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Effect of Implementing a United Protocol of Nursing Care in Ministry of Health Hospitals on Hemodialysis Nurses Knowledge and Hemodialysis Patientslevel of Satisfaction

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Abstract : *Hemodialysis is a lifesaving treatment that can offer significant advantages for certain patients, but it can have serious risks if the patients and their caregivers did not track and understand the concept of its safety.Sonurses who care for patients undergoing maintenance hemodialysis need to extend their competenciesabout pre, intra and post dialysis patients care and follow up, and have to be taught about how to preserve patients safety outcomes.*
Aim*: The aim of this study was to assess the effect of implementinga united protocol of nursing care in Ministry of Health hospitals on hemodialysis nurses knowledge andhemodialysis patientslevel of satisfaction.*
Hypothesis*: Hemodialysis nurses who receive training exhibit more improvement of their level of knowledge than before receiving itand hemodialysis patients who receive a united protocol of nursing care exhibit more improvement of their level of satisfaction than before receiving it.*
Design: *the study followed a quasi-experimental research design.*
Setting: *The study was carried out in the hemodialysis units in Ministry of Health hospitals and kom El deka training center of the Directorate of Alexandria Health Affairs.*
Subjects:*The study subjects consisted of 21 head nurses who worked at the hemodialysis unitsin Ministry of Health hospitals and80 hemodialysis patients.*
Tools: *Two tools were used to collect the necessary data.*
Tool I:*Hemodialysis nurses knowledge structured interview.*
Tool II:*Hemodialysispatients level of satisfaction sheet.*
Method: *An initial assessment was carried out for each head nurse using tool I. A total of twentyone hemodialysis nurses were exposed to training program which included7 sessions, each session about five hours/ week for a period of two months. Discussion, demonstration, re-demonstration was utilized by the researchers in training; also the researchers used colored booklet, social media and videos to reinforce the information.After finishing training, re-assessment was done by the researchers using tool I. Pre and post assessment was done for the patientslevel of satisfaction after the implementation the protocol of nursing care for hemodialysis patients, using tool II.*
Results:*There was a statistical significant difference between nurses knowledge and patient satisfaction before and after receiving training and there was an improvement in the patientslevel of satisfaction after implementation of the protocol of nursing care.*
Conclusion*: Nurse's knowledge and patientslevel of satisfaction were improved after implementation of the protocol of nursing carefor hemodialysis patients in Ministry of Health hospitals.*
Keywords -*Hemodialysis, protocol of nursing care, patientslevel of satisfaction.*

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I. Introduction

Renal failure is a medical condition in which the kidneys fail to efficiently filter toxins and waste products from the blood. It includes two forms acute and chronic renal failure. Chronic renal failure, or end stage renal disease (ESRD), is a progressive, irreversible deterioration in renal function in which the body's ability to preserve metabolic, fluid and electrolyte balance fail, causinguremia or azotemia which is the retention of urea and other nitrogenous wastes in the blood over a period of months or years [(1)]. ESRD may be caused by systemic diseases (such as diabetes mellitus and hypertension), chronic glomerulonephritis, pyelonephritis, obstruction of the urinary tract, vascular disorders, infections, medications, or toxic agents (as lead, cadmium, mercury and chromium), and hereditary lesions (as in polycystic kidney disease). Chronic kidney disease globally resulted in 800,000 deaths in 2016, up from 400,000 deaths in 1990[(2)].

In Egypt the principal causes of chronic renal disease are interstitial nephritis (14 to 32%), glomerulonephritis (11 to 24%), diabetes (5 to 20%) and nephrosclerosis (5 to 21%), also it could be attributed to improper life style (e.g. over the counter medications usage). Whereas polycystic and other hereditary diseases account for less than 5% of most cases[3].The reported annual incidence of End Stage Renal Disease (ESRD) on (2011) in North Africa countries ranges between 34 and 200 per million population (PMP) including Egypt 200 (PMP) where as in 2016 it was 400(PMP) [4].

The number of patients being treated for ESRD globally was estimated to be 2,786,000 at the end of 2011 and, with a 6 –7% growth rate, continues to increase at a significantly higher rate than the world population, approximately 2,164,000 were undergoing dialysis treatment (hemodialysis (HD) or peritoneal dialysis (PD)) and around 622,000 people were living with kidney transplants [5,6]. Dialysis is used to remove fluid and uremic waste products from the body when the kidneys cannot do so. Methods of dialysis include hemodialysis, and various forms of peritoneal dialysis which is one of the renal substitution therapies, that applied by introduction of a catheter mid-way between the umbilicus and symphysis pubis, and infusion of the dialysis solution into the peritoneal cavity [7].

