Effect of Implementing a Designed Nursing Teaching Protocol on Nurse's Performance and Hemodialysis Patient outcomes

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Abstract:
Hemodialysis is a life saving method that can offer significant benefits for end stage renal diseases management, but it can have some serious complication if the patients didn't understand of its causes. The nurse plays a critical role in reducing complications of this method .This ***study aimed*** *to assess nurse's performance regarding hemodialysis patients, design nursing teaching protocol for nurses working with hemodialysis patient, and evaluate the effect of implementing the designed teaching protocol on nurse's performanc**e** and patient outcomes.* ***Research design:*** *A quasi-experimental research design was utilized in this study.* ***Sample****: Convenient sample of (35) nurses and (60) Adult patients who are receiving hemodialysis aged from (18 to 65) years from both sexes.* ***Setting:*** *This study was conducted in the kidney dialysis unit at Assiut University Hospital.* ***Tools****: three tools utilize for data collection were a) Pre/Post test questionnaire sheet for the nurses) b) Observation checklist sheet. c) Patient assessment sheet.* ***Results****: Good improvement in the mean knowledge & practice scores were found after the implementing of designed teaching protocol.* ***In conclusion****: Improving nurses' performances can affect in minimize the incidence of hemodialysis complications.* ***Recommendation:*** *Provide written policy about the standardized nursing care that should be delivered to every patient in the unit.*

Key words: nursing teaching protocol, nurse's performance ,patient outcomes.

Introduction:

Chronic Kidney Disease (CKD) is a condition that affects kidneys for a period of time causing a gradual decrease in filtration rate of blood through the kidney glomerulus .Kidneys has a major role to play in maintaining homeostasis of the body through the removal of waste products, and through the removal of excessive fluid from the body **(Murray et al., 2013).**

End stage renal disease (ESRD) is the complete or almost complete failure of the kidneys to function. The kidneys can no longer able to perform their functions; remove wastes, concentrate of urine, and regulate electrolytes **(Gill et al., (2012)**. ESRD has reached an epidemic level, causing a foremost burden to health care resources, and it is a divesting medical, social, and economical problem for patients, and their families **(Mitch et al., 2009).**

Hemodialysis is a method of removing toxic substances (impurities or wastes) from the blood when the kidneys are unable to do so. Dialysis is from Greek word “dialusis” mean dissolution, “dia” meaning through, and “lusis” mean loosening **(Preus et al., 2015).** It removes waste products such as potassium and urea and free water from the blood when the

kidneys failure. Other renal replacement therapies are renal transplant and peritoneal dialysis. **(Soykan et al.,2014)** and **(Schilthuizen et al., 2015)**.

Also hemodialysis is a lifesaving treatment that can offer significant advantages patients, but it can have serious risks if the patients and their caregivers did not understand the concept of its safety. Without attention to patient's management and error prevention, even a well-established procedure like hemodialysis can result in an adverse event **(Ward & Taylor, 2010)**

Hemodialysis is a lifelong treatment that significantly and sometimes adversely affects patients physical and mental abilities, with depression, anxiety and fatigue being common issues **(Chen et al., 2010) and (Frazao et al., 2013)**. There are also additional stressors, including biochemical imbalance, physiological changes, neurological disturbances, cognitive impairment, and sexual dysfunction. **(Kavurmacı et al., 2014).** The most common complications during hemodialysis are including order of frequency, hypotension (20-30%), cramps (5-20%), nausea and vomiting (5-15%), headache (5%), chest pain (2-5%), back pain (2-5%), itching (5%), fever and chills (less than 1%) **(Sherman et al., 2013).**

Nurses are at the center of patient's management and they are essential drivers of quality improvement. And protected against physical, social, spiritual, financial, political, occupational, psychological, educational or other types or consequences of failure, damage, error, accidents, harm or any other event which could be considered on-desirable**. (Kliger & Diamond, 2012)**

Also, nurses are the main people who provide care for these patients, and their most important responsibility is to identify the essential care of these patients. a nephrology nurse should perform: Hemodialysis Vascular Access: Assess the fistula/graft and arm before, after each dialysis or every shift: the access flow, to assess the complication of central venous catheter: the tip placement, exit site, complications document and notify appropriate health care provider regarding any concerns .Educate the patient with appropriate cleaning of fistula/graft and exit site; with recognizing and reporting signs and symptoms of infection and complication **(Charmaine et al., 2014)**

