
• As dispose single-use items and disinfect non disposable items required in the dialysis process after use on one patient, do not move medications and other supplies between patients, wipe all potentially contaminated surfaces after each session at the dialysis station (chairs, beds, tables, machine…etc) with a low-level disinfectant if not visibly contaminated,… etc.

**c) Waste management**: (3 steps)
• Sharp containers located as close as possible to the point of generator, and use a "no- touch" technique to drop the needle into the container (if this difficult due to the design of the container, staff should complete patient care before disposing of needles).

**d) Compliance to isolation precautions:** (one step)
*Scoring system:* each item categorized into either done correctly "took one grade" or not "took zero grade". The checklist was carried out three times by the investigator and the average mean was taken for each nurse. The total scores of the checklist were 55 grades. The scoring system was classified as follows;
o Scores equal or more than 49.5 ($\geq 90\%$) was considered as a satisfactory practice level.
o Scores less than 49.5 ($< 90\%$) was considered as an unsatisfactory level of practice.

**Tools validity and reliability:** content 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 tools to a panel of experts. It is consisted of seven faculty members as follows: four faculty members in medical surgical nursing specialty, and three nephrologists. 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. Reliability of the tools was tested using the weighted kappa which showed satisfactory test-retest reliability for the questionnaire score (kappa scores > 0.7).

**Pilot Study** a pilot study was conducted on 10 % of the sample (5 nurses) to judge the feasibility of the study, objectivity, and test the applicability of the tools. No considerable modifications were done and the final format was developed. Nurses who shared in the pilot study were included in the actual study.

**Protection of Human Rights:** for ethical reasons, a primary permits was granted from the hospital director to apply this study. Also at the initial interview, each legible nurse was informed about the aim of the study and its importance. The researcher emphasized that participation in the study is entirely voluntary, and anonymity and confidentiality were assured through coding the data. Oral approval consent was taken from each nurse who agreed to participate in the study; also they were assured that they have the right to withdraw from the study at any time. As well as the obtained information will be used only for the purpose of the study.

**Field work:** The current study was carried out in two phases; including preparation and implementation.

**1. Preparation phase:**
Preparation phase was concerned with the construction and preparation of data collection tools after extensive review of literature, previous studies and preparation of a collection tools, previous studies and seeking expert's advice. The content of data collection tools were reviewed by a panel of medical surgical nursing and medical experts to ensure its validity. Then, a letter sent to the director of an Ain shams University hospital, seeking his approval for collecting data of the study. Nursing managerial meeting was carried out by the researcher to clarify the aim and the nature of the study to gain their cooperation, afterwards the pilot study was carried out.

**2. Implementation phase:**
• Once official permission was granted to proceed with the proposed study, each legible nurse was contacted by the researcher to explain the nature and aim of the study.

- 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 HCV transmission in HD units. It took about 15-20 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.
- The data collection phase was between Februarys to May, 2017.

**Statistical analysis**
Obtained data were tabulated, computed and analyzed using the statistical package for social sciences (SPSS) program version 21, descriptive statistics including frequency and percentage distribution, mean, standard deviation and correlation coefficient were utilized. The level of significance was considered at the 5% level (P = 0.05).

**Limitation of the study**
1. Findings of the study were limited to a small number of (45) nurses. Therefore, it may not be necessarily representative for the general population of nurses' knowledge and practice regarding prevention of HCV in HDUs.
2. Researcher findings are less amenable to generalization because the sample was selected from one geographical area in Egypt (Ain Shams university hospital).

## V.  Results

It can be seen from Table (1) that more than two third of the studied subjects (66.7%) were females. Majority (80%) of them age was in the early adulthood; between 20-30 years, with a mean age of (21.9 ± 10.75 SD. As regards to educational level (68.9%) of them were have diploma nursing. As regard years of experience in nursing and in HD, (40%) were having experience between 5-10 years in the field of HD with a mean years of experience of (10.245 ± 7.829).

Table (2) shows that the total mean knowledge scores of the studied subjects were (20.58 ± 5.16) out of 29.

Figure (1) shows that (55.6%) of have satisfactory levels of total knowledge regarding prevention of HCV transmission in hemodialysis units.