The need for hemodialysis may be acute or chronic. Acute hemodialysis is indicated when there is a high and rising level of serum potassium, fluid overload, or impending pulmonary edema, increasing acidosis, pericarditis, and severe confusion. It may also be used to remove certain medications or other toxins (poisoning or medication overdose) from the blood [8]. Chronic or maintenance hemodialysis is indicated in end stage renal disease (ESRD), in the presence of uremic signs and symptoms affecting all body systems like nausea and vomiting, severe anorexia, increasing lethargy, mental confusion, hyperkalemia, fluid over load not responsive to diuretics and fluid restriction, and a general lack of wellbeing. An urgent indication for dialysis in patients with chronic renal failure is pericardial friction rub [9].

The National Kidney Foundation (NKF), Kidney Disease Outcomes Quality Initiative (KDOQI) published clinical practices guidelines for initiation of dialysis depending on clinical signs and symptoms. The guidelines for the initiation of dialysis are based primarily on creatinine clearance. Dialysis is initiated when creatinine clearance falls below 10 ml/min for non-diabetic patients, while for diabetic is below 15 ml/min as they exhibit uremic signs and symptoms earlier [10]. Patients with ESRD can be maintained by dialysis for years. Although the costs of dialysis are usually reimbursable, limitations on the patient's ability to work resulting from illness and dialysis usually impose a great financial burden on patients and families. Therefore, the decision to initiate dialysis should be reached only after thoughtful discussion among the patient, family, physician, and others as appropriate [11]. Also the nurse can assist the patient and family by answering their questions, clarifying the information provided, and supporting their decision [12].

Hemodialysis is the most commonly used method of dialysis,although it does not cure the renal disease and does not compensate for the loss of endocrine or metabolic activities of the kidneys. Patients receiving hemodialysis must undergo treatment for the rest of their lives or until they undergo a successful kidney transplant [13]. Treatments usually occur three times a week for at least 3 to 4 hours per treatment (some patients undergo short daily hemodialysis) [14]. The objectives of hemodialysis are to extract toxic nitrogenous substances from the blood and to remove excess water. In hemodialysis, the blood, laden with toxins and nitrogenous wastes, is diverted from the patient to a machine's dialyzer (referred to an artificial kidney that serves as a synthetic semipermeable membrane, replacing the renal glomeruli and tubules,and act as a filter for the impaired kidneys) in which the blood is cleansed and then returned to the patient [15].

The principles of hemodialysis are diffusion, osmosis, and ultrafiltration. The toxins and wastes in the blood are removed by diffusion, as they move from an area of higher concentration in the blood to an area of lower concentration in the dialysate [16]. Excess water is removed from the blood by osmosis. Ultrafiltration is defined as water moving under high pressure to an area of lower pressure,this process is much more efficient at water removal than osmosis. Ultrafiltration is accomplished by applying negative pressure or a suctioning force to the dialysis membrane. The body's buffer system is maintained using a dialysate bath made up of bicarbonate or acetate, which is metabolized to form bicarbonate [17]. Heparin is the anticoagulant administered to keep blood from clotting in the dialysis circuit. By the end of the dialysis treatment, many waste products have been removed, the electrolyte balance has been restored to normal, and the buffer system has been replenished [18].

An effective hemodialysis protocol of nursing care is mandatory to ensure patients' safety and adverse event evading [19]. It includes training the hemodialysis nurses about competent patients management, it should enables the nurse to identify basic information regarding dialysis (e.g component of urinary system, causes and treatment option for chronic renal failure, formulate hemodialysis comprehensive individualized home care plan, identify causes that laps patients' safety and assume measures to prevent it) [20]. Additionally, it also enhances the nurse to track infection control measures and follow policies and procedures applied in hemodialysis unit.In addition, valuable protocol of nursing care should increase nurses ability to set up/initiate or discontinuing dialysis machine safely, also it make the nurses able to collect complete patient's health history, and perform complete physical examinations, vascular access's assessment, and nutritional assessment,

finally it improve the nurse ability to assess and manage patients complications during and after dialysis procedure [21, 22]. Consequently in order to ensure effective nurses performance, patients' outcomes should be measured;this includes improvement in patients satisfaction toward nursing care provided to them [23]. To put a well planned protocol of nursing care, an in-service training program is needed in order to improve nurses' performance in hemodialysis units and improving patients' health outcomes [24].

The aim of this study:

This study aims to assess the effect of implementing a united protocol of nursing care in Ministry of Health hospitals on hemodialysis nurses' knowledge and hemodialysispatients level of satisfaction.