Also the nurses teach the patient about the importance of receiving adequate dialysis. Hemodialysis treatment and complications: Performs head to toe physical assessment before, during and after hemodialysis regarding complications and access's security. Confirm and deliver dialysis prescription after review most update lab results. Address any concerns of the patient and educate patient when recognizing the learning gap and medication management .Collaborate with the patient to develop a medication and diet regimen **(Sabet, 2011)**

Hemodialysis patients need mental support to adapt to their current status, so the nurses can teach them to become accustomed to their problems and fears of the disease by reducing anxiety, enhancing adaptability, supporting decision making, and providing emotional support and education. Therefore, nurses' awareness of high quality of care can affect the care of these patients and increase patient's satisfaction notably **(Davison, 2016)**

Nursing teaching protocol for the patients undergoing hemodialysis should center on prevent hemodialysis complication to promote patient outcome by; monitoring the physical of the patient prior and during dialysis for evidence of physiological imbalance and change, comfort and safety needs of patient, and helping the patient to understand and adjust to the care and changes in life style that he is experiencing. This later objective involves teaching the patient as to the specifics of his treatment program (diet and medications in particular) and how these relate to his altered kidney function. The patient should be encouraged to express his concerns and feelings, and attempt must be made to help the patient work through his feelings. Prior to dialysis the patient is weighted, his temperature and vital signs are taken, sample of blood is usually drawn to determine the level of serum electrolytes and waste products, and the patient's physical status is assessed **(Judith & kallenach, 2016)**

Significance of the study:

From the researchers' clinical experience it has been observed that hemodialysis is a complex procedure and has numerous attendant risks and complications associated with it. Hemodialysis complications increase inpatient stay, hospital cost and mortality of hemodialysis patients, which makes the health care providers do great efforts to decrease the incidence and risk factors of these complications. Nurses are the largest group of workers; in addition, they have close and continuous contact with patient. Therefore, they are uniquely placed to incorporate preventive and promote strategies in the day-to-day care they provide. So, they should have knowledge, and being skillful in dealing with these complications. So, this study will be carried out to assess their performance regarding hemodialysis patient.

Aims of the study:

The aims of the present study is 3-folds: The first is to assess nurse's knowledge and practice regarding hemodialysis patients, the second is to design nursing protocol for nurses working with hemodialysis patient, and the third is to evaluate the effect of implementing the designed nursing protocol on nurse's knowledge and practice regarding hemodialysis patients and patient outcome.

Hypotheses:

To fulfill the aims of the study the following research hypotheses were formulated:-

1. The post mean knowledge and practice scores of nurses who will be exposed to design nursing protocol will be higher than their pre mean knowledge scores.
2. A positive relationship will exist between knowledge and practice score obtained by nurses receiving the designed nursing protocol.
3. The incidence of complications during hemodialysis process for patients cared by nurses after protocol implementation will be lesser than that developed pre protocol implementation.

Research design:

Quasi-experimental research design has been utilized in this study.

Study variables:

The independent variable in this study is the designed nursing protocol while the dependent variables are: nurse's knowledge, and practices.

Technical design:

Setting of the study:

The study will be conducted in the kidney dialysis unit at Assiut University Hospital

Study subjects:

A convenience sample of all available nurses (35 nurses) working in kidney dialysis unit and who are willing to participate in the study in addition to adult patients who are receiving hemodialysis through (6) months period not less than (60) patients before and after application of the designed nursing protocol. Patients will be selected according to the following criteria:

Inclusion criteria:

1- Adult conscious patients with chronic renal failure who are receiving hemodialysis.
2- Both sexes (male and female).
3- Age range between (18-65years).

Exclusion criteria:

1- Unconscious patients and patients on mechanical ventilation.
2- Patients receiving peritoneal dialysis.
3- Hemodialysis emergency (patients with acute renal failure).
4- Patients with Psychiatric disorder and patients with speech disorder.

Study tools:

Tool (I) Pre/Post test questionnaire sheet for the nurses: It was constructed by the researcher based on current national and international literature to assess their knowledge regarding hemodialysis patient in addition to some selected demographic data for nurses. It consists of 4 main parts:

- Demographic variables of study sample. Including age, sex, marital status, qualifications and years of experience. It includes (7) items (Questions from 1 to 7)
- Nurses' knowledge about renal failure, which includes (9) questions.
- Nurses' knowledge about hemodialysis, which includes (11) questions.
- Nurses' knowledge about nursing care with hemodialysis patient which includes (25) questions.