Table (3) shows the percentage distribution of the nurses' knowledge regarding preventive practices against HCV infection in HDU. Majority of studied nurses (90.1, 93.3% & 80%) reported that they always wear gloves when connecting patients on dialysis, when disconnecting patients off dialysis and whenever providing care to patient respectively. And all of nurses (100%) reported that they always exchange gloves for each patient. Nearly about half of studied subjects (48.3, 44.4%) reported that they should wear mask and gown when splattering of blood onto face and eyes are possible.

Table (4) shows knowledge and practice characteristics that might be determinants of nurses' positive attitudes. Almost all of nurses agreed that routine serologic testing for HCV infections, when patients first start hemodialysis, isolation of HCV patient should be included in medical record, and testing for HCV should be performed periodically (97.8%, 93.3%, 97.8% and 100% respectively). Also, (93.3%) of the studied nurses believed that they are at risk of becoming infected with HCV by working in HDU. While, more than two third (66.7%) of nurses agreed that HCV can be spread from patient-to-patient in the HDU.

Table (5) shows that the total mean practice score was (14.91 ± 2.12) out of 55 grade.
Figure (2) shows that majority (91.1%) of the studied subjects have unsatisfactory level of practice regarding prevention of HCV transmission in HDU.
Regarding hygienic precautions that prevent transmission of HCV in HDU Table (6) shows that, the studied nurses observed to wash hands before and after contact with patient were (8.9% and 15.5%) respectively. More than two thirds of them (68.9%) wear disposable gloves when caring for a patient; while less than quarter of nurses (13.3%) wear it when touching any potentially contaminated surfaces. No one of them asked patients to clean their hands, or use an alcohol gel rub, neither when arriving nor when leaving the dialysis station. There were no protective clothes used in the units totally.

Table (7) shows that there was no significant statistical relation between knowledge score and the selected demographic variables.

Table (8) shows a significant statistical relation between total practice scores and gender.

Table (9) reveals that there is no significant statistical correlation between total knowledge and total practice scores.

**Table no 1:** Percentage Distribution of the Studied Subject as regard to the selected demographic variables (n=45)

| Items | (N=60) | % |
|---|---|---|
| **Age group (years):** | | |
| 20- < 30 | 36 | 80.00 |
| 30- <45 | 9 | 20.00 |
| Mean±SD | 21.9 ±11.75 | |
| **Gender:** | | |
| Male | 15 | 33.3 |
| Female | 30 | 66.7 |
| **Qualification:** | | |
| Bachelor degree | 14 | 31.1 |
| Diploma | 31 | 68.9 |
| **Years of experience:** | | |
| < 5 | 24 | 53.3 |
| 5- <10 | 18 | 40 |
| 10- <15 | 3 | 6.7 |
| Mean±SD | 10.245 ± 7.829 | |
| **Received training courses:** | | |
| Yes | 17 | 37.8 |
| No | 28 | 62.2 |

**Table no 2:** Total and Subtotal Knowledge Scores of the Studied Subjects as regard Transmission and Prevention Patterns of HCV; and Preventive Practices against HCV Infection in HDU (N=45)

| Items | Total score | Mean±SD |
|---|---|---|
| **Total knowledge score** | 29 | 20.58 ± 5.16 |
| **Subtotal score:** | | |
| • Knowledge related to transmission and prevention patterns of HCV | 13 | 9.13    2.63 |
| • Knowledge related to preventive practices against HCV infection in HDU | 16 | 11.45 ± 3.24 |

