

Nursing Intervention Protocol for Controlling of Viral Hepatitis C Infection in Pediatric Hemodialysis Unit

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Abstract: Hepatitis C virus is a major public health problem with an estimated 170 million infected person around the world. Nurses play an important role in nursing care of children with Hepatitis C virus under hemodialysis. The aim of the present study was to evaluate nursing intervention protocol for controlling viral hepatitis C infection in pediatric hemodialysis unit materials and method. The study was conducted at The Pediatric Hemodialysis Unit at Tanta university hospital and the dialysis unit at El Minshawy Hospital. A convenient sample of 40 nurses caring for children under hemodialysis participate in this study. Tools for data collection included a structured interview questionnaire & observational checklist & nursing intervention protocol. The study results revealed that there were statistical significant differences in relation to knowledge and practice of the nurses throughout the three phases of nursing intervention.

Conclusion- It was concluded that the training program has a positive effect on nurses' knowledge and practice regarding viral hepatitis C infection in children under hemodialysis.

Recommendation of this study was to reinforce the need for sustained education and training program for continuous updating nurse's performance about viral hepatitis C infection in children under hemodialysis

Keywords: Hepatitis c virus, nurses, hemodialysis, infection.

1. INTRODUCTION

Hepatitis C virus (HCV) is a major public health problem with an estimated 170 million infected person around the world. HCV is an inflammation that affect the liver. children undergoing hemodialysis are at high risk of acquiring this blood borne pathogen, ⁽¹⁾

Hepatitis C virus (HCV), is divided into, acute and chronic hepatitis C virus acute hepatitis C refer to first 6 month after infection and chronic infection is the main cause of liver cirrhosis and liver cancer in Egypt . The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. ⁽²⁾

Hepatitis C infection (HCV) occurs in about 0.15% of 6-11 year olds and 0.4% of 12-19 year olds. It is estimated that there are 23,000 to 46,000 children in the US . Egypt has the highest hepatitis C virus (HCV) prevalence worldwide. The prevalence of HCV in Egypt is found to be 14.7% among the general population. ⁽³⁾ Risk factors appear to be parenteral anti-schistosomal therapy, injections, transfusions, and surgical procedure. and hemodialysis . ⁽⁴⁾

Hepatitis C virus infection is a significant problem among children undergoing maintenance hemodialysis within dialysis units; nursing staff must take adequate precautions and implement appropriate practices that will substantially reduce the risk of workplace transmission of infection to children and staff within this high risk environment. ⁽⁵⁾

Renal failure is a medical condition of impaired kidney function in which the kidneys fail to adequately filter metabolic wastes from the blood, The two main forms are acute renal failure, which is often reversible with adequate treatment, and chronic renal failure, which is often not reversible.⁽⁶⁾

Acute renal injury is an acute decline in renal function characterized by an increase in blood urea nitrogen (BUN) and serum creatinine values, often accompanied by hyperkalemia, metabolic acidosis, and hypertension. Acute renal injury is divided into three forms, prerenal failure (most common), intrinsic renal failure, and post renal failure. Treatment ranges from conservative medical management to dialysis or renal transplantation.⁽⁷⁾

Chronic renal failure (CRF) is the term used for irreversible kidney damage that can lead to a progressive decrease in kidney function and structural or functional abnormalities of the kidney with or without a decreased glomerular filtration rate (GFR) that is manifested by either pathological abnormalities or other markers of kidney damage, including abnormalities in the blood, urine.⁽⁸⁾

Children with established CRF can show a continued progression of renal disease leading to end stage renal disease (ESRD). Child develop end stage renal disease usually by the time he lose about 85 to 90 percent of the kidney function and have a GFR of <15.⁽⁹⁾

Dialysis is a technique in which substances pass from the blood through a semipermeable membrane and into a dialysis solution There are two methods of dialysis which include hemodialysis, and various forms of peritoneal dialysis. Hemodialysis is a removal of waste products during a limited period of time 3-4 hours, which usually 2-4 liters of fluid overload is removed.⁽¹⁰⁾

Hemodialysis unit have responsibility to ensure implementation of strict infection control program designed to prevent nosocomial transmission of blood borne pathogens including hepatitis C virus between children.⁽¹¹⁾

Infection prevention and control is an essential component of every nursing activity. Nurses, together with all healthcare workers, share the responsibility of preventing the spread of infection between themselves and children and between one child and another. Patients in healthcare settings are at risk of acquiring infections because of lowered resistance and increased exposure to microorganisms. Sources of infecting microorganisms can be people or environment objects, such as medical or nursing equipment that has become contaminated.⁽¹²⁾

Nurses play an important and major role in nursing care of children under hemodialysis, nurses are the predominant caregivers in hemodialysis units delivering the dialysis prescription and associated nursing care which may include pre-, during and after hemodialysis care and observe the principles of asepsis at all time to prevent spread of infection. Nurses observe standard precaution of handle needle and other sharp safely. Learn the children don't share personal item that might have blood. Don't share item such as razors, toothbrushes or persona Medical supply so Nursing interventions have a great impact on reducing risk for complications to promote health of hemodialysis children.⁽¹³⁾

Aim of the study to: Evaluate nursing intervention protocol for controlling of viral hepatitis C infection in pediatric hemodialysis unit.

Research hypothesis:

The present study was hypothesized that nurses showed an improvement on their knowledge and practice for controlling viral hepatitis C infection in pediatric hemodialysis unit after implementation of intervention.

2. MATERIALS AND METHOD

Materials:

Research design:

A quasi-experimental design was used in carrying out the present study to identify the impact of health educational intervention in improving nurse's knowledge and practice provided for controlling of viral hepatitis C infection in pediatric hemodialysis unit.

Setting: The study was conducted at Pediatric at hemodialysis unit at Tanta University Hospital& Hemodialysis Unit at El Minshawy Hospital which Affiliated to the Ministry of Health.

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Subjects: Convenient sample of nurses working in above previously mentioned setting regardless of their age, years of experience and level of education with the total numbers forty nurses .The studied nurses were working with 30 children undergoing hemodialysis having the following criteria:

Age ranged from 6-18 years, both sexes, under hemodialysis therapy.