The questionnaire sheet was administered by the researcher to the nurses for answering all its components then collected. The total number of questions was (45) items.

This tool was used prior to implementation of the designed nursing protocol to measure the exact knowledge level of nurses regarding hemodialysis patient. The same tool was used immediately after the implementation of the designed nursing protocol (immediate post-test).

Scoring system: each right answer was given five score. The total scores were 225. Those who obtained (60%-75%) were considered having unsatisfactory level. While those who obtained more than (75) were considered having satisfactory level.

Tool (II) An observational checklist sheet for the nurses: It was developed by the researcher based on reviewing of literature to assess nurse's practice. This tool was used before and immediately after the implementation of the designed nursing protocol to evaluate the effect of the designed nursing protocol on nurses' practice. It consists of the following 5 main items:

- General care of patient with hemodialysis, which includes (12) items (Items from 1 to 12).
- Specific care which includes 100 items, as regards the following:

1. Cannulation of arteriovenous fistula.
2. Accessing a vascular catheter
3. Initiation of hemodialysis.
4. Termination of hemodialysis.

Scoring system:

The total score of observation checklist sheet was (224) degree, each item in checklist was scored as follow: - two degree for each step that done correct and one degree for each step done incorrect and zero for step that not done.

This system translated in results into adequate and inadequately done, adequately done includes steps that done correct and inadequately done include steps that done incorrect and not done. Scores more than 70 % were graded as satisfactory level of practice. Scores > 70% were graded as unsatisfactory level of practice.

Tool (3) Patient's assessment sheet: It was used to assess expected complications that might develop among patients with hemodialysis admitted to the kidney dialysis unit after implementation of the designed nursing teaching protocol in addition to some selected demographic characteristics data for patients. The assessment sheet includes (47) items and covers the following areas:-

- Demographic data: patient's name, age, sex, marital status, occupation, level of education. It includes 5 items.
- Information about hemodialysis covering 4 items.
- General assessment covering 8 items.
- Assessment of each body system covering 8 items.
- Detailed assessment of expected complications covering 22 items.

Construction of designed nursing teaching protocol: It was developed according to the needed nurse's knowledge and practice, which can help nurses in provision of a safe care for hemodialysis patient

Ethical Consideration

- The study follows the common ethical guidelines of clinical research according to the principles of **Helsinki Declaration** for medical research, **(1996)**.
- Research proposal was approved by ethical committee of the faculty of nursing.
- Informed consent was taken from nurses participating study, after explaining the nature and purpose of the study.
- Confidentiality and anonymity were being assured.
- Each patient and nurse was informed that they refuse to participate and or withdraw from the study without any rational at any time.

Validity and Reliability:

It was established by panel of 7 expertises who reviewed the instruments for clarity, relevance, comprehensiveness, understanding, applicability and easiness for administrative minor modifications were required. The content validity of this tool was checked by expert professors in fields of medicine and nursing and correction was carried out accordingly.

A pilot study:

A pilot study carried out in January 2016 to test the feasibility and practicability of the study tools on 10% of sample (6) patient and (4 nurses). It had also provided an estimate of time needed to fill out the tools.

Technique for data collection: This study was carried out in three phases:

Phase I: Preparatory phase:

A review of current and past, local and international related literature in the various aspects of the problems using books, articles, periodicals, and magazines was done. The proposed study setting was assessed for the numbers of nurses and patients in the kidney dialysis unit at Assiut University Hospital. This phase ended by a pilot study.

Phase 2: Planning phase:-

Based on finding of the preparatory phase, the designed nursing protocol will be developed, after extensive literature review considering nurses needs and their levels of understanding.

Phase 3: Implementation phase:

The designed nursing teaching protocol (Implementation phase):

Data were collected at kidney dialysis unit at Assiut University Hospital during the period from 1/1 /2016 to 1/6/2016. The tools filled through interviewing. The purpose of the study was explained to the nurses prior to answering the questions. The study was carried out at morning, and after noon shifts.

- At initial interview the researcher introduce her self to initiate line of communication, explain the nature & purpose of the designed nursing protocol and fill out the questionnaire sheet (tool 1) to assess nurse's knowledge before application of designed nursing protocol.