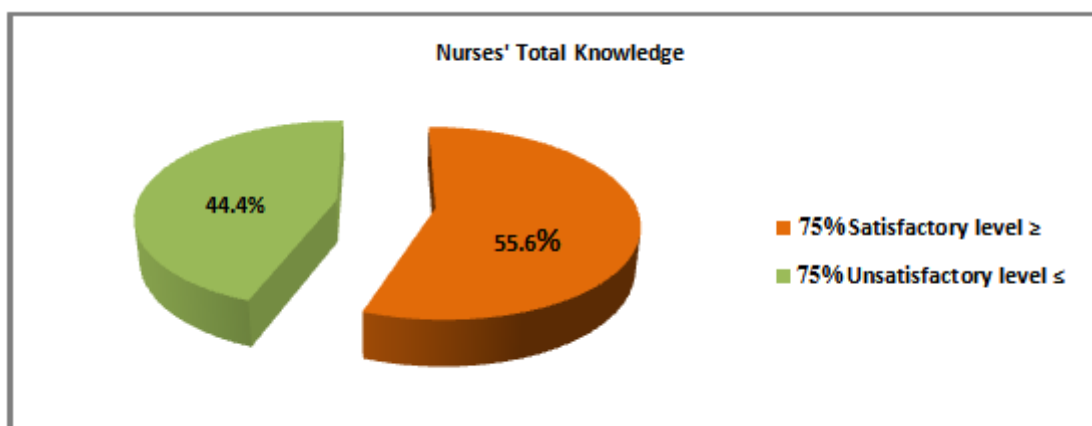**Figure no1:** Nurses' total level of knowledge regarding prevention of HCV transmission in HDU (n=45)



**Table no 3:** Percentage distribution of nurses' knowledge regarding preventive practice against HCV Infection in HDU (N=45)

| Items | Satisfactory | | Unsatisfactory | |
|---|---|---|---|---|
| | **No** | **%** | **No** | **%** |
| **You always wear gloves when:** | | | | |
| • Connecting patients on dialysis | 41 | 91.1 | 4 | 8.9 |
| • Disconnect patient off dialysis | 42 | 93.3 | 3 | 6.7 |
| • Whenever providing patient care | 36 | 80 | 9 | 20 |
| • Preparing the dialysis machine | 12 | 26.7 | 33 | 73.3 |
| • Using equipment | 13 | 28.9 | 32 | 71.1 |
| **You always exchange gloves:** | | | | |
| • For each patient | 45 | 100 | 0 | 0 |
| • Before administering IV medications | 35 | 77.8 | 10 | 22.2 |
| • After Dealing with non-disposable equipment | 32 | 71.1 | 13 | 28.9 |
| **Individual protective equipment wear when:** | | | | |
| • Mask when splattering of blood onto face is possible | 22 | 48.9 | 23 | 51.1 |
| • Eyewear when splattering of blood into eye is possible | 15 | 33.3 | 30 | 66.7 |
| • Gown when splattering of blood onto clothes is possible | 12 | 26.7 | 33 | 73.3 |
| • Cap when splattering of blood onto head is possible | 20 | 44.4 | 25 | 55.6 |

**Table no 4:** Percent distribution of Knowledge and practice characteristics that might be determinants of nurses' positive attitudes (n=45)

| Items | Agree % | Uncertain % | Disagree % |
|---|---|---|---|
| Routine serologic testing for HCV infections should be included in medical record | **97.8** | **2.3** | **0** |
| Testing for HCV should be performed when patients first start hemodialysis | **93.3** | **2.3** | **4.4** |

| | | | |
|---|---|---|---|
| Testing for HCV should be performed periodically in hemodialysis patients | **100** | **0** | **0** |
| Previous bloodstream infections should be included in medical record | **95.6** | **4.4** | **0** |
| Isolation of HCV-infected patients is recommended | **97.8** | **2.3** | **0** |
| The use of dedicated dialysis machines for HCV infected patients is recommended | **97.8** | **2.3** | **0** |
| Nurses are at risk of becoming infected with HCV by working in HDU | **93.3** | **2.3** | **4.4** |
| HCV can be spread from patient to patient in the HDU | **66.7** | **6.6** | **26.7** |
| Transmission of blood-borne pathogens among nurses may be prevented through adoption of evidence-based practices | **90.9** | **9.1** | **0** |
| Wearing gloves does not replace the need of hand washing | **91.1** | **2.3** | **6.6** |
| Hand washing between patient contacts reduces the risk of HCV infection | **84.4** | **9.1** | **6.5** |