Tools of data collection:

Tow tools were used for data collection:

Tool I: Structure Interview schedule: Structure Interview schedule was developed by the researcher under the supervision of the supervisors and it included two parts:

Part I: a-Socio-demographic characteristics of the studied nurses: age, , level of education, occupation, years of experience and any previous training program about hepatitis C &infection control.

b- Socio-demographic characteristics of the studied children: age, sex , level of education and birth of order.

Part II: Nurses' knowledge about hepatitis C virus in children under hemodialysis. It was composed of 46 questions dealing with nurses' knowledge about:

a- Definition of HCV, causes, signs, mode of transmission, mode of protection, complication and treatment.

b- Definition of renal failure , types, causes, complication and treatment, definition of hemodialysis, importance, preparation pre, during and after hemodialysis and nursing role toward renal failure child and hemodialysis unit

c- Infection control protocol, personal hygiene, sterilization, equipment, universal precaution and waste disposal.

The scoring system for nurses knowledge

Knowledge obtained from nurses was scored and calculated according to the answers, their responses were evaluated using the model key answer sheet prepared by the researcher. The questionnaire sheet contained 46 questions. The nurses were asked to respond to these questions with only one correct response for each question before, immediately and after one month from the nursing intervention protocol . Three level of scoring for questions were be used: the correct and complete answer was scored (2), the correct and incomplete answer was scored (1), wrong answer and don't known was scored (0).The total score was 76, and then the result is divided by 100 to be converted into percentage. It was filled in the clinical area by the studied nurses in presence of researcher

Each question item was calculated as follow:

Poor level was scored less than 60%

Fair level was scored 50% - 69%

Good level was scored 70% -100%

The researcher assessed nurses knowledge about viral hepatitis, renal failure and infection control precaution three times 1-before the session 2-immediat the session 3-after one month of nursing intervention protocol.

Tool II: Observational checklist for nurses intervention

Observational checklist that was developed by **Bowden & Greenberg, (2010)**.⁽¹⁴⁾ and developed by the researcher and was used to determine nurse's intervention offered to hemodialysis child, and was validated by experts' opinions. observational checklist was composed of (14)procedure It was included the following items:

1-Before dialysis:

- hand washing, gloving,Check vital signs., Measure weight, central venous catheter ,access central venous catheter
- Observe signs of local infection which: include edema, redness or swelling.
- Nurses check for abdominal discomfort/ distention, nausea, vomiting, diarrhea, irritability.
- The machine patency should be checked before hemodialysis.
- Check the machine free from any problem and all alarms.

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2-Nursing intervention during dialysis: Check blood pressure, pulse, venous pressure, arterial pressure, volume of fluid removed, and Ultra filtration rate and heparin dose delivered.

- Changing position of child.
- Activity during dialysis is largely a matter of individual preference; some persons sleep throughout their treatment, others read; watching TV or carry on various activities.
- Mouth care in case of nausea or vomiting.

3-Nursing intervention after dialysis:

- Nurses record vital signs.
- Measure weight.
- intravenous medication,, environmental assessment observational checklist precautions, instrumental assessment observational checklist precautions and Nurses assessment observational checklist precautions.
- Provide routine care for access, check circulation, record lab (BUN, serum creatinine, serum electrolytes and hematocrit).

Method:

1-An official permission for collection of data was obtained by submission of an official letter issued from the director of the Faculty of Nursing at Tanta University to the director of Tanta University hospital at the hemodialysis Unit in the Pediatric Departments and the director of ElMinshawy hospital at the hemodialysis unit.

2-Ethical considerations and human rights' principles were followed during carrying out the study and written consent was obtained from nurses.

3-A pilot study was carried out on 10%' of the study subjects and necessary modification was done before starting the data collection to verify the applicability, feasibility and clarity of the tool

4-The development of the tools the two tools (structured interview schedule, observational checklist and nursing intervention protocol) were developed by the researcher under supervision of the supervisors after thorough detailed review of literature.

5- Each nurse was individually interviewed to complete tool I and tool II (pretest). It took 20 to 30 minutes to complete the questionnaire and approximately 10 minutes to carry out the clinical checklist.

Nursing Intervention Protocol:

Nursing intervention protocol was developed by the researcher to improve nurses' knowledge and practice for controlling of viral hepatitis C in pediatric hemodialysis unit

The nursing intervention protocol: It was developed and implemented through four phases as follows:

1-Assesment phase

The nursing intervention was partially built on the assessment of hemodialysis nurses' knowledge and care practices that were done before implementation of the health instructions. This assessment phase shed light and gave more insight about deficits in hemodialysis nurses' knowledge and care practices and helped in identifying their educational needs.

2-Planning phase

The content of the nursing intervention: was selected and nursing intervention protocol was planned and developed according to careful study of hemodialysis nurses' educational needs revealed from the assessment phase and reviewing the relevant literature.

Teaching methods were selected to suit teaching small groups' learners in the form of lectures, group discussion, demonstration, and re-demonstration. Teaching materials were prepared as booklet, brochures and colored posters that covered theoretical and practical information.

3-Implementation phase

Nurses were divided into small groups; each group consisted of four nurses. The intervention protocol was given in eight sessions; time of each session was around 30-45 minutes three times/weekly.

First Session: It was covering the following topics: Definition, causes, signs and symptoms of hepatitis C virus, Identify Mode of transmission of hepatitis c virus.

Second Session: it was focused on the main treatment of hepatitis C virus infection and precautions and nursing role during treatment and consideration after treatment

Third Session: it was concentrated on potential complications of hepatitis C virus infection in children under hemodialysis. **Fourth Session:** : it was concentrated on mode of prevention of hepatitis C virus infection in children under hemodialysis at the end of the session nurses were answered.

Fifth Session: It began with the renal failure and was focused on definition, types, causes and treatment of renal failure& definition of hemodialysis, importance and Complication of hemodialysis therapy.

Sixth Session: It was focused on demonstrating and Explaining Preparation before, during and after hemodialysis

Seventh Session: It was focused on discuss the role of the nurse for chronic renal failure child and hemodialysis unit.