The research hypotheses were:

- Hemodialysis nurses who receive training have more improvement of their level of knowledge than before receiving it.
- Hemodialysis patients who receive a united protocol of nursing care exhibit more improvement of their level of satisfaction than before receiving it.

II. Materials And Method

II.1 **MATERIALS**

II.1.1.**Design:**A quasi-experimental research design was used.

II.1.2.**Setting**: The hemodialysis units of Ministry of Health hospitals, including 8 hospitals (Abou Qir general hospital, RasAlteen general hospital, El Agamy general hospital, El Gomhoria hospital, El kabbari general hospital, El Homiat hospital, Gamal Hamada Hospital and Alamria general hospital).

The training was carried out for nurses in kom El deka training center of the Directorate of Alexandria Health Affairs.

II.1.3.**Subjects**: The subjects of the present study consisted of:

- Twenty one nurses who were in charge at hemodialysis units in the Ministry of Health hospitals.
- A convenience sample of 80 adult patients (ten patients from each hospital) scheduled for maintenance hemodialysis in the above mentioned setting, based on Epi-nfo program that estimate the sample size using the following parameters:

1. Total population over one year ago at the above mentioned hospitals was 320 patients.
2. Expected frequency = 50%
3. Acceptable error= 10%
4. Confidence coefficient= 95%
5. Minimum sample size= 80

Inclusion criteria for patients were as the following:

- Adult patients 20- 60 years.
- Patients scheduled for maintenance hemodialysis 3 times per week.

II.1.4.**Tools:**Two tools were used to collect the necessary data.

Tool I: Hemodialysis nurses knowledge structured interview:

This tool was developed by the researcher based on reviewing of related relevant literature [25-28]. It was used to assess the nurses knowledge regarding hemodialysis. This tool was used before and after receiving the training, it consisted of two parts:

Part 1:Nurses socio-demographic data: It comprised items related to nurses socio-demographic datasuch as: age, sex, years of experience, level of education and receiving any previous training programs.

Part 2:Hemodialysis nurses knowledge: It compriseditems related to renal failure types and its management, setup/initiation of hemodialysis, discontinuing hemodialysis, safety measures in hemodialysis unit, machine alarmtroubleshooting procedures, nursing management of the patientscomplications and infection control measures in hemodialysis units.

Scoring system:

Hemodialysis nurses knowledge was scored on 3 point likert scale as the following:

- Correct and complete knowledge = 2
- Correct and incomplete knowledge = 1
- Incorrect knowledge = 0

According to this scoring system, the highest total score was 50 and the lowest total score was 20.

The total scores for each patient were calculated and transferred to percentage and patients were categorized according to resulted score and presented as the following:

- Poor level of knowledge = 20 >30 points (40 > 60%)
- Fair level of knowledge = 30 >40 points (60 > 80%)
- Good level of knowledge = 40 -50 points (80 -100%)

Tool II: Patients level of satisfaction questionnaire sheet:

This tool was developed by Chunlaka (2015) [29],and was modified by the researchers. It was usedto assess the patients level of satisfactionregarding nursing care before and after application of protocol of nursing care in the hemodialysis unites. It consisted of two parts:

Part 1:Patients socio-demographic and clinical data:

A) Patients socio-demographic data: It comprised items related to patients socio-demographic data such as: age, sex, occupation, marital status, and level of education.

B) Clinical data: It wasincluded patient's associated diseases, duration of hemodialysis and hemodialysisaccesstype.

Part 2:Patients level of satisfaction: It comprised items related to assurance, empathy, reliability, responsiveness and tangibility.

Scoring system:

Hemodialysis Patients level of satisfaction was scored on 3 point likert scale as the following:

- Agree = 2
- Uncertain = 1
- Disagree = 0

According to this scoring system, the highest total score was 34 and the lowest total score was 17.

The total scores for each patient was calculated and patients levels of satisfaction were categorized according to resulted score and presented into number and percentage as the following:

- Low level of satisfaction = 17>22 points. (50>65%)
- Moderate level of satisfaction = 22> 27 points. (65>75%)
- High level of satisfaction = 27- 35 points. (75-100%)

II.2. METHODS

II.2.1. Written approval to conduct the study was obtained from Faculty of Nursing, Alexandria University and presented to the hospital administrative personnel and directors of departments of the chosen setting after explanation of the aim of the study.

II.2.2. The study tools were developed, tools I was developed by the researchers after review of recent relevant literature [25- 28].Tool II was initially developed by Chunlaka (2015) [29],and was modified by the researcher to measure patients level of satisfaction regarding nursing care in hemodialysis unit.