**Table no 5:** Total and subtotal practice score of nurses regarding prevention of HCV transmission in HDU
(n=45)

| Items | Total score | Mean±SD |
|---|---|---|
| **Total practice score** | 55 | 14.91 ± 2.12 |
| **Subtotal score:** | | |
| • Total hygienic precaution score | 24 | 5.91 ± 2.12 |
| • Total equipment management score | 21 | 6 |
| • Total waste management score | 9 | 3 |
| • Application of isolation precautions | 1 | 0 |

**Figure no 2:** Nurses' total level of practice regarding prevention of HCV transmission in HDU (n=45)
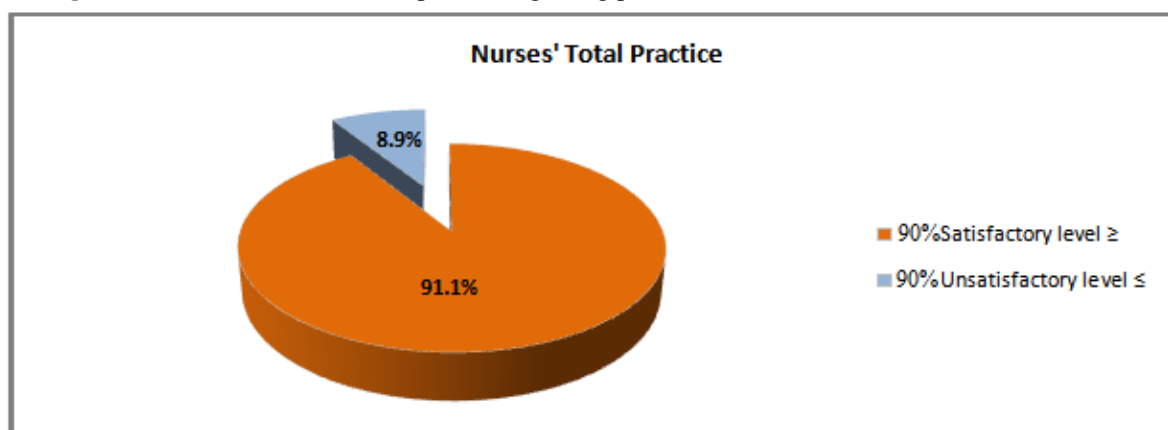


**Table no 6:** Percentage Distribution of nurses' practice related to Hygienic Precautions that Prevent Transmission of HCV in HDU (N=45)

| Items | Done correctly | |
|---|---|---|
| | **No** | **%** |
| **Hygienic Precautions:** | | |
| • Wash hands with soap or an antiseptic hand-wash and water, before contact with a patient. | 4 | 8.9 |

| | | |
|---|---|---|
| • Wash hands with soap or an antiseptic hand-wash and water, after contact with a patient. | 7 | 15.5 |
| • Wear disposable gloves when caring for a patient. | 31 | 68.9 |
| • Wear disposable gloves when touching any potentially contaminated surfaces at the dialysis station. | 6 | 13.3 |
| • Remove gloves when leaving the dialysis station. | 0 | 0.00 |
| • Ask patients to clean their hands, or use an alcohol gel rub, when arriving at the dialysis station. | 0 | 0.00 |
| • Ask patients to clean their hands, or use an alcohol gel rub, when leaving the dialysis station | 0 | 0.00 |
| • Wear individual protective equipment | 0 | 0.00 |

**Table no7:** Relation between nurses' knowledge score and the selected demographic variables (independent t test relations) (n=45)

| Variables | X ± SD | Test of sig. | P value |
|---|---|---|---|
| **Gender**: | | | |
| • Male | 21.50 ± 4.696 | t=0.998 | P = 0.740 (NS) |
| • Female | 20.06 ± 5.401 | | |
| **Level of Education:** | | | |
| • BSN | 19.55 ± 4.009 | t= 0.742 | P = 0.330 (NS) |
| • Diploma Nursing | 20.84 ± 5.417 | | |

**Table no 8:** Relation between nurses' practice score and the selected demographic variables (independent t test relations) (n=45)

| Variables | X ± SD | Test of sig. | P value |
|---|---|---|---|
| **Gender**: | | | |
| • Male | 14.85 ± 1.226 | t= 0.155 | P = 0.042* (S) |
| • Female | 14.94 ± 2.508 | | |
| **Level of Education:** | | | |
| • BSN | 15.14 ± 2.268 | t= 1.614 | P = 0.184 (NS) |
| • Diploma Nursing | 14.00 ± 1.00 | | |

