Assessment of Nurses Performance Regarding Application of Preventive Measures of Hepatitis C Virus Infection Among Children undergoing Hemodialysis

Asmaa Ragab Abd El Mobdy[1], Manal Mohamed Ahmed Ayed[2], and Sabra Mohamed Ahmed[3]
[1]Instructor Pediatric Nursing Department, Faculty of Nursing, Sohag University, Egypt
[2]Assist. Prof. of Pediatric Nursing Department, Faculty of Nursing, Sohag University, Egypt
[3]Assist. Prof. of Pediatric Nursing Department, Faculty of Nursing, Sohag University, Egypt
Corresponding author email Email: ***asmaaragab1000@gmil.com***
Phone number: ***002-01010855448***

Abstract

Background: Children on hemodialysis are at excessive liability to Hepatitis C Virus because of repeated blood get admission to and scientific devices. Nurses play a crucial role in infection prevention, but deficiencies in their skills and knowledge might compromise patient care. **Aim:** To assess nurses performance regarding application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis. **Design**: This study was conducted using an exploratory, descriptive design. **Setting:** This study was carried out in the Hemodialysis Units at Sohag University Hospitals. **Sample:** A convenience sample comprising all 50 nurses employed in hemodialysis units. **Tools:**To gather data, two tools were used. **Tool (I):** Structured interview questionnaire for nurses.**Tool (II):** Checklists for Practice Observation. **Results: The results indicate that**, 56% of nurses lacked sufficient knowledge about how to apply hepatitis C preventive methods. The results indicate that 38% of nurses in the study applied preventive measures against infection with the hepatitis C virus in children receiving hemodialysis competently, where as 62% of nurses in the study applied these measures incompetently. The total particle level of the nurses under study and their educational background were statistically significantly correlated. **Conclusion**: According to the study, over half of the nurses lacked adequate information about Hepatitis C virus prevention. Additionally, less than half of nurses demonstrated competent practices in implementing these measures. **Recommendation**: Implementing health educational programs and training to enhance nurses' knowledge and skills in preventing Hepatitis C infections within pediatric hemodialysis units.

Keywords: Hemodialysis, Hepatitis C Virus, Nurses Performance, Preventive Measures

Introduction

A hepatitis C virus (HCV) infection is one of the main causes of chronic liver disease and the associated morbidity and death rates worldwide. In both industrialized and underdeveloped nations, infection caused by the hepatitis C virus is still a prevalent infectious disease. It is still a significant leading cause of chronic liver conditions, such as persistent hepatitis, cirrhosis, and hepatocellular carcinoma **(Smith et al., 2023)**

Hepatitis C is a liver disease triggered by infection with the hepatitis C virus. From a minor ailment that subsides after a few weeks to a severe, permanent ailment that incorporates liver cirrhosis and mortality, The virus can lead to hepatitis, either in its acute or chronic form. The majority of hepatitis C virus infections are caused by blood exposure from unsafe injection procedures, intravenous drug use, unsafe medical treatment, unscreened blood transfusions, and blood-exposure-related sexual activities.

HCV infection usually causes no symptoms in children **(WHO, 2022).**

Dialysis is a process performed when the kidneys fail to efficiently remove excess fluid and waste products from the bloodstream. Usually, Blood is often directed toward a cleaning machine, In children with renal failure, it is a therapeutic option. Dialysis can assist with blood filtering and waste removal from the body when a child's kidneys are not working well enough. Dialysis can be divided into two categories: hemodialysis and peritoneal dialysis **(Robinson et al., 2022).**

Hemodialysis (HD) is a complex process that children undergo in hospitals or dialysis facilities, typically three times a week, resulting in significant daily adjustments. workouts of youngsters' lives. Hemodialysis has been demonstrated to be the handiest remedy modality for superior and everlasting kidney failure, because it results in excessive survival prices and enables preserve the child's existence at a quality level. It is the maximum not unusual place technique used to deal with persistent and superior kidney failure. However, regardless of progressed tactics and equipment, hemodialysis stays a complex and inconvenient remedy that calls for coordinated

efforts from the complete healthcare team, inclusive of nephrologists, dialysis nurses, dialysis technicians, dietitians, and social workers **(Jones et al., 2023).**

In hemodialysis units, nurses are the primary caregivers and are in charge of administering dialysis prescriptions as well as providing related nursing care, such as pre-, during-, and post-hemodialysis care. They are also responsible for making sure that infection control protocols, which are intended to stop the nosocomial transmission of blood-borne infections, including the HCV, are followed

(Centers for Disease Control and Prevention, 2023).