- Also she scheduled with them the teaching sessions for both theory and practice and the nurses were divided into small groups, each group contains 5 nurses.
- The designed teaching nursing protocol has been implemented for nurses in terms of sessions and teaching on the spot during their official working hours. There were a total of 10 sessions. These sessions were repeated 10 times to each group. Number of nurses in each session 4-5 nurses. The duration of each session was an hour, including 15 minutes for discussion and feedback.
- Each session usually started by a summary of what has been taught during the previous sessions and the objectives of the new topics. Feedback and reinforcement of designed nursing protocol was performed according to the nurses needs to ensure their understanding. Giving praise and/or recognition to the interested nurses were emphasized for motivation during the designed teaching protocol implementation.
- Each nurse obtained a copy of the designed nursing protocol booklet that included all the training contents.
- Also the researcher explained the nature & purpose of the designed nursing protocol to the selected patients who are willing to participate in the study and filled out the patient assessment sheet (tool 3).

Evaluation phase:

The last phase of designed teaching protocol is the evaluation phase. Immediately after protocol implementation the nurses' knowledge and practices has been evaluated by the researcher through filling the tool (1&2).

Statistical design:

Data collected and analysis by computer program SPSS" ver. 17" Chicago .USA Data expressed as mean, Standard Deviation, number, and Percentage. Using t.test to determine significant for numeric variable. Using Chi square to determine significant for non-parametric variable.

P >0.05 non-significant P <0.05 significant P <0.005 moderate. Significant P <0.001 highly significant

Results:

Part 1: Demographic characteristics for nurses:

Table (1): Frequency distribution of demographic characteristics of the studied nurses (n=35).

Variable	No	%
Sex:		
Male	16	45.7
Female	19	54.3
Age:		
< 20 years	0	0.0
20-30 years	22	62.9
> 30years	13	37.1
Marital Status:		
Single	9	25.7
Married	26	74.3
Qualifications:		
Diploma of nursing 3 years	23	65.71
Diploma of specialty of nursing	7	20
Institute of nursing	2	5.71
Baccalaureate of nursing	3	8.6
Years of experience:		
<5 years	5	14.3
5-10years	15	42.9
> 10years	15	42.9
Previously of attended training programs about dialysis:		
Yes	6	17.14
No	29	82.85
Previously of attended training programs about infection control:		
Yes	29	82.85
No	6	17.14

Table (1): shows that; the majority of nurses (62.9%) their age ranged from 20-30 years. (74.3%) of them were married. (85.8%) of them had ranged from 5 to more than 10 years of experience. (54.3%) of them were female. (65.71%) of them had diploma of nursing. As regard to previously of attended training programs, it was found that (82.85 %) were not attending training program about dialysis. As regard to other training course, it was found that (82.85%) of nurses attended training course as infection control.

Part II: Assessment nurse's level of knowledge:

Table (2): Total mean knowledge scores obtained by nurses pre and post implementing of designed teaching nursing protocol (n=35).

Knowledge Items	Mean ± SD	p-Value
Knowledge about renal failure (Maximum score = 45):		
• Pre-test	29.67±5.31	***
• post-test	40.65±9.36	<0.0001
Knowledge about dialysis (Maximum score = 55):		
• Pre-test	41.10±4.54	*
• post-test	50.47±6.42	<0.04
Knowledge about care of hemodialysis patients (Maximum score =125):		
• Pre-test	86.80±15.36	*
• post-test	116.34±12.69	<0.03
Total score (Maximum score = 225):		
• Pre-test	157.57±21.60	***
• post-test	207.47±26.19	<0.0001

*: Significant ***: Highly significant

Table (2): shows that; the mean scores for total knowledge are low before implementing of designed teaching protocol (29.673 ±5.31, 41.10 ±4.54, 86.80 ±15.36, 157.57±21.60 respectively). However, a good improvement in the mean knowledge scores after the implementation of the designed teaching protocol (40.65 ±9.36, 50.47±6.42, 116.36 ±12.69, 207.47±26.19 respectively).

Table (3): Nurses' levels of performance pre and post implementing of designed nursing teaching protocol.

Variable	Pre protocol		Post protocol		p-Value
	No	%	No	%	
Nurse's level of knowledge Satisfactory level < 225 (<135 degree)	30	85.7	32	91.4	*** <0.0001
Unsatisfactory level ≥ 225 (≥135 degree)	5	14.3	3	8.6	
Nurse's level of practice					
Adequate level < 224 (<134.5 degree)	30	85.7	35	100	*** <0.0001
Inadequate level ≥224 (≥134.5 degree)	5	14.3	0	0.0	

*** Highly significant

Table (3): show that; the majority of nurses had satisfactory level of knowledge and practices in post implementing designed nursing protocol with (P<0.001).