**Table no 9:** Correlation between total nurses' knowledge and total nurses' practice scores (n=45).

| Variables | X ± SD | r | P value |
|---|---|---|---|
| • Total knowledge scores | 20.58 ± 5.159 | 0.154 | 0.263 |
| • Total practice scores | 4.967 ± 0.707 | | (NS) |

## VI.    Discussion

The findings of the current study that answered the first stated research question which was "What is nursing staffs' level of knowledge regarding Prevention of HCV transmission in the HDUs?" revealed that  more than half of the studied subjects have got a satisfactory level of total knowledge, with the mean (20.58 ± 5.16) out of 29 scores.

This findings were consistent with the study done by (Cekin,Y. Cekin and Ozdemir,2013) entitled "the level of  knowledge and attitude toward and emphasis given to HBV and HCV infections among healthcares

professionals: data from a tertiary hospital in Turkey". The study had a total of 206 healthcare professionals (mean age was 37.0±6.3 years and 86.9% were females) 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 (51.5%) participants were found to be satisfactory.

However; On the other hand, in a study of medical groups, done by (Setia, 2014) entitled "attitudes and awareness regarding hepatitis B and hepatitis C amongst healthcare workers of the tertiary hospital in India". Results showed that the level of awareness regarding the modes of transmission and vaccination was unsatisfactory. The researcher 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).

Regarding the level of nurses' knowledge related to preventive practices against HCV infection, the study findings revealed that more than two third of nurses have unsatisfactory level of knowledge 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 (Pozzetto et al. ,2014).; 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, (El-Enein and El Mahdy,2011) 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.

On the other hand (Abdel-satir, 2013) study entitled "evaluation of nurses awareness and practice of hemodialysis access care in Khartoum State, Sudan" included 50 randomly selected HD nurses, revealed that most nurses (98%) knew that knowledge regarding preventive practices were necessary to prevent infection.

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 two third of the studied nurses were diploma nurses graduated and this is also the most predominant level of education in HDU.

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 prevention of HCV 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 (Frazer, Glacken, Coughlan et al. ,2011) study in surveying nurses working in primary care, reported that almost (90%) of respondents agreed that infection-control precautions would protect them from acquiring HCV.

On the other side; the European Renal Best Practice (ERBP) by (Covic et al. ,2009) and International Society of Nephrology (ISN) by (Abboud et al. , 2008) support the other opinion that considered the implementation of universal hygienic measures as the standard of care, and isolation might be only considered as an additional optional measure in those centers with a high HCV prevalence.

The current study finding that answered the second research question "What is nursing staffs' level of practice regarding prevention of HCV 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 (Bakey, 2014) 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 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 researcher may interpret this deficit in practice level regarding prevention of HCV transmission 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 M., Gholap, and Shinde, 2014) 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.

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.

In accordance with the study results, (El-Eneina and El Mahdy, 2010) study showed that none of the nurses washed hands before and after the different activities that required hand washing or the use of plastic aprons or face protection among nurses in the dialysis unit in a University Hospital in Alexandria despite that (47.1%) correctly knew that they had to wash their hands before and after caring for a patient in.

On the other hand; a study done by (Chenoweth et al. ,2015) 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 (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.

The finding of the present study showed that there was no 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 (Cekin,Y. Cekin and Ozdemir,2013) 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, (Joukar et al., 2012) 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 (Bakey, 2014) 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 status.

## VII.    Conclusion & recommendations

*Conclusion*: based on the results of the current study; it can be concluded that, more than half of the hemodialysis nurses at Ain Shams University hospital have a satisfactory level of knowledge regarding prevention of HCV transmission in HD units, while majority of them have unsatisfactory level of practice in the same concerned topic

*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 HCV transmission in HD units.
- Conducting standards educational program that emphasize on improving knowledge level regarding prevention of HCV transmission in HDUs in order to raise awareness and correct misconceptions.
- Reinforce HDUs with nurses with Bachelor degree and post graduate 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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