Nurses are essential in providing care for children undergoing hemodialysis. As a precautionary measure, nurses carefully handle needles and other sharp objects, promote patient comfort, ensure good blood flow, monitor for complications such as infection and bleeding, and educate children and their families about not exchanging potentially blood-contaminated personal items **(Hockenberry et al., 2023).**

Significance of the study

The hepatitis C virus (HCV) is a significant global health concern, playing a central role in the development of liver-related diseases and contributing to a substantial number of deaths worldwide. It is the primary cause of cirrhosis, hepatocellular cancer, and chronic liver disease. The prevalence of hepatitis C virus (HCV) among children and adolescents in the United States and Europe typically lies between 0.05% and 0.36%, whereas in some developing nations, it can be considerably higher, ranging from 1.8% to 5.8% (**Smith et al., 2024).**

In Egypt, a recent systematic review on HCV seroprevalence among children estimated that approximately 13.2 million children aged 1-15 years are infected with HCV globally, with higher rates observed among children with renal failure requiring hemodialysis **(Ahmed et al., 2023).**

Despite established guidelines, the risk of contracting HCV (the Hepatitis C Virus)in children undergoing hemodialysis continues to rise significantly. This might be because nurses don't know enough about how HCV spreads and how to prevent it. Furthermore, limited information is available on specific infection prevention practices for pediatric hemodialysis patients **(Ahmed et al., 2023).**

Therefore, this study is crucial for assessing the effectiveness of nurses in implementing preventive measures against HCV infection in children undergoing hemodialysis, which contributes to improving healthcare and reducing infection risks in this vulnerable group.

The title of study was chosen to emphasize the study's focus on evaluating nurses' critical role in preventing HCV transmission in pediatric hemodialysis units. It directly reflects the aim of identifying gaps in knowledge and practices, which is essential to improving infection control and ensuring better healthcare outcomes for vulnerable children

Aim of the study

The study aimed to assess nurses performance regarding application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis. Through:

1- Assessing the level of knowledge regarding the application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis.
2- Assessing the level of practice regarding the application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis.

Research Questions

1. What is the nurses knowledge regarding application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis?
2. What are the nurses practices regarding application of preventive measures of hepatitis C virus infection among children undergoing hemodialysis?
3. What is the relation between knowledge and practice regarding the application of preventive measures for hepatitis C virus infection among children undergoing hemodialysis?

Operational definition

Nurses' performance: refers to nurses' knowledge and practices

Subjects and Method

Research Design

A descriptive exploratory approach was utilized to conduct this study.

Setting

The study took place in the Hemodialysis Unit at Sohag University Hospital

Subjects

A convenience sample was used, including all

nurses in the hemodialysis unit who provide direct care for children.

Regardless of their age, gender, or educational background, all nurses from the aforementioned hospitals were part of the study sample. Fifty nurses (41 females and 9 males) made up the sample.

Data collection tools: Two tools used in this study

The following tools were used to gather data:

Tool (I): Nurses' Structured Interview Questionnaire:The tool was revised based on a previous study conducted by the researcher and was written in clear and simple Arabic. It was created following a review of the scientific literature and was divided into two primary sections.

Part (1): Demographic Characteristics of the Nurses: This section included information about the nurses, The demographic information gathered included the nurses' age, gender, educational qualifications, experience in the dialysis unit, and involvement in relevant training programs.

Part (2): Nurses' Knowledge Regarding HCV Infection: This section was designed to evaluate the nurses' knowledge about HCV infection. It comprised 56 questions, divided into two types: 35 true/false questions and 21 multiple choice questions total, divided into the following four categories:

A. Nurses' Knowledge about Hepatitis C:

"This section consisted of 7 true/false questions and 5 multiple-choice questions.

B. Nurses' Knowledge about Hemodialysis: This part included 4 true/false questions and 5 multiple-choice questions.

C. Nurses' Knowledge about Care for the AV Arteriovenous Fistula: The section contained 3 true /false questions and 4 multiple-choice questions.

D. Nurses' Knowledge about Nursing Care Before, During, and After Dialysis: This section had 21 true/false questions.

E. Nurses' Knowledge of Preventive Measures to Prevent Hepatitis C Transmission at Hemodialysis Units: This section included 7 multiple-choice questions.

Scoring system: The nurses' knowledge was assessed based on their completion of the interview questionnaire. The total score was calculated as 100%, with one point awarded. Each correct answer was assigned a score of one, and incorrect answers were given a score of zero. The scores were then totaled and expressed as a percentage. Based on these results, the overall level of knowledge was determined.

Three score levels accordingly as:

- A score of more than 85% is considered an indicator of good knowledge (more than 85%)
- A score from 60% to 85% is considered an indicator of the average level of knowledge (60-85%)
- A score below 60% is regarded as a sign of poor knowledge. (less than 60%)

Tool (II): Checklists for Practice Observation: This tool was adopted from **Boyce & Pitted, (2018), considered an indicator of Bailor et al., (2018) and also Karkare et al., (2018),** and adapted by the researcher to evaluate nurses' practices regarding application of preventive measures for hepatitis C virus infection among children undergoing hemodialysis by an observational checklist. The procedures included 11 steps, totaling 125 in all, and involved the following procedures: safety precautions in the hemodialysis unit as hand precautions and equipment precautions (8 steps), medication precautions (5 steps) and wastes management (5 steps), care of central line and daily care of Av(Arteio venous) fistula (12 steps), Isolation policy in hemodialysis units and sterilization and disinfection: dialyzer machine (12 steps), nursing care before hemodialysis (10 steps), nursing care during and after hemodialysis (15steps), measuring oral body temperature, axillary body temperature and respiration Rate (18 steps), measuring apical heart rate and blood pressure (18 steps), Assessment of anthropometric measurements(9 steps) and Blood Sampling in child under hemodialysis &Fluid and electrolyte balance a total of 13 steps.