Eighth Session: It was covering the following topics: Infection control protocol, personal hygiene, sterilization, environment, equipment and nurses infection control measure, universal precaution and waste disposal.

Various teaching media were used in the form of lectures, group discussions, demonstrations and re-demonstrations, video and data show.

4- Evaluation phase

Evaluation of the effect of implemented nursing intervention protocol for controlling of viral hepatitis C infection in pediatric hemodialysis unit before, immediately and after one month after nursing intervention protocol

Data collection:

Data was collected for 7 months, starting from January 2016 to July 2016.

3. RESULTS

Table (1) shows the socio demographic Characteristics of the studied nurses, Regarding age, it was found that 37.5% of studied nurses were from 30 <40 years, with mean age of 33.47 ± 9.41 years. According to education it was found that half of studied sample had a secondary nursing education The same table revealed that two third of studied nurses were greater than 8 years of experience with mean years 10.87 ± 05.97 years. Regarding to attendance of training program, the table showed that only 22.5% of the studied nurses had been trained compared to 77.5% who didn't attend any previous training program.

Table (2): Shows the Nurses 'knowledge related to definition, causes ,symptoms, mode of transmission diagnostic test of hepatitis C virus it was observed that nurses' knowledge related to definition of HCV, it was found that 45% of the nurses did not know the definition before nursing intervention, and this percentage dropped to 10% immediately after nursing intervention and to 15% after one month.

Regarding the causes of HCV it was found that 4% of nurses reported the causes before nursing intervention, and this percentage improved to 52% after nursing intervention and 45% after one month.

Related to the signs and symptoms of HCV, it was found that 15% answered before nursing intervention, and this percentage improved to 50% and 47.5% respectively for both after nursing intervention and after one month.

As regard the incubational period of HCV, it was found that 57.5% of the nurses did not know it before nursing intervention, and this percentage dropped to 10% before nursing intervention and to 37.5% after one months.

Concerning the mode of transmission of HCV and the diagnostic test it was found that 22.5% & 5% of the studied nurses reported the correct answer in before nursing intervention, and this percentage improved to 65% & 57.5% after nursing intervention and 50% & 30% after one month respectively the result was statistically significant.

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Table (3): shows the Percentage distribution of the studied nurses' knowledge related to definition, causes, types and treatment of renal failure and definition, preparation pre, during and after hemodialysis regarding definition, causes and types of renal failure. It was revealed that 50%, 42.5% & 52.5% of the studied nurses didn't know definition, causes and types of renal failure before nursing intervention, and this percentage dropped to 10%, 30% & 25% respectively after nursing intervention and to 30%, 20% & 15% after one month.

Concerning Treatment of renal failure it was observed that 20% of the studied nurses mentioned treatment of renal failure before nursing intervention, and this percentage increased to 67.5% and 30% after nursing intervention and after one month respectively.

Regarding to the definition of hemodialysis, it was found that 47.5% of the nurses didn't know it before nursing intervention and this percentage dropped to 15% and 32.5 for after nursing intervention and after one month.

Table (4): Percentage distribution of the studied nurses' knowledge related to Personal hygiene, Workers safety, Hand washing and Principles of sterilization. According to personal hygiene it was clear that 57.5% of the nurses didn't know it before nursing intervention, and this percentage dropped to 12.5% after nursing intervention and after one month of nursing intervention

Concerning to safety measure of the workers, was mentioned by 5% of nurses before nursing intervention, and this percentage increased to 57.5% and 22.5% for both after nursing intervention and after one month of nursing intervention. respectively.

As regard hand washing and principals of sterilization it was found that 62.5% & 60% of nurses didn't know it before nursing intervention, and this percentage decreased to 17.5%, 12.5% and 12.5% for after nursing intervention and after one month of nursing intervention. respectively. The result was statistically significant respectively ($P=0.000$).

Table (5): Shows Percentage distribution of the studied nurses' intervention protocol before hemodialysis it was observed that 50% of the studied nurses didn't collect equipment, 37.5% didn't ask the child to wash his arm from hands to the elbow and dry, 40% didn't wash her hands before touching the child, 57.5% didn't assess vital signs 50% didn't assess child weight, 42.5% didn't assess child skin colour, 60% didn't assess child skin integrity, 65% didn't assess baseline fluid status, 80% didn't assess mental status or recent changes in behavior, 57.5% didn't assess laboratory results, 55% didn't report or act on unusual results, 45% didn't explain the procedure to the patient 90% didn't ask the child to evacuate the bladder before starting the procedure 47.5% didn't put the child in comfortable position, 52.5% didn't implement safety precautions before nursing intervention

After nursing intervention and after one month it was observed that completely 62.5% & 55% collect equipment, 45%, ask the child to wash his arm to the elbow, 60% & 45%, wash her hands before touching the child, 52.5% & 40%, assess vital signs, 52.5% & 40%, assess child weight, 45%, assess child skin colour assess child 50% & 40%, assess skin integrity, 40% & 37.5%, assess baseline fluid status, 47.5% & 37.5%, assess mental status or recent changes in behavior, 45% & 37.5%, assess laboratory results, 55% & 45, reports or acts on unusual results 42.5% & 40%, asks the child to evacuate the bladder before starting the procedure 80% & 47.5%, puts the child in comfortable position, 60% & 40% implements safety precautions respectively.

Table (6): Shows Percentage distribution of the studied nurses' intervention during hemodialysis it was observed that 67.5% of the studied nurses didn't wash hands before nursing intervention, 60% didn't wear personal protective clothes, 55% didn't put sterile towel under child arm, 60% didn't clean access site using alcohol swab, 50% didn't palpate the vein after cleaning the skin 57.5% didn't insert the venous needle at least 5cm from the arterial needle 65% didn't clean the AV fistula needles 55% didn't tape IV tubing securely to extremity 60% didn't obtain blood for predialysis blood samples as ordered gives heparin bolus to the child, 50% primes the extra corporal circuit, 55% didn't note time of dialysis initiation, 60% tapes connections securely 50% didn't establish blood flow rate 67.5% didn't ensure that access connection are visible 60% didn't check child blood pressure and pulse 55% didn't assess general condition, 57.5% didn't document all given medication in the child sheet, 70% didn't respond to all alarms immediately, 60% didn't report all conditions to the physician. before nursing intervention.