II.2.3. Tools of the study were tested for the content validity by a jury of five experts in the field of Medical Surgical Nursing.

II.2.4. Reliability of the tools was done using Cronbach's alpha coefficientsand it was 0.77.

II.2.5. Informed consent was obtained from the participants after explanation of the purpose of the study. Privacy and confidentiality was ascertained.

II.2.6. A pilot study was carried out by the researcher on five patients to test the clarity and the applicability of the tools and to identify the difficulties that may be faced during the application of the tools.

II.2.7. After securing the administrative approval, data collection was started, and continued for a period of 6 months (from March 2017 to August 2017).

II.2.8.Steps of data collection:-

An initial assessment was carried out for each nurse using tool I (Hemodialysis nurses knowledge structured interview**)** to obtain base line data about hemodialysis nurses knowledge.

Nurses were receivedthe training program which include (7) sessions, each session was about five hours, once per week. Discussion, demonstration, utilized by the researchers in the training program, also the researchers used colored booklet, social media and videos to reinforce the information.

First session: Urinary system anatomy and physiology:
By the end of this session the nurses were able to describe component of urinary system and its physiology.
Content:
- Basic structure of the urinary system (kidneys, ureters, urinary bladder and urethra).
- Physiology of the urinary system.

Second session: Acute kidney injury AKI:
By the end of this session the nurseswere able to identify the acute renal failure, causes, signs and symptoms and its management.
Content:
- Definition of acute kidney injury AKI.
- Azotemia.
- Epidemiology.
- Etiology of acute kidney injury.
- Pathophysiology of acute kidney injury.
- Mechanism of acute kidney injury.
- Phases of acute kidney injury.
- Sign and symptoms of acute kidney injury.
- Diagnosis of acute kidney injury.
- Management of acute kidney injury.

Thirdsession: Chronic renal failure:
By the end of this session the nurses were able to identify chronic renal failure,pathophysiology,clinical manifestations, stagesand its management.

Content:
- Definition of chronic renal failure(endstage renal disease).
- Pathophysiology.
- Clinical manifestations.
- Stages of chronic renal failure.
- Assessment and diagnostic findings.
- Complications.
- Medical and nursing management.

Fourthsession: Nursing management for patient on hemodialysis:
By the end of this session the nurseswere able to perform nursing management for patient on hemodialysis.
Content:
- Definition of dialysis therapy.
- Types of dialysis.
- Principles and purpose of dialysis.
- The hemodialysis dialysis process.
- Complications of hemodialysis.
- Nursing management for patient on hemodialysis.
- Hemofiltration.
- Type of Hemofiltration.

Fifthsession: Policies and procedures applied in hemodialysis unit:
By the end of this session the nurseswere able to identify policies and procedures applied in hemodialysis unit.
Content:
- Employee health.
- Traffic control.
- Isolation.
- Quality standards

Sixth session: Dealing with hemodialysis patients safely:
By the end of this session the nurseswere able to deal with hemodialysis patients safely.
Content:
- Set up/initiate or discontinuing dialysis machine safely.
- Machine alarm troubleshooting procedures.

- Patient's physical examinations.
- Vascular access assessment.
- Nutritional assessment.
- Assessment and management patient's complications during and after dialysis procedure.
- Complete the administrative records.
- Developing procedures checklists to ensure infection prevention and control for patient on hemodialysis.

Seventh session: Dialysis session tips:
By the end of this session the nurses were able to manage hemodialysis session safely.
Content:

- Dry weight.
- Dialysate flow.
- Ultrafiltration modalities.
- Bicarbonate concentrate (time, quality, and how to prepare)
- Profiles.
- Priming of the session and how to rinse filters.
- Types of filters.
- How to administer heparin.
- Complications during session
- Sterilization procedures.

Nurses were re-evaluated by the researchers using toolI after one month of training on the protocol of nursing care. The protocol of nursing care was implemented by the nurses for hemodialysis patients for one month.

Hemodialysis patients were assessedby the researchers using tool II before and after implementation of the protocol of nursing care, each patient interviewed for a period of 30 minutes.

II.2.9.Ethical considerations:

A written informed consent was obtained from each patient after explanation of the aim of the study. Privacy and anonymity of nurses, confidentiality of data collection was assured and right to be withdrawn at any time from this study was respected and accepted.

II.2.10.Statistical analysis: After data were collected and transferred into specially design formats, so as to be suitable for computer feeding. Data were analyzed using computer with statistical package for social sciences (IBM SPSS) version 20.