Scoring system: Nurses' practices were evaluated using the following scoring system, based on the completed observational checklists. Therefore, the steps of each procedure were evaluated as done and not done each procedure ranged from 10 to 20 grades according to its importance, and weighting of steps. Each step done correctly and completely was scored 1 degree and zero for each step done incorrectly or incompletely. The total score of each checklist was 100 grades. Scores on the observation checklist were categorized as Competent for totals of 85% or higher, and Incompetent for scores below 85%."

Pilot study

A pilot study was conducted on 10% (5 out of 50) of the total study participants to assess the applicability, clarity, and time required for data collection using the study tools. The results of the pilot study showed that the questions were clear, relevant, and appropriate for the study's objectives. Based on these findings, no further modifications were needed to the study tools. The participants from the pilot study were then included in the main study .

Validity of tools

The tools were reviewed by five experts in Pediatric Nursing from the Faculty of Nursing at Sohag University to assess their face and content validity. These experts thoroughly evaluated the tools based on criteria such as clarity, relevance, comprehensiveness, simplicity, and appropriateness for the target population. Minor revisions were made according to their constructive feedback to enhance clarity and ensure that the tools accurately captured the intended outcomes

Reliability of tools

The reliability of the instruments was assessed to ensure consistency in the study tools, with statistical methods used for verification. Cronbach's Alpha reliability analysis indicated that all the tools comprised highly homogenous items. The Cronbach's Alpha coefficient was calculated at 0.893 for the nurses' knowledge questionnaire and intra- and inter- reliability tests were examined using Cohen's kappa (κ) correlation coefficient for practices 0.893.

Administrative design

Formal approval was obtained via an official letter issued by the Dean of the Faculty of Nursing at Sohag University. The letter was addressed to the directors of the mentioned settings, explaining the study's purpose and expected outcomes to facilitate data collection for the research

Ethical Considerations

Approval for the study was secured from the Ethical Research Committees of both the Faculty of Nursing and the Faculty of Medicine at Sohag University. Additionally, authorization was obtained from the administration of Sohag University Hospital prior to initiating data collection. Ethical principles were meticulously observed to safeguard participant rights. Each nurse was provided with a clear and straightforward explanation of the study's purpose, importance, and anticipated outcomes. Participation was entirely voluntary, with nurses having the freedom to withdraw at any point without providing a reason. To maintain confidentiality and anonymity, all data were coded. Verbal consent was obtained from each participant following a detailed explanation of the study's objectives, and all collected information was handled with strict confidentiality

Fieldwork

Data were gathered over a six-month timeframe, starting from November 2023 to May 2024. The researcher visited each of the mentioned settings Data were collected twice a week, from 9 AM to 1 PM, using the specified tools.

The researcher conducted interviews with nurses to evaluate their practices regarding the implementation of preventive measures for HCV infection in children undergoing hemodialysis. After introducing herself, the researcher explained the study's background and distributed questionnaires to the nurses, allowing them to complete the tools according to their availability. On average, data collection took 30-45 minutes. The researcher also monitored nurses' practices through the use of the observational checklist., with data collection taking approximately 20-40 minutes.

Statistical Analysis

The collected data were carefully organized, coded, and entered into a computerized database for analysis using the Statistical Package for Social Sciences (SPSS), version 27. Descriptive statistics were used to summarize the data, with frequencies and percentages for categorical variables and the mean and standard deviation (SD) for continuous variables. To assess the relationships between categorical variables, the Chi-Square test (X^2) was utilized. For correlation analysis, Pearson's correlation coefficient (r) was applied. A p-value of less than 0.05 was considered statistically significant.

Results

Table (1): Illustrates that 70% of the nurses included in the study aged from 25 to 35 years, 82% of them were female, 48% of them had a Secondary Diploma in Nursing, and 52% of them had experience ranging from one to under five years in the dialysis unit. Eighty two percent of them did not attend training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis and 8% of them attended the last course of training from one year - two years.

Table (2): Indicates the average score of the studied nurses' knowledge dimension. It was 9.583±1.492 related to nursing care steps for the dialysis process, while the lowest mean scores were 3.542±2.194 & 4.3265±4.193 related to hemodialysis and caring for the (Arteriovenous fistula)area: or AV shunt respectively.

Figure (1): Illustrates the distribution of knowledge levels among the studied nurses regarding the application of preventive measures for hepatitis C virus infection in children undergoing hemodialysis. The results show that 56% of the nurses demonstrated a poor knowledge level, 30% showed

a moderate level, and 14% exhibited a good level of knowledge about these preventive measures.

Table (3): Indicates that 52% of the involved nurses demonstrated a competent level concerning " Oral body temperature "and " axillary body temperature", while 66% of the involved nurses had an incompetent level concerning "waste management" and " Nursing care during dialysis " respectively

Figure (2): Illustrates that 62% of the studied nurses displayed incompetent practice levels in application of preventive measures for hepatitis C (HCV) virus infection among children undergoing hemodialysis. Conversely, 38% demonstrated competent practices and effective application of these measures .