After nursing intervention and after one month of nursing intervention it was observed that the studied nurses completely perform all nursing intervention during hemodialysis procedure 70 % & 50% washes hands, 60% & 50%, Wear personal protective clothes 6.52% & 45% Put sterile towel under child arm, 70% & 50% cleans access site using alcohol swab, 60% & 50%, palpate the vein after cleaning the skin 62.5 % & 45, insert the venous needle 70% & 50%, clean the AV fistula needles, 60% & 55%, tapes IV tubing securely to extremity 70% & 60%, obtains blood for pre dialysis blood samples 57.5% & 45% primes the extra corporal circuit, 62.5% & 45% notes time of dialysis initiation, 70% & 50% tapes connections securely, 47.5% & 42.5 % ensures that access connection are Visible, 62.5% & 45% checks child blood pressure and pulse, 70% & 50% assesses general condition, 60% & 50% condition, 57.5% didn't documents all given medication in the child sheet, 62.5% & 45% responses to all alarms immediately, 67.5% & 47.5%, report all condition to physician.

Table (7): Shows Percentage distribution of the studied nurses' intervention after hemodialysis it was observed that 67.5% of the studied nurses before nursing intervention didn't Wear gloves, gown, mask, 70% didn't place pads under connect or sand open I.V of normal saline to return blood on the arterial side of tubing pump at 200 ml/min. 55% didn't Return venous blood 62.5% didn't clamp lines 60% Remove tape and needles according to the unit Protocol and Press on the insertion site by sterile gauze and adhesive tape 67.5% didn't measure and record post dialysis vital signs 60% didn't measure and record post dialysis weight 50% record total infusions given both saline and blood 70% didn't Strip and clean dialysis machine 60% didn't Advise child to wait until B.P is nearly to Normalized before nursing intervention.

After nursing intervention and after one month these finding improved to 70% & 60% of the studied nurses completely wear gloves, gown, mask, 60% & 50% place pads under connectors, 67.5% & 42.2% open I.V of normal saline to return blood on the arterial side of tubing, 67.5% & 50% start blood pump at 200 ml/min 60% & 40% return venous blood, 70% & 50% clamp lines, 60% & 50% remove tape and needles according to the unit Protocol 62.5% & 45% press on the insertion site by sterile gauze and adhesive tape 52.5% & 45% Measure and record post dialysis vital sign 62.5% & 45% measure and record post dialysis weight 70% & 50% record total infusions given both saline and blood 62.5% & 47.5% strip dialysis machine 70% & 50% advise child to wait until blood Pressure is nearly to Normal.

Figure (1) Shows the total nurses knowledge scores levels in percentages before and after nursing intervention and After one month it was documented that more than half of the studied nurses (67%) had low knowledge level before nursing intervention However, after nursing intervention, after one month the majority of nurses (62.5 %, 50 %) having a good knowledge level respectively.

Figure (2) Shows the total nurses practices scores levels in percentages before and after nursing intervention and after one month . It was Illustrated that the majority of the studied nurses (77.5 %) were having low practice level before nursing intervention. However, after intervention and, after one month the majority of the studied nurses (65 %, 60 %) respectively having a good practice.

Table (1): percentage distribution of the studied nurses related to socio demographic Characteristics (n=40)

Characteristics of the studied nurses	No	%
	Age in years	
20< 30	14	35.0
30- <40	15	37.5
40>	11	27.5
Mean± SD	33.47±8.41	
Level of education		
Secondary school of nursing	20	50.0
Technical institute of Nursing	12	30.0
Bachelor degree of nursing	6	15.0
Postgraduate study	2	5.0
Occupation		
Nurse	32	80.0
Nursing specialist	3	7.5
Nurse Supervisor	3	7.5

Head nurse	2	5.0
Years of experience		
1-3	5	12.5
>3-5	5	12.5
>5-8years	3	7.5
>8years	27	67.5
Mean± SD	10.87±5.97	
Training courses		
Yes	9	22.5
No	31	77.5

Table (2): Percentage distribution of the studied nurses 'related to their knowledge of hepatitis C virus (no=40).

Nurses' knowledge	Before the nursing intervention						After the nursing intervention						After one months of the nursing intervention						X2 (1)	P Value	X2 (2)	P value	X2 (3)	P value
	Correct and complete		Correct and incomplete		Wrong answer		Correct and complete		Correct and incomplete		Don't know		Correct and complete		Correct and incomplete		Don't know							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%						
Definition	9	22.5	13	32.5	18	45	22	55	8	20	10	25	18	45	16	40	6	15	3.050	.218	8.600	.014	8.45	.015
Causes	4	10	11	27.5	25	62.5	21	52.5	10	25	9	22.5	18	45	18	45	4	10	17.150	.000**	9.800	.000**	6.65	.000**
Symptoms	6	15	11	27.5	23	57.5	20	50	15	37.5	5	12.5	19	47.5	7	17.5	14	35	10.850	.000**	8.750	.000**	5.45	.000**
Incubational period	11	27.5	6	15	23	57.5	24	60	12	30	4	10	6	15	19	47.5	15	37.5	11.450	.003	15.200	.001	6.65	.036
Modeof transmission	9	22.5	8	20	23	57.5	26	65	10	25	4	10	20	50	12	30	8	20	10.55	.000**	19.400	.000**	5.60	.000**
Diagnostic test	2	5	15	37.5	23	57.5	23	57.5	12	30	5	12.5	12	30	18	45	10	25	16.850	.000**	12.350	.000**	2.60	.000**

*Difference between before and immediate post intervention.

**Difference between before and after one month of the nursing intervention.

**Difference between immediate post intervention and after one month of nursing intervention.

*Statistically significant at P < 0.05

Table (3): Percentage distribution of the studied nurses' related to their knowledge about renal failure (no=40).