Part III: Nurse's level of practice:

Table (4): Total mean practice scores obtained by nurses pre and post implementing of designed teaching nursing protocol.

Practice items	Mean ± SD	P-value
Total hemodialysis patient care: • Pre-test	154.80 ± 9	** <0.001
• Post-test	192.28 ± 6.56	

**: Moderate significant

Table (4): shows that, the baseline mean scores for total practice are high pre implementing of designed teaching protocol (154.80 ± 9), However, a good improvement in the mean practice scores post implementing of the protocol (192.28 ± 6.56) and a significant relation between nurse's practice in relation to mean practice score with P<0.001.

Table (5): Relationship between nurse's knowledge and their practice scores post implementing designed nursing protocol

Knowledge score	Practice score				P-value
	Inadequate		Adequate		
	No	%	No	%	
• Satisfactory	0	0.0	32	91.5	** 0.001
• Unsatisfactory	3	8.5	0	0.0	

**: Moderate significant

Table (5): shows that, there was significant difference between nurse's knowledge and their practice scores post implementing designed nursing protocol.

Table (6): Relationship between nurse's knowledge score and their experience pre implementing teaching designed nursing protocol

Knowledge score	Years of experience						P-value
	< 10 y (no= 5)		5-10y (no= 15)		>10y (no= 15)		
	No	%	No	%	No	%	* <0.03
• Satisfactory	5	100	11	73.3	14	93.3	
• Unsatisfactory	0	0.0	4	26.7	1	6.7	

*: Significant

Table (6): shows that, there was significant difference between nurse's knowledge scores and their years of experience, it was found that, less than half of nurses of experience more than 10 years had satisfactory level of knowledge, and all of nurses (100%) of experience less than 5 years had satisfactory level of knowledge pre implementing designed teaching g protocol with p-value<0.03.

Part 4: Assessment of patients who had undergone hemodialysis. **Table (7):** Frequency distribution of demographic characteristics of studied patients (n=60).

Variables	No	%
1- Age:		
- 18-20 year	24	40
- 40- 60 year	26	43.3
- >60 year	10	16.7
2- Sex:		
- Male	40	66.7
- Female	20	33.3
3- Marital status:		
- Single	17	28.3
- Married	43	71.7
4-Level of education:		
- High education	14	23.3
- Secondary	18	30
- read and write	21	35
- Illiterate	7	11.7
5-Occupation:		
-Employee	24	40
- Farmer	23	38.3
- House wife	13	21.7

Table (7): shows that, demographic characteristics of patients included in the study. The majority of the patients are male (66.7%). Regarding their age; less than half of them (43.3%) their aged ranged from the 40- 60 years old. Regarding marital status; the majority of patients were married (71.7%). Regarding; level of education more than third of patient (35%) were read and write. Regarding occupation; less than half of patients (40%) are employee.

Table (8): Distribution for medical data of the studied patients.

Items	No	%
1- How many times of session for week?		
- One time	5	8.33
- Two time	20	33.33
- More than two time	35	58.33
2- How many hours per session?		
- 4-5 hours	55	91.67
- More than 5 hours	5	8.33
3-Type of vascular access:		
- Arteriovenous fistula	53	88.3
-Silicon dual- lumen catheter with Dacron cuff	7	11.7
4- Period of receiving hemodialysis? Mean ± SD	7.56±2.43	

Table (8): Demonstrate that about two third of the patients are receiving hemodialysis more than two time pre week by percent of (58.33%).And as regard to their hemodialysis hours pre session , the majority of patients (91.67%) taking from (4- 5) hours' in hemodialysis session.

Table (9): Percentage distribution for history taking of the studied patients (no= 60).

History taking	No	%
1 - Chronic disease: *		
– Diabetes mellitus	28	46.67
– Hypertension	31	51.67
– Cardiovascular disease	11	18.33
– Pulmonary disease	0	0.0
– Kidney diseas.	28	46.67
2-Previous surgery related to kidney:		
- Yes	34	56.7
- No	26	43.3.3
3- Drug therapy used:		
–Yes	35	58.3
–No	25	41.7
4- Family history:		
– Yes	11	18.3
– No	49	81.7

Table (9): shows that, about half of them were having hypertension (51.67%). As regards to previous surgery more than half of patients were having previous surgery (56.7 %). In relation to drug therapy used more than half of patients were used drug therapy (58.3%). as regards to family history, the majority of patients were not having medical family history (81.7%)

Table (10): Percentage distribution of hemodialysis complications as regarding pre and post implementing designed nursing protocol of the studied patients (no= 60).