Table(4): Indicates a statistically significant relationship between the nurses' overall knowledge and their level of education (educational qualifications, as well as attendance in training courses about preventive measures to prevent Hepatitis C infection among children undergoing dialysis, with p-values of 0.003 and 0.001, respectively, for each factor.

Table (5): Reveals a statistically significant correlation between the overall performance level of studied nurses and their educational qualifications and attending training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis at P=.002 and P=0.001 respectively.

Table (6): Indicates a statistically significant positive correlation between the studied nurses' overall knowledge and practices regarding the application of preventive measures for hepatitis C virus infection in children undergoing hemodialysis, with a correlation coefficient of r = 0.492 and a p-value of 0.001.

.

Results

Table (1): Distribution of the studied nurses' personal data (n=50)

Personal data	No	%
Age		
less than 25 years	9	18.0
From 25 to 35 years	35	70.0
From 40 and over	6	12.0
Mean±SD	43.864±12.435	
Gender		
Male	9	18.0
Female	41	82.0
Educational Qualification		
Secondary school of nursing	24	48.0
Health Technical Institute	10	20.0
Bachelor of Nursing	13	26.0
Postgraduate studies or diploma	3	6.0
Number of years of experience in the dialysis unit		
- From 1 to less than 5 years	26	52.0
From 5 to less than 10 years	22	44.0
15 years and more	2	4.0
Attendance of training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis		
Yes	9	18.0
No	41	82.0
When was the last course:		
Less than a year	2	4.0
One year - two years	4	8.0
More than 2 years	3	6.0

Table (2): Distribution of the total mean score of studied nurses' knowledge dimensions regarding the application of Preventive measures of hepatitis C virus infection among children undergoing hemodialysis (n=50)

Dimensions	Mean
Hepatitis C	5.4312±3.49
Hemodialysis	3.542±2.194
Caring for the (Arteriovenous fistula) area: or AV shunt	4.3265±4.193
Nursing care steps for the dialysis process	9.583±1.492
Preventive measures to prevent the spread of Hepatitis C within hemodialysis units	5.432±2.194
Total mean scores	29.264±11.735

Figure (1): Distribution of the studied nurses' total knowledge level regarding the application of Preventive measures of hepatitis C virus infection among children undergoing hemodialysis

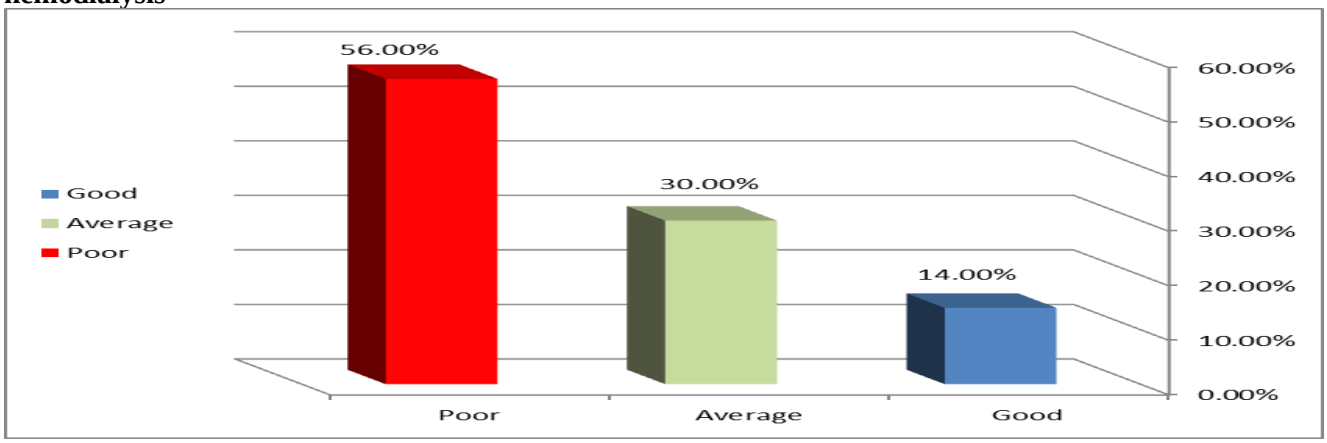

Table (3): Distribution of the studied nurses' practices subscales

Variables	Competent		Incompetent	
	No	%	No	%
Hygiene precautions	20	40.0	30	60.0
Equipment precautions	22	44.0	28	56.0
Medication precautions	18	36.0	32	64.0
Wastes management	17	34.0	33	**66.0**
Care of central line	23	46.0	27	54.0
Isolation policy in hemodialysis units	24	48.0	26	52.0
Sterilization and disinfection: dialyzer machine	23	46.0	27	54.0
Nursing care before dialysis	21	42.0	29	58.0
Nursing care during dialysis	17	34.0	33	**66.0**
Nursing care after dialysis	19	38.0	31	62.0
Oral body temperature	26	**52.0**	24	48.0
Axillary body temperature	26	**52.0**	24	48.0
Respiration Rate	23	46.0	27	54.0
Apical heart rate	18	36.0	32	64.0
Blood Pressure	19	38.0	31	62.0
Anthropometric measurements	21	42.0	29	56.0
Blood Sampling in Hemodialysis Child	24	48.0	26	52.0
Fluid and electrolyte balance	18	36.0	32	64.0
Total practices	19	38.0	31	62.0