Nurses' knowledge	Before the nursing intervention						After the nursing intervention						After one months of the nursing intervention						X2 (1)	P Value	X2 (2)	P value	X2 (3)	P value
	Correct and complete		Correct and incomplete		Wrong answer		Correct and complete		Correct and incomplete		Wrong answer		Correct and complete		Correct and incomplete		Wrong answer							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%						
Definition of renal failure	6	15	14	35	20	50	18	45	18	45	4	10	18	45	10	25	12	30	7.400	.000**	9.800	.000**	3.600	.000**
Causes	12	30	10	25	17	42.5	22	55	6	15	12	30	12	30	20	50	8	20	13.400	.000**	9.800	.000**	9.800	.000**
Types	9	22.5	10	25	21	52.5	26	65	4	10	10	25	11	27.5	23	57.5	6	15	6.650	.000**	19.400	.000**	11.450	.000**
Treatment	8	20	14	35	18	47	27	67.5	1	2.5	12	30	12	30	18	45	10	25	4.524	.000**	25.550	.000**	2.600	.000**
Definition of hemodialysis	13	32.5	8	20	19	47.5	28	70	6	15	6	15	6	15	21	52.5	13	32.5	4.550	.000**	24.200	.000**	8.450	.000**
Preparation pre dialysis	6	15	13	32.5	21	52.5	25	62.5	8	20	7	17.5	15	37.5	16	40	9	22.5	8.450	.000**	15.350	.000**	2.150	.000**
Preparation during dialysis	3	7.5	19	47.5	18	45	18	45	17	42.5	5	12.5	16	40	12	30	12	30	12.050	.000**	.800	.000**	7.850	.000**
Preparation after dialysis	5	12.5	16	40	19	47.5	28	70	2	5	10	25	12	30	23	57.5	5	12.5	8.150	.000**	26.600	.000**	12.350	.000**

*Statistically significant at P < 0.05

Table (4): Percentage distribution of the studied nurses' knowledge related to infection control

Nurses' knowledge	Before the nursing intervention						After the nursing intervention						After one months of the nursing intervention						X2 (1)	P Value	X2 (2)	P value	X2 (3)	P value
	Correct and complete		Correct and incomplete		Wrong answer		Correct and complete		Correct and incomplete		Wrong answer		Correct and complete		Correct and incomplete		Wrong answer							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%						
Personal hygiene	3	7.5	14	35	23	57.5	27	67.5	8	20	5	12.5	8	20	27	67.5	5	12.5	15.050	.001	21.350	.0001	21.350	.001
Workers safety	2	5	14	35	24	60	23	57.5	12	30	5	12.5	9	22.5	21	52.5	10	25	18.200	.000**	3.050	.000**	6.650	.000**
Hand washing	2	5	13	32.5	25	62.5	26	65	7	17.5	7	17.5	6	15	29	72.5	5	12.5	.100	.000**	18.050	.000**	27.650	.000**
Principles of sterilization	3	7.5	13	32.5	24	60	20	50	15	37.5	5	12.5	7	17.5	28	70	5	12.5	.100	.000**	8.750	.000**	24.350	.004

*Statistically significant at P < 0.05

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Table (5): Percentage distribution of the studied nurses' intervention protocol before hemodialysis (n =40).

Nurses' practice	Before the nursing intervention						After the nursing intervention						After one months						X2 (1)	P Value	X2 (2)	P value	X2 (3)	P value
	Completely done		Incompletely done		Not done		Completely done		Incompletely done		Not done		Completely done		Incompletely done		Not done							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%				
The nurse collects equipment	4	10	16	40	20	50	25	62.5	11	27.5	4	10	22	55	12	30	6	15	10.400	.006	2.450	.294	9.800	.007
asks the child to wash his arm from hands to the elbow dry	10	25	15	37.5	15	37.5	18	45	11	27.5	11	27.5	18	45	12	30	10	25	1.250	.535	14.150	.001	2.600	.273
The nurse washes her hands before touching the child	12	30	12	30	16	40	24	60	24	60	5	12.5	18	45	16	40	6	15	.800	.670	11.150	.004	6.200	.045
The nurse assesses vital signs:	3	7.5	14	35	23	57.5	21	52.5	4	10	15	37.5	16	40	16	40	8	20	15.050	.001	11.150	.004	3.200	.202
The nurse assesses child weight	5	12.5	15	37.5	20	50	21	52.5	15	37.5	4	10	16	40	19	47.5	5	12.5	8.750	.013	.200	.950	8.150	.017
The nurse assesses child skin colour	4	10	19	47.5	17	42.5	18	45	12	30	10	25	18	45	10	25	12	30	9.950	.007	6.350	.042	1.250	.535
The nurse assesses child skin integrity	4	10	12	30	24	60	20	50	13	32.5	7	17.5	16	40	15	35	9	22.5	16.550	.000	.950	.622	2.150	.341

Continue

The nurse assess baseline fluid status	3	7.5	11	27.5	26	65	16	40	11	27.5	13	32.5	16	40	10	25	14	35	15.200	.001	9.950	.007	.350	.839
The nurse assesses mental status or recent changes in behavior	0	0	8	20	32	80	19	47.5	17	42.5	4	10	15	37.5	16	40	9	22.5	20.450	.000	2.450	.294	3.800	.150
The nurse assesses laboratory results	3	7.5	14	35	23	57.5	18	45	11	27.5	11	27.5	15	37.5	12	30	11	27.5	14.40	.000	6.200	.045	1.400	.497
The nurse reports or acts on unusual results	3	7.5	15	37.5	22	55	22	55	15	37.5	3	7.5	18	45	14	35	8	20	15.050	.000	6.650	.049	9.950	.000
The nurse explains the procedure to the patient	6	15	16	40	18	45	17	42.5	9	22.5	14	35	16	40	10	25	14	35	6.200	.001	4.850	.088	2.150	.341
The nurse asks the child to evacuate the bladder before starting the procedure	0	0	4	10	36	90	32	80	4	10	4	10	19	47.5	17	42.5	4	10	25.600	.004	21.650	.000	2.150	.341
The nurse repositions the child in a comfortable position	5	12.5	16	40	19	47.5	24	60	6	15	10	25	16	40	15	37.5	9	22.5	8.150	.017	6.050	.094	1.250	.535
The nurse implements safety precautions	4	10	15	37.5	21	52.5	24	60	9	22.5	7	17.5	16	40	15	37.5	15	37.5	11.150	.004	4.850	.008	1.400	.497

*Statistically significant at P < 0.05

Table (6): Percentage distribution of the studied nurses' intervention during hemodialysis (n =40).