Items	Pre-test		post-test		p-Value	Level of sign.
	No	%	No	%		
1-Vascular access complications:						
– Thrombosis	12	20	6	10	100	n.s
– Infection	22	36.7	11	11	<002	*
– Bleeding	32	53.3	14	14	<0.001	**
– Arterial or venous stenoses	7	11.7	3	3	0.161	n.s
– Pseudo aneurysm	17	28.3	5	5	<0.004	**
– Vascular steal syndrome	0	0.0	0	0.0	–	
– Venous Hypertension	0	0.0	0	0.0	–	–
						–
2- Dialysis process complications:	35	58.3	24	40	<0.03	*
– Hypotension	8	13.3	6	10	0.389	n.s
– Hypertension	34	56.7	20	33.3	<0.008	**
– Headache	0	0.0	0	0.0	–	–
– Cardiac arrhythmias	16	26.7	7	11.7	<0.03	*
– Chest pain	17	28.3	6	10	<0.01	*
– Muscle cramps	24	40	8	13.3	<0.001	**
– Back pain	13	21.7	5	8.3	<0.03	*
– Nausea and vomiting	15	25	5	8.3	<0.01	*
– Itching	10	16.7	9	15	0.50	n.s
– Fever						
3- Other complications:						
– Air embolism	0	0.0	0	0.0	–	–
– Seizures	0	0.0	0	0.0	–	–
– Hemolysis	34	56.7	15	25	<0.0001	***
– Severe dialysis disequilibrium	7	11.7	6	10	0.50	n.s
– Acute urticaria	0	0.0	0	0.0	–	–
– Cardiac tamponade	0	0.0	0	0.0	–	–

Table (10): Revealed that the incidence of hemodialysis complications after application of a designed nursing teaching protocol lesser than pre implementation of a designed nursing protocol. It was found that more the half of the study sample having bleeding, hypotension, headache and hemolysis.

Table (11): Assessment of mean patient vital signs recording chart as regard pre, during and post dialysis of the studied patients (no= 60).

Vital signs recording chart	Mean ± SD	
1 - Body temperature:		
– Pre dialysis	37.10±0.392	
– During dialysis	37.04±0.350	
– Post dialysis	36.96±0.317	
2- -Pulse:		
– Pre dialysis	70.10±9.03	
– During dialysis	70.18±8.25	
– Post dialysis	70.18±8.25	
3-Respiration:		
– Pre dialysis	23.36±3.70	
– During dialysis	22.oo±2.63	
– Post dialysis	21.26±2.57	
4-Blood pressure:	**Systole**	**Diasystole**
– Pre dialysis	146.33±19.74	88.33±14.74
– During dialysis	145.67±20.86	80.25± 5.43
– Post dialysis	145.00±24.39	78.25±14.38

Table (11): reveals that, the mean vital signs recording chart in pre dialysis was higher than in during and post dialysis especially for temperature, respiration and blood pressure (37.10± 0.392, 23.36 ± 3.70, 146± 19.74respectively).

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Table (12): Percentage distribution for physical assessment of body systems of the studied patients pre and post implementing designed nursing protocol (no= 60).

Variable	No	%
Cardiovascular system assessment		
– Hypertension.	42	70
– Hypotension.	38	63.3
– Dysrhythmias	27	45
Respiratory system assessment:		
– Dyspnea	32	53.3
– Orthopnea	16	26
– Tachypnea	24	40
– Productive Cough	32	53.3
Gastrointestinal system assessment: *		
– Anorexia, nausea, vomiting	39	65
– Constipation	34	56
– Ammonia odor to breath	17	28.3
Integumentary system assessment (Skin):		
– Pitting edema.	15	25
– Dry skin and pruritus.	60	100
Neurological system assessment:		
– Weakness and fatigue.	35	58.3
– Burning of soles of feet.	25	41.7

Table (12)**:** shows that, the majority of patients were having hypertension (70%) and hypotension (63.3%) and more than one third of them complain from dysrhythmias (45%). Also more than half of patients (53.3%) were having dyspnea and more than one third of them complain from tachypnea (40%). As regarding to cough, more than half of patients (53.3%) having productive cough. as regarding assessment of gastrointestinal system. It is clear from the above table that**,** two third of patients (65%) were having anorexia, nausea, vomiting. More than half of them (56) were having constipation. Also all patients were having dry skin and pruritus (100%).