Figure (2): Distribution of the studied nurses' total practice level regarding the application of Preventive measures of hepatitis C virus infection among children undergoing hemodialysis (n=50)

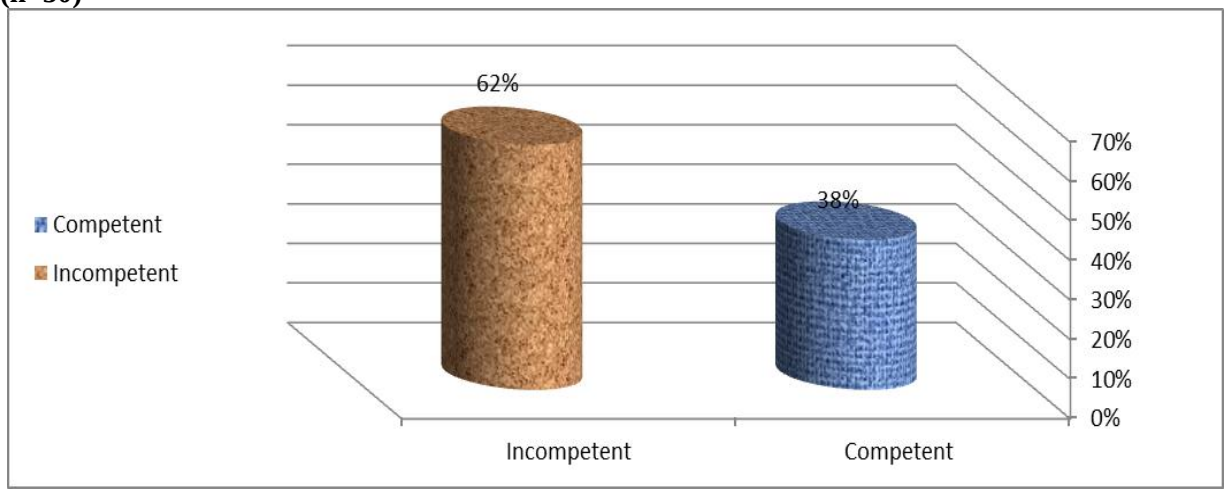

Table (4) Relation between the studied nurses' knowledge and their personal data (n=50)

Personal data	Total knowledge level						X^2	p-value
	Good		Average		Poor			
	No	%	No	%	No	%		
Age								
Less than 25 years	2	4.0	3	6.0	4	8.0	1.701	.791
From 25 to 35 years	5	10.0	10	20.0	20	40.0		
From 40 and over	0	0.0	2	4.0	4	8.0		
Gender								
Male	2	4.0	2	4.0	5	10.0	.752	.687
Female	5	10.0	13	26.0	23	46.0		
Educational Qualification								
Secondary school of nursing	2	4.0	8	16.0	14	28.0		
Health Technical Institute	0	0.0	2	4.0	8	16.0	11.942	.003
Bachelor of Nursing	5	10.0	3	6.0	5	10.0		
Postgraduate studies or diploma	0	0.0	2	4.0	1	2.0		
Number of years of experience in the dialysis unit								
From 1 to less than 5 years	3	6.0	10	20.0	13	26.0	3.172	.529
From 5 to less than 10 years	4	8.0	5	10.0	13	26.0		
15 years and more	0	0.0	0	0.0	2	4.0		
AAttendance of ttend training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis.							2.687	.001
Yes	0	0.0	2	4.0	7	14.0		
No	7	14.0	13	26.0	21	42.0		

Table (5): Relation between the studied nurses' practices and their personal data (n=50)

Personal data	Total practices level				X^2	p-value
	Competent		Incompetent			
	No	%	No	%		
Age						
Less than 25 years	5	10.0	4	8.0		
From 25 to 35 years	22	44.0	13	26.0	.225	.894
From 40 and over	4	8.0	2	4.0		
Gender						
Male	4	8.0	5	10.0	1.436	.231
Female	27	54.0	14	28.0		
Educational Qualification						
Secondary school of nursing	11	22.0	13	26.0		
Health Technical Institute	6	12.0	4	8.0	7.340	.002
Bachelor of Nursing	11	22.0	2	4.0		
Postgraduate studies or diploma	3	6.0	0	0.0		
Number of years of experience in the dialysis unit						
- From 1 to less than 5 years	18	36.0	8	16.0	1.218	.544
From 5 to less than 10 years	12	24.0	10	20.0		
15 years and more	1	2.0	1	2.0		
Attendance of training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis.					1.436	.001
Yes	4	8.0	5	10.0		
No	27	54.0	14	28.0		