Nurses' practice	Before the nursing intervention						After the nursing intervention						After one months						X2 (1)	P Value	X2 (2)	P value	X2 (3)	P value
	Completely done		Incompletely done		Not done		Completely done		Incompletely done		Not done		Completely done		Incompletely done		Not done							
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%				
The nurse washes hands	2	5	11	27.5	27	67.5	28	70	10	25	2	5	20	50	16	40	4	10	18.350	.000	1.600	.206	.350	.839
Wear personal protective clothes	4	10	12	30	24	60	24	60	10	25	6	15	20	50	13	32.5	7	17.5	21.950	.000	24.200	.000	1.250	.535
Put sterile towel under child arm	3	7.5	13	32.5	22	55	25	62.5	5	12.5	10	25	18	45	12	30	10	25	21.350	.000	21.950	.000	3.800	.150
cleans access site using alcohol swab	1	2.5	15	37.5	24	60	25	62.5	10	25	5	12.5	18	45	12	30	10	25	1.600	.206	16.550	.000	.350	.150
palpate the vein after cleaning the skin	5	12.5	15	37.5	20	50	28	70	10	25	2	5	20	50	4	10	16	40	24.230	.000	.400	.527	1.400	.890
insert the venous needle at least 5cm from the arterial needle	6	15	11	27.5	23	57.5	25	60	8	20	7	17.5	22	55	9	22.5	9	22.5	21.950	.000	2.500	.114	1.850	.397
clean the AV fistula needles	3	7.5	11	27.5	26	65	28	70	9	22.5	3	7.5	25	60	11	27.5	14	35	16.550	.000	11.102	.000	4.550	.839
tapes IV tubing securely to extremities	6	15	12	30	22	55	23	57.5	10	25	7	17.5	18	45	12	30	10	25	.400	.527	7.850	.020	3.800	.202

Continue

obtains blood for predialysis blood samples as ordered gives heparin bolus to the child	2	5	14	35	24	60	25	62.5	10	25	5	12.5	18	45	8	20	14	35	2.500	.114	14.400	.000	1.850	.397
primes the extra corporal circuit	5	12.5	15	37.5	20	50	28	70	10	25	5	12.5	20	50	4	10	16	40	11.150	.004	4.900	.027	3.350	.187
notes time of dialysis initiation	6	15	12	30	22	55	19	47.5	16	40	5	12.5	17	42.5	13	32.5	10	25	7.550	.000	8.750	.000	6.950	.031
tapes connections securely	1	2.5	15	37.5	24	60	25	62.5	10	25	5	12.5	18	45	12	30	10	25	7.850	.020	17.450	.000	1.400	.497
establishes blood flow rate	5	12.5	15	37.5	20	50	28	70	10	25	2	5	20	50	4	10	16	40	14.400	.000	18.850	.000	12200	.007
ensures that access connection are visible	2	5	11	27.5	27	67.5	28	70	10	25	2	5	20	50	16	40	4	10	23.305	.000*	12.35	.0000*	3.65	.0000*
checks child blood pressure and pulse	4	10	12	30	24	60	24	60	10	25	6	15	20	50	13	32.5	7	17.5	21.350	.000	18.350	.000	3.350	.187
assesses general condition	3	7.5	13	32.5	22	55	25	62.5	5	12.5	10	25	18	45	12	30	10	25	4.900	.027	21.650	.000	6.950	.000
documents all given medications in the child sheet	8	20	9	22.5	23	57.5	27	67.5	7	17.5	6	15	19	47.5	7	17.5	14	35	8.750	.013	7.400	.025	1.400	.000
responds to all alarms immediately reports all conditions to the physician	5	12.5	7	17.5	28	70	25	62.5	8	20	7	17.5	19	47.5	12	30	9	22.5	24.050	.000	7.850	.020	2.450	.294
	4	10	12	30	24	60	28	70	4	10	8	20	20	50	5	12.5	15	37.5	14.400	.000	6.200	.045	3.350	.187

*Statistically significant at P < 0.05

Table (7): Percentage distribution of the studied nurses' intervention after hemodialysis (n =40)

Nurses' practice	Before the nursing intervention						After the nursing intervention						After one months						X ² (1)	P Value	X ² (2)	P value	X ² (3)	P value
	Completely done	Incompletely done	Not done	Completely done	Incompletely done	Not done	Completely done	Incompletely done	Not done	Completely done	Incompletely done	Not done												
Wear gloves, gown, mask	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	22.850	.000	1.400	.497	3.200	.202
Place pads under connectors	3	7.5	10	25	27	67.5	28	70	8	20	4	10	24	60	10	25	6	15	25.550	.000	7.850	.020	5.150	.397
Open I.V of normal saline to return blood on the arterial side of tubing	3	7.5	9	22.5	28	70	27	67.5	10	25	3	7.5	17	42.5	16	40	7	17.5	25.550	.000	1.850	.397	4.550	.103
Start blood pump at 200 ml/min	5	12.5	10	25	25	62.5	27	67.5	10	25	3	7.5	20	50	11	27.5	9	22.5	25.505	.000	10.850	2.600	1.250	.076
Return venous blood	6	15	12	30	22	55	24	60	10	25	6	15	16	40	14	35	10	25	16.250	.000	8.150	.017	5.150	.079
Clamp lines	4	10	11	27.5	25	62.5	28	70	8	20	4	10	20	50	11	27.5	9	22.5	9.800	.000	2.600	.270	3.50	.339
Remove tape and needles according to the uniProtocol	4	10	12	30	24	60	24	60	10	25	6	15	20	50	13	32.5	7	17.5	17.150	.000	8.150	.017	3.800	.150
Press on the insertion site by sterile gauze and adhesive tape	2	5	14	35	24	60	25	62.5	10	25	5	12.5	18	45	8	20	14	35	15.000	.000	6.650	.036	6.200	.045