II.2.10.1. Descriptive statistics. Count and percentage: used for describing and summarizing data.

II.2.10.2.*Analytical statistical tests*:
The statistical testswere included:-
1.Chi-square ($\chi 2$): It was used to test the association between two qualitative variables.
2.Normality assumptions of the ICS variables were violated (Kolmogorov-Smirnov test, $P < 0.05$), and thus, numerical (age, length of stay) background factors in association with the ICS variables were tested using Spearman' rho correlation coefficients (r with P-value)
3.Categorical variables with two groups (gender, type of admission, previous experiences of hospitalization, chronic condition) using Mann–Whitney U-test with bonferroni corrections (U with P-value) and with three or more groups (education) using Kruskall–Wallis test.
4.The level of significant for the study was $p \leq 0.05$ (10).

III. Results

Table I: Percentage distribution of socio-demographic characteristics of the nurses.

As regards age, it was observed that the highest percentages 72.73% were in the age group of 30-40 years. In relation to marital status, the highest percentages 72.73% were married, while 18.18%were single.As for level of education, it was noted that all of nurseshad bachelor degree. Regarding Years of experiences in hemodialysis, the results show thatmore than half of nurses 54.55% had 5-10 years of experiences in hemodialysis patients care, all of them had previous training programs about dialysis.

Table II: Comparison between nurses knowledge before and after receiving a united protocol of nursing care.

It was found that, there was a statistical significant difference between nurse's knowledge before and after receiving a united protocol of nursing care, regarding knowledge aboutrenal failure types and its management, setup/initiation of dialysis safely, discontinuing dialysis safely, safety measures in hemodialysis unit, machine alarmtroubleshooting procedures, nursing management of the patient'scomplications, and infection control measures in dialysis unit(0.004, 0.039, 0.012, 0.001, 0.008, 0.039, 0.012 respectively).

Table III: Comparison between total scores of nurses knowledge before and after receiving a united protocol of nursing care.

Regarding nurses knowledge total scores, the results revealed that, there was a statistical significant difference between nurses knowledge before and after receiving training (p = 0.001*) as higher percentages of nurses 76% had good level of knowledge after receiving the protocol of nursing care, in comparison to 85% of them had fair knowledge before receiving of the protocol of nursing care.

Table IV: Percentage distribution of hemodialysis patients according to their socio-demographic and clinical data.

As regards age, it was observed that three quarters75%of the patients were in the age group of 50-60 years. Regarding sex, it was observed that 82.5% of the patients were males. As for level of education, the highest percentages 45% had secondary education. Regarding occupation, three quarters of studied patients75% were not working. In relation to marital status, nearly two thirds of studied patients65% were married and 50% of them did not have associated diseases. It was noted that 61.25% of them start dialysis since >3 years and all of them had arteriovenous fistula.

Table (V): Comparison between hemodialysis patients before and after implementation of the protocol of nursing care according to their satisfaction level

It was noticed that more than two thirds of the patients agreed on the nurses adherence to the 5 dimensions of the patents level of satisfaction namely assurance, empathy, reliability, responsiveness, and tangibilityafter implementation of the protocol of nursing care for the patients compared with before the implementation of the protocol of nursing care.

Table VI: Comparison between total scoresof hemodialysis patientslevel of satisfaction before and after implementationof the protocol of nursing care.

Regarding patients level of satisfaction, the results showed that 13.75%of the patients had high level of satisfaction before implementationof the protocol of nursing care, compared with 85% after implementationof the protocol of nursing care.The difference was statistically significant (WRSTp<0.001*)

IV. Figures and Tables

Table (I):Percentagedistribution of nurses according to their socio-demographic data (n = 21)

Socio-demographic data	Studied nurses (n=21)	
	No.	%
Age:		
20 > 30	2	18.18
30 – 40	18	72.73
< 40	1	9.09
Marital status:		
Single	2	18.18
Widow	1	9.09
Married	18	72.73
Level of education:		
Bachelor	21	100
Master degree	0	0
Years of experiences in hemodialysis:		
1-5	2	18.18
5 – 10	16	54.55
>15	3	27.27
Previous training program:		
Yes	21	100
No	0	100
If yes when:		

During working	21	100
No	0	0
Who was training you?		
Coworkers	0	0
Supervisor	19	81.82
Others	2	18.18

Table (II):Comparison between nurses knowledge before and after receiving a united protocol of nursing care (n= 21)