– As regarding to neurological system shows that, the majority of the study sample complains from weakness and fatigue and Burning of soles of feet (58.3%, 41.7 respectively).

Discussion

Nursing teaching protocols for all nursing staff constitute an important part in patient cure. These programs are urgently designed to assist staff nurses in developing and enhancing the skills needed to provide high standards of care to hemodialysis patients **(Marriner, 2009**).

Based on the results of the present study, the majority of the nurses their ages ranged from 20-30 years, married, female, and have diploma of nursing. The majority of them have in-service training courses related to infection control but the majority of them have no in-service training courses related to dialysis. The majority of them their experiences range from 5 to more than 10 years. This is in the same line with **Mustafa, (2010**);study which revealed that 87.5%, 66.7%, 47.9%, 93.8%, 52.09%, 68.8% of the sample were married, female, their age ranged from 20-29 years, have a diploma qualification, years of experiences in hemodialysis units less than 20 and have in-service training courses related to infection control precautions.

Also **Brenner, and Levine, (2008) and Marquis and Huston, (2009):** they stated that teaching and training are two components of staff development that occur after an employees' indoctrination (which refers to planned, guided adjustment of employee to the organization and work environment). The staffs' knowledge level and capabilities are a major factor in determining the number of staff required to carry out unit goals. The better trained and more competent the staff, the fewer staff required, which in turn saves the organization money and raise productivity.

Data collected before the designed nursing protocol implementation (pre-test) showed unsatisfactory level of knowledge about renal failure, hemodialysis and care of patients undergoing hemodialysis , which reflects the lack in their scientific preparation. The implementation of the designed protocol showed an improvement in the nurses' level of knowledge regarding the care offered to hemodialysis patients. The findings indicate that a good improvement in the mean knowledge scores after the application of the designed nursing protocol.

So, we can conclude from the data collected and analysis in the present study that all studied nurses weren't properly prepared prior to their working and/or dealing with such hemodialysis patients and really they got their experience while being there, working and managing the patients in the real life emergency situations.

The results in the present study revealed that, a great improvement in the practice score levels obtained by nurses after the application of the nursing teaching protocol. This has been concluded by the presence of significant difference between results of pre-test and post-tests. This finding indicated that skills can be easily improved, especially if linked with their relevant scientific base of knowledge about hemodialysis.

Also **Youssef, (2007);** in the same line with the current study findings conducted a study in at the reconstructive microsurgical & trumatology care units in Assiut University Hospital. Entitled“ Microvascular free tissue transfer surgeries, Impact of a designed teaching protocol on nurse's knowledge, practices and patient's outcome" which revealed that an improvement in nurse's practice after the attendance at continuing nursing education sessions. Research findings indicated that continued nursing education programs increase both knowledge, practice and can also improve attitudes. And in the same line of **Ookalkar, (2009)** who recommended that educational programs should be organized according to the needs of nurses with continuous evaluation and adopting proper checklists for work monitoring to enhance patient and staff awareness; led to reduced process errors, mitigating overall risks, eventually resulting in effective patient care.

However, the study of **Carroll and Susan, (2005**), demonstrated that nurses must be accountable and responsible for the assessment, planning, intervention, teaching supervision, and evaluation of care to ensure that the patient will receive safe hemodialysis.

The results of the present study showed that; the majority of patients were male, married, their ages ranged from 40 to 60 years, read and write and employee. This study finding was supported by **Shams El-deen, (2000);** who reported that males still having a higher risk than females in developing renal failure.

Also this results agree with the study of **Mohammed, (2010),** entitled as " Effect of Rehabilitation program for patients undergoing hemodialysis upon their Psychosocial adjustment in Assiut University Hospitals" which revealed that 62.5% of the sample (80 patient divided into study group and control group 40 for each group) were male in the study group, while in the control group were 75%.

As regard their age, it was found that 62.5% of the study group patients were in the age group of 40 – 49 years while those who are less than 30 years constituted only 12.5% in the same group. **Basile, and Lomonte (2015);** added that historically, the age of patients developing end stage renal disease steadily rose each year, but it appears to have stabilized since 1993 at a mean age of 60 years.

In the relation to material status it was found that the majority of patients were married this study finding was supported by **Mohammed, (2010),** who found that 87.5% of the study sample were married while 75% in the control group. As well, **Ahmed, (2000)** it was found that the majority of the studied patients (74%) were married and only (26%) were single (50 patient).