Continue

Measure and record post dialysis vital signs	4	10	9	22.5	27	67.5	21	52.5	9	22.5	10	25	18	45	6	15	16	40	18.200	.000	7.850	.020	2.600	4.550
Measure and record post dialysis weight	1	2.5	15	37.5	24	60	25	62.5	10	25	5	12.5	18	45	12	30	10	25	21.900	.000	16.200	4.550	2.150	.341
Record total infusions given both saline and Blood	5	12.5	15	37.5	20	50	28	70	10	25	5	12.5	20	50	4	10	16	40	20.150	.000	4.550	4.550	6.650	.350
Strip and clean dialysis machine	5	12.5	7	17.5	28	70	25	62.5	8	20	7	17.5	19	47.5	12	30	9	22.5	21.950	.000	4.550	.103	2.150	.341
Advise child to wait until B.P is nearly to Normalized	4	10	12	30	24	60	28	70	4	10	8	20	20	50	5	12.5	15	37.5	24.350	.000	6.650	.020	6.200	.045

*Statistically significant at P < 0.05

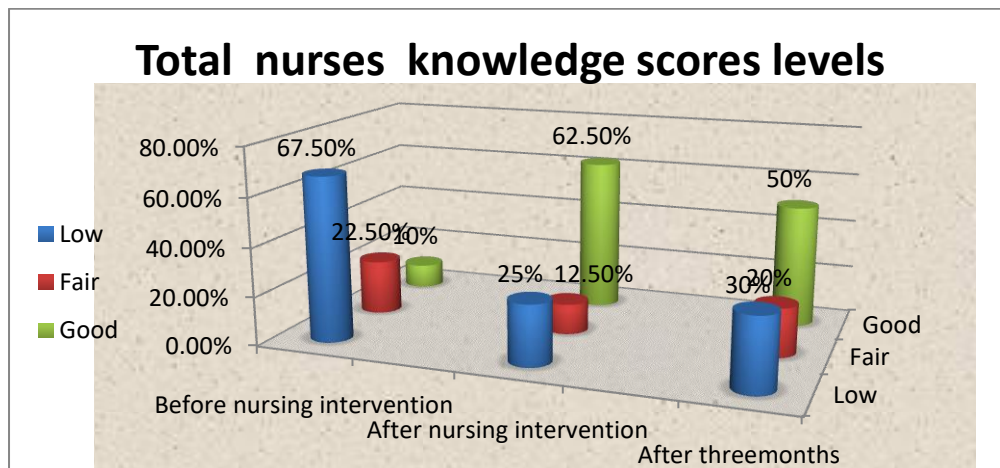


Figure (1): Total nurses knowledge scores levels in percentages before and after nursing intervention and After one months

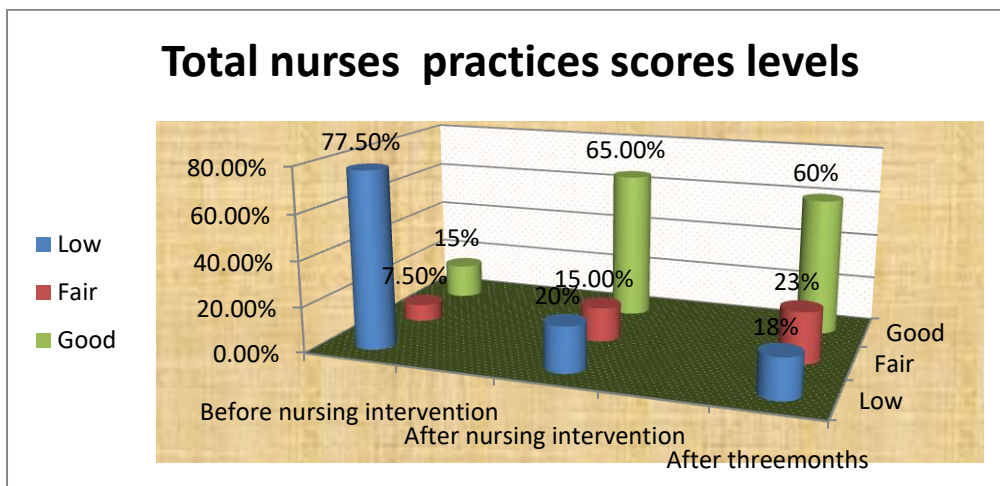


Figure (2): Total nurses practice scores levels in percentages before and after nursing intervention and After one month

4. DISCUSSION

Renal failure is a progressive loss in kidney function over a period of months or years, It could be acute or chronic. There are three stages of chronic renal failure, the latest stage of chronic renal failure is called end stage renal disease (ESRD).the treatment of end stage renal disease is dialysis, hemodialysis is life saving and the development of infection as hepatitis c virus in children under hemodialysis is associated with an increase in morbidity, mortality, and cost. These infections are largely preventable through the implementation of infection control program⁽¹⁵⁾.

Nurses play an important role in nursing care of children under hemodialysis-Nurses are the predominant caregivers in hemodialysis units delivering the dialysis prescription and associated nursing care which may include pre-, during and after hemodialysis care. Nursing interventions have a great impact on reducing risk for complications and potential to promote health of end-stage-renal disease.

Concerning characteristics of the studied nurses the present study showed that, two thirds of studied sample aged from 30 <40years, Considering education, half of the studied nurses have diploma in nursing, Regarding to nurses' position, the majority of them were staff nurses. this results were similar to the results of study by Mostafa 2009⁽¹⁶⁾ who found that age group of nurses' were between 30-<40 year and had diploma degree and staff nurse.

In relation to years of experience more than two third of them (67.5%) had more than 8 years of experiences in dialysis units with a mean 10.8 ± 5.9 years, these findings were similar to Abd Elhady 2015⁽¹⁷⁾ who found that more than half of nurses had 10 years of experience in dialysis unit. Meanwhile Mustafa 2009⁽¹⁶⁾ who found that, half of nurses' had six years of experience and less than one quarter of them had 12 years this may be due to that nurses were familiar with the unit .