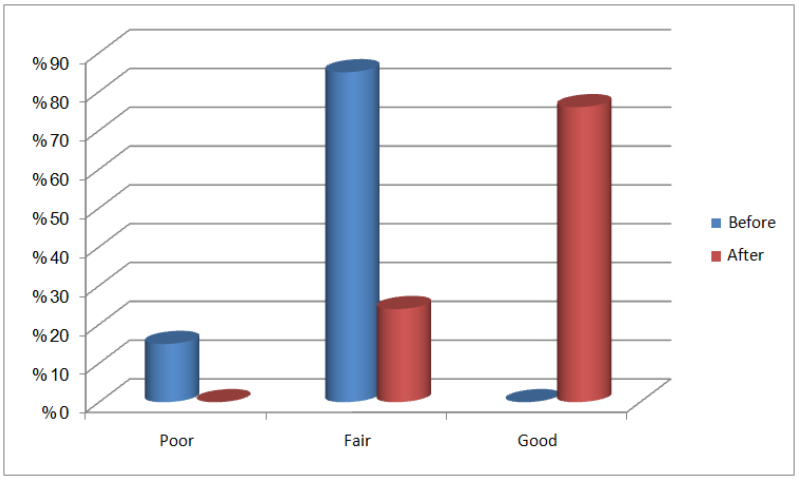
Nurses knowledge	Before						After						P
	Correct complete		Correct incomplete		Incorrect		Correct complete		Correct incomplete		Incorrect		
	No.	%	No.	%	%	No.	No.	%	No.	No.	%	No.	
Renal failure types and its management.	0	0.00	18	85	3	15	16	76	5	24	0	0.00	p= 0.004*
Setup/initiation of dialysis safely.	0	0.00	16	76	5	24	16	76	5	24	0	0.00	p= 0.039*
Discontinuing dialysis safely.	0	0.00	18	85	3	15	15	71.4	6	28.6	0	0.00	p= 0.012*
Safety measures in hemodialysis unit.	0	0.00	18	85	3	15	15	71.4	6	28.6	0	0.00	p= 0.001*
Machine alarmtroubleshooting procedures.	0	0.00	17	81	4	19	16	76	5	24	0	0.00	p= 0.008*
Nursing management of patients' complications.	0	0.00	16	76	5	24	16	76	5	24	0	0.00	p= 0.039*
Infection control measures in hemodialysis unit.	0	0.00	18	85	3	15	16	76	5	24	0	0.00	p= 0.012*

p: p value for Wilcoxon signed ranks test for comparing between before and after
*: Statistically significant at $p \leq 0.05$

Table (III):Comparison between total scores of nurses knowledge before and after receiving a united protocol of nursing care(n= 21)

Total scores of nurses knowledge		Before		After		P
		No.	%	No.	%	
Poor	**20- 30**	3	15	0	0	0.001*
Fair	**30-40**	18	85	5	24	
Good	**40-50**	0	0	16	76	

p: p value for Wilcoxon signed ranks test for comparing between before and after
*: Statistically significant at $p \leq 0.05$



Comparison between nurses knowledge before and after receiving a united protocol of nursing care

Table (IV):Percentage distribution of hemodialysis patients according to their socio-demographic and clinical data.

Socio-demographic and clinical data	Studied patients (n=80)	
	No.	%
Age (years):		
20-	3	3.75
30-	6	7.5
40-	11	13.75
50-60	60	75
Sex:		
Male	66	82.5
Female	14	17.5
Level of education:		
Illiterate	2	2.5
Read and write	2	2.5
Primary education	33	41.25
Secondary education	36	45
University	7	8.75
Occupation:		
Professional		8.75
Manual	7	6.25
House wife	5	10
Not working	8	75
	60	
Marital status:		
Single	0	0.00
Married	52	65
Widow	20	25
Divorced	8	10
Associated disease:		
Heart failure		5
Hypertension	4	20
Diabetes	16	25
Did not have	20	50
	40	
Duration of hemodialysis that the patient pass:		
<1 year	4	5
1< 2 years	15	18.75
2<3 years	12	15
>3 years	49	61.25
Hemodialysis access type		
Arteriovenous fistula	80	100

Table (V):- Comparison between hemodialysis patients before and after application of the protocol of nursing care according to their level of satisfaction.