Table (6): Correlation between the studied nurses' knowledge and practices regarding the application of Preventive measures of hepatitis C virus infection among children undergoing hemodialysis (n=50)

Study variables	Total knowledge	
	r	P
Total practices	.492	.001

Discussion

Hepatitis C virus infection accounts for a major concern for children undergoing maintenance hemodialysis, necessitating that nursing staff implement appropriate precautions and practices. These actions are vital in reducing the risk of infection transmission to both children and healthcare personnel within this high-risk setting **(Hammam et al., 2024).**

Concerning the distribution of the enrolled nurses' personal data, we found that fewer than three-quarters of the nurses ranged from 25 - 35 years, the majority of them were female, Fewer than half of the nurses possessed a secondary school of nursing, while over half had between one and less than five years of experience in the dialysis unit. The majority of them did not. attend training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis and minority of them attended courses from one year - two years. This may be attributed to the research setting in which diploma nurses more than bachelor nurses and also nursing is still female dominating profession.

The results align with the study of Mahmoud **et al., (2022),** entitled "A Survey Study: Nurses' Knowledge and Attitudes regarding Hepatitis C Virus" which showed that over 50% of nurses were female , nearly two-fifths of them resided in rural areas. Regarding their educational background, most of them hold a diploma degree. These outcomes align with the study of **Morkes et al., (2018),** titled "Effect of Educational Program on Nurse's Performance About Infection Control for Patients Undergoing Hemodialysis" and the data showed that nurse's age ranged between 20-30 years female. concerning the level of education, over three-quarters of the sample held nursing institutes. In terms of years of experience, 50% of the sample had less than five years of experience. Furthermore, over two-thirds of the sample had not undergone any specialized training in the field.

Regarding the distribution of the nurses' overall

knowledge about application of Preventive measures of HCV infection among children undergoing hemodialysis. This study displayed that over 50% of the studied nurses demonstrated poor knowledge level of these measures. Less than one-third showed an average level of knowledge, whereas fewer than one-sixth possessed a good knowledge level regarding application of these preventive measures.

This may arise from the lack of conducted training programs regarding Virus C preventive measures besides the wide educational gap that needs to be filled with adequate training programs.

These outcomes were incompatible with **Falta's, (2018),** the study conducted by titled "Nursing Staff' Knowledge and Practice regarding Prevention of Hepatitis C Virus Transmission in Hemodialysis Units" and who specified that over 50% of nurses possessed a satisfactory knowledge level concerning prevention of HCV transmission in hemodialysis unit. These results were inconsistent with the findings of **Mohamed & Wafa, (2011),** who conducted a study titled " The effects of an educational program on nurses' knowledge and practice related to hepatitis C virus: A pretest and posttest quasi-experimental design" who revealed that nearly three-quarters of nurses had good knowledge regarding Universal precaution guidelines related to blood and body fluid. Additionally, these results were incongruent with **Khudhair & Muhaibes, (2021),** who carried a study about " A comparative study of nurses' knowledge regarding preventive measures and precautions for viral hepatitis B and C at hemodialysis units among southern provinces of Iraq (Doctoral dissertation)." revealed that over 50% of nurses demonstrated good knowledge regarding preventive measures and precautions for viral hepatitis B and C at a hemodialysis unit.

The current study revealed that the overall knowledge level of nurses regarding application of preventive measures for hepatitis C virus infection in children undergoing hemodialysis. The findings indicated that more than half of the participants demonstrated a poor knowledge level regarding application of Preventive measures, while less than one-third showed an average level of knowledge level and fewer than one-sixth displayed a good level of knowledge. This could be attributed to the lack of specialized training programs on hepatitis C prevention, alongside a significant educational gap that necessitates addressing through well-structured and targeted training initiatives.

The results were incompatible with the study conducted by **Faltas, (2018),** who revealed that more than 50% of the nurses demonstrated a comprehensive understanding of HCV transmission prevention in a hemodialysis unit. These results disagreed with **Mohamed & Wafa, (2011),** who revealed that nearly three-quarters of nurses had good knowledge regarding Universal precaution guidelines related to blood and body fluid. Additionally, these results were different from that of **Khudhair & Muhaibes, (2021),** according to their study, over 50% of the nurses possessed good knowledge regarding the preventive measures and precautions for viral hepatitis B and C at a hemodialysis unit.

Concerning the distribution of the nurses' practices subscales, our study showed that over 50% of the nurses in the study had competent levels regarding "Oral body temperature" and "Axillary body temperature", while nearly two-thirds of the nurses demonstrated incompetent levels concerning "Wastes management" and "Nursing care during dialysis". This could be attributed to the absence of infection control and medical waste management programs being implemented.

These results were congruent with the study conducted by **Shehata et al., (2016),** titled "Nursing Staffs' Knowledge and Practice Regarding Prevention of Hepatitis (C) Virus Transmission in Hemodialysis Units" which found that all nurses demonstrated unsatisfactory practices concerning waste management.

The current study found that nearly two-thirds of the studied nurses exhibited an inadequate level of practice in applying preventive measures for HCV infection in children undergoing hemodialysis. In contrast, over one-third demonstrated competent application of these preventive strategies. This may be due to the absence of preventive measures conducted in training programs besides nurses' low levels of educational qualifications and unsatisfactory knowledge levels.