As regards nurses' training courses in dialysis, the present study reflected that majority of nurses' did not attend any previous training courses owing to the shortage of nurses number , absence of continuing education department in hospital and lack of motivation for training, This was in accordance with the study conducted by Abbas2005⁽¹⁸⁾ who found that nurses under study have never been introduced to any kind of learning or training courses related to hemodialysis, except the experience they gained throughout their work with their colleagues under the supervision of the head nurse of the unit, meanwhile Ramadan (2004)⁽¹⁹⁾ in his study found that few of nurses had training about HBV and HCV. In this respect, Golper (2006)⁽²⁰⁾ emphasized that a commitment is needed for continuing education and continuing re-evaluation for nurses of policies and procedures and the empowerment goals.

Regarding nurses' knowledge about hepatitis C virus, the present study revealed that nearly half of the studied nurses had poor knowledge about definition of HCV and more than half of the studied sample had poor knowledge about causes, signs, incubation period, mode of transmission and diagnostic test of hepatitis C virus before nursing intervention. This finding may be due to their inadequate knowledge as a result of lack of previous training programs, lack of providing and attending specialized training courses about HCV. These results disagreed with Mohammed (2012)⁽²¹⁾ who found in a study that the majority of nurses had good knowledge about definition, causes, clinical manifestations, incubation period , mode of transmission and laboratory investigation of hepatitis C virus as well as nearly half of the studied. An obvious improvement was documented in nurses' knowledge scores after nursing intervention and after one month with highly significant statistically differences. This improvement might be related to the fact that majority of them were enthusiastic to learn. This finding may be due to that these nurses were experienced as they worked in this field and with this category of children since graduation.

Regarding to nurses' knowledge about renal failure , the current study showed that an obvious improvement was documented in nurses' knowledge scores after nursing intervention and after three months with highly significant statistically differences about definition, cause, type and treatment of renal failure these finding may be related to the fact that majority of them were young and enthusiastic to learn. this finding agree with Mostafa (2009)⁽¹⁶⁾ who found that there were highly statistically significant differences between pre/post program about nurses knowledge related to renal failure as for definition; causes types of acute and chronic renal failure.

Regarding to nurses' knowledge about hemodialysis, the current study showed that highly significant statistically differences in nurses' knowledge scores after nursing intervention and after one months about definition of hemodialysis

and preparation pre, during, and after hemodialysis. These finding may be due to that these nurses were experienced as they worked in this field and with this category of children since graduation. this finding agree with Mostafa (2009)⁽¹⁶⁾ who found that the differences were highly statistically significant for definition of hemodialysis and care pre, during and after hemodialysis procedure. this finding also agree with Hollow (2009)⁽²²⁾ who believed that, hemodialysis procedure is a highly technical procedure that needs specialized, well-trained nurse with high level of knowledge and performance to support children and prevent potential complication.

Regarding knowledge of the studied nurses about infection control practice the present study revealed that highly significant statistically improvement in nurses knowledge scores after nursing intervention and after one month about healthy basics for personally hygiene, safety of all worker time for hand washing and basic principal for sterilization these finding may be due to effect of cleaning & disinfecting environment surfaces in reducing their potential contributing to the incidence of healthcare associated infection these finding agree with Ghonaim (2011)⁽²³⁾ who stated that a significant increase in knowledge scores about cleaning ,disinfection& sterilization post program implementation .also Ahmed (2003)⁽²⁴⁾ emphasized that the staff awareness about the concept of infection control and the principles of aseptic techniques need to be reestablished to ensure nurses understand the importance of prevention of infection.

As regards nurses' level of knowledge about hepatitis c virus The current study revealed that total scores of knowledge for tow third of nurses before nursing intervention were poor. This may be attributed to lack of orientation program prior to work as well lack of nursing care conference during work, invariability of procedure, and books especially in this area which help nurses to get the required knowledge whenever they need. On the opposite after nursing intervention and after one months the total scores of more than half of nurses' knowledge were good. This could be attributed to the content of program which was developed based on nurses' needs, its clarity and simplicity, using of audiovisual aids, availability of the teacher in the field for more clarification, using simple language, frequent repetition to fix the knowledge. This result was in line with Potter (2008)⁽²⁵⁾ who describes that the nurse attains knowledge and competency through the standard application.

Regarding nurses' level of performance related to hepatitis c virus, the results of the present study revealed that the total score of three quarter of nurses' performance was poor before nursing intervention. This may be attributed to lack of proper equipment that needed to provide and improve nursing care and shortage of the Pediatric hemodialysis unit nursing staff. In addition to, lack of supervision and nurses' evaluation against identified standards of patient care, all these factors are behind this unsatisfactory level of practice

On the contrary after nursing intervention and three month after implementation it is clearly obvious that the nursing intervention implementation had effectively achieved its expected objectives, nursing staff had significant higher performance score than before nursing intervention implementation. This can be attributed to the new knowledge and skills that the nurses acquire and they become able to apply it during their practice. nurses there was an increase in the mean practice score of nursing staff.

5. CONCLUSION

The basis of the finding of the present study, can conduct that there were lack of essential and proper knowledge and practice concerning controlling of viral hepatitis c in pediatric hemodialysis unit, the application of nursing intervention protocol led to improve nurses knowledge and nurses practice for controlling of viral hepatitis C infection in pediatric hemodialysis unit

6. RECOMMENDATION

In the light of findings of the current study the following recommendations are suggested:

- 1-The study reinforces the need for sustained education and training program for continuous updating nurse's knowledge and practice related to nursing intervention.
- 2-Standardized nursing procedure should be used to guide nurses dealing with children under hemodialysis& suffering from hepatitis c virus.

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3-Periodically checkup and medical examination to all staff nurses and children for Anti HCV markers

4-Periodical educational training program about infection control, HCV and nephrology for nurses and staff members working at hemodialysis Unit is mandatory and periodical monitoring for nursing care for children with HCV , and raising nurses awareness about this nursing care through update nurses' knowledge and practice in hemodialysis unit.

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