As regard the occupation of the patients in this study it was found that less than half of them are employee. This study finding agrees with the study of **Shams El-deen, (2000);** who reported that the incidence of end stage renal disease was high in employees' patients than farmer and housewife. In this respect**; Mohammed, (201**0) in this study found that; employee patient were 62.5%, while farmer constituted, 25% and 12.5% were housewife.

The results in the present study revealed that, two third of the patients were receiving hemodialysis more than two times per week. The majority of them taking from (4 - 5) hours' in hemodialysis session and using arteriovenous fistula. This study finding was supported by **(Hall, et al., 2004**); who reported that hemodialysis treatment usually take place three times a week for 3 to 5hours per treatment to achieve adequate clearance and maintain fluid balance.

This study finding also agree with **Rayner, et al., (2003)**; who reported that arteriovenous fistula is the preferred vascular access for long-term dialysis patients because they last longer than any other vascular access and are less prone to infection and clotting. In the same line with this finding **Canaud, et al., (2002)**; reported that venous catheters provided reduced flow performances and dialysis doses compared to arteriovenous fistula (5-6%).

As regard family history about the renal disease, the majority of patients were almost having no medical family history. This study finding disagrees with the study of **Perrone, et al., (2001);** who reported that family history accounts for 8% to 10% of cases of end stage renal disease in the United States and Europe.

As regard vital signs recording chart in the present study found that the mean vital signs in pre dialysis were higher than in during and post dialysis especially for temperature, respiration and blood pressure. According to body temperature and respiration of the study sample pre dialysis, it was found that most of patient with increase in body temperature and respiration.

Through researcher's physical assessment results, it was found that the study subjects complaining from; common cold, rhinitis, and productive cough. These finding in association with hyperthermia and tachypnea may be due to respiratory tract infection.

This finding was supported by **Agarwal, et al.,(2006**); who reported that blood pressure readings should show only a slight gradual drop during the course of dialysis, because the rate and pressure at which blood flows through the dialyzer are proportional to the rate and amount of fluid removed.

Regarding the assessment of the integumentary system of the studied patients in the present study it was found that; all patients were having dry skin. Also the majority of them were having Pruritus and less than one third of them were having coarse thing hair.

As regard hemodialysis complications in the present study it was found that**,** the incidence of hemodialysis complications after application of a designed nursing protocol was lesser than pre implementation of the designed nursing protocol. The most common complications which occurred pre implementing the designed nursing protocol were headache, bleeding, hypotension, and hemolysis.

This finding agrees with **Brenner, and Levine, (2008**); who stated that potential complications of hemodialysis are hypotension that was commonly caused by hypovolemia from the rapid and excessive removal of fluid. Also intra-dialytic hemolysis can be caused by

overheated, hypotonic, or contaminated dialysate fluids. Also headache may be a neurological symptom of dialysis disequilibrium syndrome. And bleeding or loss of blood may result from blood not being completely rinsed from the dialyzer, accidental separation of blood tubing, dialysis membrane rupture, or after the removing of needles at the end of dialysis. In the present study the majority of study sample regarding medical data were receiving hemodialysis three time of session per week.

Finally, it can be concluded that, the designed nursing protocol for nurses working with patients undergoing hemodialysis has achieved its objectives by improving nurses' knowledge and practice regarding hemodialysis patient care. This further was supported by **Mohammad (2014) and Porth, (2000**) who stated that professional nurses have a large role to play in the minimization and prevention of hemodialysis complications and should be clinically well versed in all aspects of the condition, current strategies to address risk minimization and prevention management and advocates for patient safety.

Conclusions:

- Hemodialysis patient exposed for several complications. These complications include hypotension, muscle cramps, bleeding, and headache, as previously mentioned in the literature and need effective measures to prevent/ reduce this considerable profound problem.

- Implementing the designed nursing protocol on nurse's knowledge and practice regarding hemodialysis patients shows a significant improvement in nurses' knowledge and practice. Improving nurses' knowledge and practice can favorable affect the incidence of hemodialysis complications.

Recommendations:

- Annually in-service training programs to equipped the necessary upgrade knowledge and skills of practicing nurses, which will be reflected on better patient outcomes

- Provide written policy about the standardized nursing care that should be delivered to every patient in the unit.

- Availability of manual procedures for nurses to be aware of handling any problems that may be arises.

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