These results were similar to the study conducted by **Magor et al., (2022),** titled "Effect of Video-Assisted Educational Guidelines on Nurses' Performance Regarding Infection Control Measures for Children undergoing Hemodialysis" and indicated that nearly 75% of studied nurses demonstrated an an incompetent level of practice before implementing video-assisted educational guidelines. These results were congruent with **Morkes et al., (2018),** who indicated poor nurses' practice in the pre-program phase. Additionally, these results were in line with the study carried out by **Machaly et al., (2020),** titled "Effect of Implementing Evidence-Based Nursing Guidelines on Nurses' Performance Regarding Care Provided for Children Undergoing Hemodialysis "was demonstrated that over 50% of the nurses had an unsatisfactory overall practice score in providing care for children receiving hemodialysis.

Regarding to the relation between the nurse's knowledge and their personal data, the current study clarified that there was a statistically significant

relation between the studied nurses' total knowledge level and their educational qualification and Attending training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis. This may be attributed to highly educated nurses improved cognitive abilities and self-learning readiness beside their improved perceptions. These results agreed with the study performed by **Hassan et al., (2023),** titled" Hemodialysis nursing staff' knowledge regarding practices toward viral hepatitis B & C in dialysis unit " who revealed that there was a strong statistically significant relation between dialysis nurses' knowledge and their participation in educational lectures before. These results disagreed with **Faltas, (2018),** his findings revealed no significant statistical relationship between the nurses' level of education and their knowledge score.

As regards to relation between the studied nurses' practices and their personal data .the current study clarified that there was a statistically significant relation between the studied nurses' total particles level and their educational qualification and attending training courses about preventive measures to prevent infection with Hepatitis C among children undergoing dialysis. This may be due to the effectiveness of training programs in providing knowledge and filling nurses' educational and training gaps that help improve their performance.

These finding were congruent with the study performed by **Ahmed et al., (2019),** titled "Effect of an Educational Program about infection control precautions for Nurses in pediatric hemodialysis units" and showed that there was a significant correlation between infection control practice among the studied nurses and attending education programs well as regarding qualification of nurses. However, these results were different with that of **Machaly et al., (2020),** who showed that there was no statistically significant difference between studied nurses' total mean practice scores and their educational level prior to the implementation of the evidence-based nursing guidelines.

Regarding the correlation between the studied nurse's knowledge and practices regarding the application of Preventive measures of hepatitis C virus infection among children undergoing hemodialysis the current study showed that there was a statistically significant positive correlation between the nurses' overall knowledge and their practices concerning the implementation of Preventive measures of hepatitis C virus infection in children undergoing hemodialysis. This may be attributed to knowledge effectiveness in improving cognition, perception, and understanding of the importance of every preventive measure step which is reflected positively on nurses' practices.

These results were in the same line with the study conducted by **El waleil et al., (2019),** entitled "Effect of Primary Prevention for Infection with Hepatitis B & C on Nurses' Knowledge and the study on "Knowledge and Practices" showed a significant correlation between the nurses' knowledge and their practices in implementing preventive measures for hepatitis B and C. preprogram. These results agree with **Magor et al., (2022),** who indicated a positive a positive statistically significant correlation between total scores of nurses' knowledge and their overall practice scores related to infection control measures in the care of children undergoing hemodialysis before the implementation of video-assisted educational guidelines. Additionally, these results agreed with **Ahmed et al., (2019),** who revealed that there were statistically significant differences between nurses' knowledge and practices at the pre-program phase.

Conclusion

Our findings concluded that over half of the nurses surveyed demonstrated insufficient knowledge concerning the application of preventive measures for HCV infection in children receiving hemodialysis, while only a minority demonstrated a good level of knowledge. Additionally, fewer than half of the nurses exhibited competent practice concerning preventive measures for HCV in this context.

Recommendations

1. **Comprehensive Health Education and In-Service Training:** Systematically implement comprehensive health education and in-service training programs in dialysis units to improve nurses' knowledge and skills in applying preventive measures against hepatitis C virus infections during hemodialysis.
2. **Develop Comprehensive Guidelines for Nurses:** Create detailed guidelines for nurses on providing care for children undergoing hemodialysis to minimize the risks of hepatitis C virus infection.
3. **Regular Training and Updates:** Establish ongoing training programs for nursing staff to ensure they are familiar with the latest infection control guidelines and updates related to hepatitis C virus management.

References

1. **Ahmed, R.**, **Youssef, F.**, & **Shah, M.** (2023). Nurses' knowledge and practices regarding hepatitis C prevention in pediatric hemodialysis units: An educational intervention approach. Journal of Infection Control Nursing, 15(2), 88-95.
2. **Ahmed, S.**, **Mohamed, A.** & **Ahmed, S.** (2019). Effect of an educational program about infection

control precautions for nurses in pediatric hemodialysis units. Minia Scientific Nursing Journal, 5(1), 77-88.