Dimensions of Patients level of satisfaction	Before application of the protocol of nursing care			After application of the protocol of nursing care		
	Disagree	uncertain	agree	Disagree	Uncertain	Agree
Assurance:						
1.Nurses are knowledgeable for treatment (For example, nurses monitor a patient's condition to report t a doctor if the patient's condition significantly changes).	**62.5%**	**12.5%**	**25%**	**11.25%**	**13.75%**	**75%**
2. Nurses provide a clear explanation before giving medical care (For example, nurses provide an instruction before giving intravenous (IV) fluid).	**50%**	**13.75%**	**36.25%**	**15%**	**15%**	**70%**
3. Nurses provide a clear explanation of home medications upon discharge.	**50%**	**18.75%**	**31.25%**	**11.75%**	**17.5%**	**70.75%**
4. Nurses make patients feel safe and confident when providing service (For example, nurses professionally use aseptic technique while performing wound dressing).	**25%**	**56.25%**	**18.75%**	**18.75%**	**10.5%**	**70.75%**
Empathy:						
5. Nurses are able to communicate with the patients in easy understandable way.	**50%**	**18.75%**	**31.25%**	**11.25%**	**13.75%**	**75%**
6.Nurses have a pleasant tone of voice.	**62.5%**	**13.75%**	**23.75%**	**10%**	**10%**	**80%**
7.Nurses show empathetic facial expression.	**56.25%**	**18.75%**	**25%**	**10%**	**8.75%**	**81.25%**
8.Nurses give patients personal attention (For example, nurses address a patient's name every time entering the patient's room).	**87.5%**	**11.25%**	**1.25%**	**8.75%**	**11.25%**	**80%**
Reliability:						
9. Services provided by hemodialysis nurses are within promised timeframe (For example, nurses provide pain medication after patients request within 15 minutes).	**62.5%**	**15%**	**22.5%**	**10%**	**15%**	**75%**
10. Nurses show their interest in solving patients' basic problems.	**27.5%**	**56.25%**	**16.25%**	**7.5%**	**18.75%**	**73.75%**
11. Nurses are reliable and provide accurate information about : (Self-care, vascular access care, nutrition and exercise).	**40%**	**43.75%**	**16.25%**	**10%**	**18.75%**	**71.25%**
12. Nurses perform a service right at the first time (For example, nurses identify a patient's name correctly before giving medications)	**62.5%**	**11.25%**	**26.25%**	**10%**	**11.25%**	**78.75%**
Responsiveness:						
13. Nurses are willing to answer a patient's questions.	**67.5%**	**10%**	**22.5%**	**12.5%**	**10%**	**77.5%**
14. Nurses are willing to help at all times.	**68.75%**	**10%**	**21.25%**	**8.75%**	**10%**	**81.25%**
15. Nurses visit patients at appropriate time (For example, nurses come to investigate and mute alarm sound when it heard).	**27.5%**	**56.25%**	**16.25%**	**10%**	**10%**	**80%**
16. Nurses respond to a patient's request immediately in the case of troubles exist as pain.	**62.5%**	**15%**	**22.5%**	**7.5%**	**10%**	**82.5%**
Tangibility:						
17. Hemodialysis nurse provides cleanliness of :						
♦ Dialysis machines	**60%**	**22%**	**18%**	**10%**	**10%**	**80%**
♦ Dialysis chairs	**65%**	**20%**	**15%**	**10%**	**10%**	**80%**
♦ Dressing tables.	**50%**	**30%**	**20%**	**10%**	**20%**	**70%**

Table (VI):-Comparison between total scores of hemodialysis patientslevel of satisfaction before and after implementation of the protocol of nursing care.

Hemodialysispatients level of satisfaction	Before		After		P
	No.	%	No.	%	
Low level of satisfaction	34	42.5	0	0	$^{WRST}p<0.001^{*}$
Moderate level of satisfaction	35	43.75	12	15	
High level of satisfaction	11	13.75	68	85	

p: p value for McNemar test for comparing between before and after

^{WRST}p: p value for Wilcoxon signed ranks test for comparing between before and after

*: Statistically significant at $p \leq 0.05$.

V. Discussion

Hemodialysis is a method of removal of waste products such as creatinine and urea, as well as excess water from the blood when kidneys fail. Hemodialysis nurses play an essential role in ensuring adherence to the hemodialysis standards and to provide effective and safe patient care[30]. The present study revealed that, all of nursing staff had a university qualifications, this come in line with Younes (2012)[31], who studied knowledge and performance among nurses before and after receiving a training program on patient in hemodialysis unit. He found that the majority of nursing staff had a university qualification. Also highest percentage of the nursing staff was in the age group 30-40 years and had 5-10 years of experiences in hemodialysis unit. This finding was supported by Jawad (2015)[32], who studied improving nurses knowledge to reduce catheterrelated blood stream infection in hemodialysis unit and found that the majority of nursing staff age was more than 30 yearsand had more than 7 years of experiences.