3. **Bailon, A., Luy, C., & Torres, A. (2018).** Prevention of hepatitis C virus in hemodialysis units: Role of safety protocols and healthcare staff practices. Journal of Clinical Nursing, 27(7-8), 1601-1607.
4. **Boyce, J. M., & Pittet, D. (2018).** Hand hygiene and infection prevention: A worldwide review of current concepts. Infection Control and Hospital Epidemiology, 39(4), 390-396.
5. **Centers for Disease Control and Prevention.** (2023). Infection control guidance for hemodialysis facilities. Retrieved from https://www.cdc.gov/hemodialysis/guidance/index.html
6. **Elwaleil, M.**, **Ahmed, A.**, & **Mohamed, S. (2019).** Effect of primary prevention for infection with hepatitis B & C on nurses' knowledge and practices. *Journal of Infection and Public Health, 12*(6),
7. **Faltas, S. (2018).** Nursing staff' knowledge and practice regarding prevention of hepatitis C virus transmission in hemodialysis units. IOSR Journal of Nursing and Health Science (IOSR-JNHS), 7(5), 35-47.
8. **Hammam, E.**, **Mohammed, S.** & **Mohamed, H. (2024).** Nurses' performance regarding prevention of vascular access complications among children undergoing hemodialysis. Egyptian Journal of Health Care, 15(3), 17-31.
9. **Hassan, H.**, **Saleh, A.**, **Mohamed, A.** & **Mohamed, M. (2023).** Hemodialysis nursing staff' knowledge regarding practices toward viral hepatitis B & C in dialysis unit. *American Journal of Nursing Research, 11*(3), 110-117.
10. **Hockenberry, M.**, **Wilson, D.**, & **Rodgers, C. (2023).** Wong's Essentials of Pediatric Nursing (11th ed.). Elsevier.
11. **Jones, S.**, **Patel, R.** & **Williams, L. (2023).** Challenges and advancements in pediatric hemodialysis: A multidisciplinary approach to treatment. Pediatric Nephrology Journal, 18(4), 305-317.
12. **Karkar, A.**, **Mahfouz, A.**, & **Fadlalla, M. (2018).** Assessment of infection control practices in hemodialysis centers: A study in a developing country. *Journal of Nephrology & Therapeutics*, *8*(3), 234-239.
13. **Khudhair, A.** & **Muhaibes, F. (2021).** A comparative study of nurses' knowledge regarding preventive measures and precautions for viral hepatitis B and C at hemodialysis units among southern provinces of Iraq (Doctoral dissertation). College of Nursing, University of Babylon.
14. **Machaly, E.**, **Bahgat, R.**, **Hassan, H.** & **Kafl, R. (2020).** Effect of implementing evidence-based nursing guidelines on nurses' performance regarding care provided for children undergoing hemodialysis. *IOSR Journal of Nursing and Health Science, 9*(3), 21-28.
15. **Magor, N.**, **Abdella, N.**, **Hegazy, A.** & **Ayed, M. (2022).** Effect of video-assisted educational guidelines on nurses' performance regarding infection control measures for children undergoing hemodialysis. Tanta Scientific Nursing Journal, 27(4), 11-29.
16. **Mahmoud, F.**, **Abozead, S.** & **Ahmed, G. (2022).** A survey study: Nurses' knowledge and attitudes regarding hepatitis C virus. Assiut Scientific Nursing Journal, 10(32), 1-10.
17. **Mohamed, S.** & **Wafa, A. (2011).** The effects of an educational program on nurses' knowledge and practice related to hepatitis C virus: A pretest and posttest quasi-experimental design. Australian Journal of Basic & Applied Sciences, 5(11), 564-570.
18. **Morkes, S.**, **Abozead, S.** & **Azer, S. (2018).** Effect of educational program on nurses' performance about infection control for patients undergoing hemodialysis. Assiut Scientific Nursing Journal, 6(15), 162-168.
19. **Robinson, C.**, **Klowak, J.**, **Jeyakumar, N.**, **Luo, B.**, **Wald, R.**, **Garg, A.** & **Chanchlani, R. (2022).** Long-term healthcare utilization and associated costs after dialysis-treated acute kidney injury in children. American Journal of Kidney Diseases, 81(1), 79-89.
20. **Shehata, A.**, **Elsawi, K.** & **Hashem, H.** (**2016).** Nursing staff' knowledge and practice regarding prevention of hepatitis C virus transmission in hemodialysis units. Egyptian Journal of Health Care, 7(3), 73-84.
21. **Smith, J.**, **Doe, M.**, & **Brown, T. (2024).** The rising incidence of hepatitis C among children undergoing hemodialysis: A cohort study. Journal of Pediatric Nephrology, 32(4), 123-130.
22. **Smith, J.**, **Thompson, R.**, & **Garcia, L. (2023).** Hepatitis C virus infection: Epidemiology, chronicity, and clinical outcomes in developing countries. *Journal of Viral Hepatitis, 30*(2), 123-135.
23. **World Health Organization. (2022).** Hepatitis C fact sheet. Retrieved May 24, 2023, from https://www.who.int/news-room/fact-sheets/detail/hepatitis-c