In relation to nurses knowledge, the present results showed that, there was a notable statistical significant difference between nurses knowledge before and after receiving training. This may be related to nurses desire to improve their knowledge level as well as the simplicity of the received nursing care training. This finding was supported by Douglas (2012)[33], who studied patient's safety, satisfaction, and quality of hospital care. He noted thatnegative outcomes were due tolack of trainingand direction from the nurseresponsible of nursing services. Moreover nursing training is amoderating factor affects the patient'ssafety. Also these results were in line with Shrestha (2013)[34], who studied the impact of educational interventions on nurses knowledge regarding care of the patient with central venous line, he noted that there was improvement in nurses knowledge and clinical skills in relation to caring for hemodialysis patients after receiving training. Moreover the implementation of the educational training program has improved patients care and facilitated a better working environment for staff, as well as, rapid improvements were achieved in vascular access competencies.

In relation to patients socio-demographic data, the results of the present study demonstrated that, the majority of the patients were in the age group 50-60 years. This finding was supported by Mohamed (2010)[35] and Holzer (2012)[36], who reported that the patients between 50 and 60 years were frequently affected by ESRD more than other age groups. Furthermore, Seok (2010)[37], reported that the commonest age group affected was between 40- 60 years. In addition, Laudansk (2013)[38], studied age-related differences in the quality of life in end-stage renal disease in patients enrolled in hemodialysis, mentioned that the most common age groups of patients complaining from ESRD and undergoing AVF were ranging from 50 - 60 years old, that may be due to age related changes. On contrary, Ropert (2010)[39], emphasized that young children are at particularly high risk for ESRD due to their lower level of immunity.

Moreover, the present study showed that, the majority of patients were males. This could be interpreted as males have greater risk to develop chronic renal failure than females, as males are at higher risk for hypertension than females. This result comes in line with Lannery (2015)[40],who verified that, male patients comprised a majority of the study group, were complaining from ESRD, and he rationalized that, males had bad life styles as the use of the over counter medicationssuch as analgesics and antibiotics. Similar findingswere found by a study done by Ali (2014) and Liman (2014)[41, 42],who presented, the incidence of ESRD was higher in males as compared to females.These results was interpreted as males at higher risk for hypertension than females before 60 years old, while after 60 both are equal, and after 75 years females are at increased risk for hypertension than male which precipitate to ESRD.

On the contrary, Abdallah (2015)[43],conducted a descriptive study about concerns of hemodialysis patients, concluded that the incidence of ESRD among females was higher than males. He suggested that these results may be due to, an increased stressful situations today in females that lead to diseases as hypertension and diabetes mellitus that aggravate ESRD. Also, Sawako (2011)[44], studied the association between estrogen receptora gene polymorphism and mortality in end-stage renal disease female patients. He clarified that the majority of patients were females that may be due to their higher risk for urinarytract infection that may lead to ESRD. On the other hand, Oder (2013)[45],showed in his study that the incidence was equal between males and females.

Regarding marital status, the findings of this study indicated that the two thirds of patients were married. Similar finding was revealed by Gerogianni (2014)[46], who studied concerns of patients on dialysis found that the majority of patients were married. On the other hand, Ayub (2014)[47],revealed contradictory results, where the majority of patients were single and divorced because kidney disease affected their sexual function.

In relation to patients occupation the findings of this studyrevealed that, three quarters of patients were not working. This result may be due to the effect of ESRD on the patients daily living activities and limitations of the patients ability to work as a result of hemodialysis sessions burden. This is in line with Harold (2014)[48], who studied the clinical and economic impact of pharmaceutical care in end-stage renal disease patients, and mentioned that, ESRD and dialysis can result in work related problems.

Regarding patients satisfaction level, the present study showed that, there was increased in patients satisfaction level after the implementation of the protocol of nursing care, as the improvement in nursing care provided to them. This could be justified that giving health education help patients to understand their condition and increase their self-care practices as well as improve their confidence satisfaction towards nurses services. This result is in line with Sutherland (2011)[(49)],who stated that, patient satisfaction with the care received may have been increased as they were treated exclusively within clinical practice. Also, Ugurlu (2012)[(50)] and Ali(2015)[(51)], showed that, well informed patients with CRF are more likely to adjust to their condition and improve their quality of life than non-informed patients.

VI. Conclusion and recommendations

It can be concluded thatnursing care training had a crucial role in improving nurses knowledge which affect positively patents level of satisfaction.

Based on the results findings of the present study, the following recommendations are suggested:

•Pre-service training program should be provided to the newly appointed nurses before assuming independent responsibilities for hemodialysis patients' care.

•Developed competencies handout about care for hemodialysis patient should be available for all staff nurses working in hemodialysis units.

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