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Effect of Empowerment Protocol on Self- Care Behavior with Arteriovenous Fistula among Hemodialysis Patients

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Abstract: **Background: One of the leading causes of morbidity and death among hemodialysis (HD) patients is arteriovenous fistula malfunction. In spite of this, a lot of patients fail to practice the proper care for arteriovenous fistula because they are unaware of it correctly. Aim: To determine effect of empowerment protocol on self- care behavior with arteriovenous fistula among hemodialysis patients.**

Material and Methods: A quasi- Experimental (pre and posttest) research design was utilized in this study. Convenient sample of 100 adult male and female patients attended the dialysis unit was included as a study sample in hemodialysis unit at Sohag University Hospital. Structured Interview Questionnaire and Scale of Assessment of Self Care Behaviors with Arteriovenous Fistula in Hemodialysis were used for data collection. Results: There were significant differences regarding total self-care behavior pre (47.7900) and post (71.4200) (P = .000). Also, there were significant differences between pretest & posttest about self-care behaviors with arteriovenous fistula in hemodialysis regarding self-care in management of signs and symptoms as well as self-care in prevention of complications (p=0.000).

Conclusion: Empowerment protocol has effective role in increasing self-care behaviors with arteriovenous fistula among hemodialysis patients

Keywords: **Arteriovenous Fistula; Behavior; Empowerment Protocol; Hemodialysis; Nursing care; Self-Care.**

I. INTRODUCTION

Chronic kidney disease (CKD) is a progressive, lifelong illness that impairs kidney function. (Dąbek, et al., 2023). The most effective intervention that reduces symptoms and preserves life for patients is hemodialysis (HD) (Soodmand, 2019). It continues to be the most used technique for renal replacement therapy (Thurlow, 2021). Vascular access (VA), especially arteriovenous fistula (AVF), is the preferred method for establishing HD access due to its reduced risk of infection and central venous stenosis when compared to catheters (Lok, 2020). Thousands of people have been able to live longer because of hemodialysis. To minimize problems and enhance their quality of life, patients need to participate in their self-care and

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treatment. Self-care defind as taking care of oneself so as to enhance one's own life, well-being and health (Ramezani, et al., 2019).

So that, patients undergoing hemodialysis sessions must be instructed for self-care techniques to acquire proper information about kidney disease, avoid complications from AVF, and enhance their physical, mental, and social situations (Wu, et al., 2021). In addition, health literacy plays an essential role for promoting healthy lifestyle changes because people with low health literacy are more likely to be diagnosed with advanced illness, therefore delays diagnosis and treatment and has adverse consequences (Aljassim & Ostini, 2020).

Self-care strengthens patients' ability for dealing with the consequences of chronic diseases, which makes it an essential aspect of health care research (Izadi, 2021). Providing nursing care to patients undergoing hemodialysis requires understanding of an essential duty fulfilled by nurses. Patients undergoing hemodialysis require continuous and specific nursing care, which involves establishing therapeutic education, managing symptoms, monitoring physical restrictions, and offering patients with the proper education they require (Hermalia, et al., 2021).

II. SIGNIFICANCE OF THE STUDY

An alarming number of people worldwide suffer from chronic renal failure. More than 50 million people have CKD, and above one million of them need renal replacement therapy either dialysis or renal transplantation (Hayes et al., 2022& Ammirati, 2020). According to statistics CKD is a growing health burden as financial cost, mortality, morbidity (Carney, 2020). Therefore, it's critical to formulate an empowerment education protocol that assists patients acquire greater outcomes, increase their health literacy, do daily living activities on their own, and comply with the guidelines of self-care programs. The results of the current study will provide patients and nurses with the proper knowledge and improving patient's health literacy and self-care behaviors which are essential for enhancing their quality of life as well as improving clinical outcomes for hemodialysis patients.

Aim of the study

The aim of the current study is to determine the effect of empowerment protocol on self- care behavior with arteriovenous fistula among hemodialysis patients.

Research hypotheses

1. Patients who receive the designed protocol program regarding hemodialysis have a positive significant difference in self-care behavior.

III. METHODS

Research Design

A quasi- Experimental (pre and posttest) research design was utilized in this study.

Research Setting

The study was conducted at hemodialysis unit at Sohag University Hospital. Hemodialysis unit found in the first and second floor. First floor hemodialysis unit contains 2 rooms for patients free from hepatitis, while unit in the second floor contains one room for patients with positive hepatitis C virus and one room for patients with positive hepatitis B virus.

Research Sample

Convenient sample of (100) adult female and male patients, who attended the dialysis unit and have the following inclusion criteria; 18-65 years old, have the ability to communicate, and accept to participate in the study, sample size was calculated using the following equation;

$$n = \frac{N \times p(1-p)}{\left[\left[N-1 \times \left(d^2 \div z^2\right)\right] + p(1-p)\right]}$$

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Tools of Data Collection

Tool (I): Structured Interview questionnaire: This tool was developed by the researcher. It was consisted of three parts as follow:

Part 1: **Socio demographic data**: that covered the following: age, sex, marital status, occupation, smoking history, and income.

Part 2: Patient's medical history: It comprised the following: past medical history as diabetes, hypertension, liver disease, heart disease and cancer.

Part 3: Hemodialysis data: This part was consisted of hemodialysis data such as: (duration of hemodialysis treatment, site of vascular access, number of vascular access creation and number of hours in each session).

Tool II: Scale of Assessment of Self Care Behaviors with Arteriovenous Fistula in Hemodialysis.

Scale developed by **(Sousa et al., 2015)** consisted of 16 items distributed in two subscales: self-care in prevention of complications and self-care in management of signs and symptoms.

Scoring System:

Each item is scored according to a 5-point Likert scale ranging from 1 (Never carry out the self-care) to 5 (Always carry out the self-care). The final score is found by adding all the item scores, with a minimum of 16 and a maximum of 80. Therefore, a higher percentage (closer to 100) reflects a higher frequency.

Validity and Reliability:

Face validity was done by a panel of five experts in Medical & Surgical Nursing, while reliability was tested statistically; as Cronbach's Alpha (0.893).

Pilot study

A pilot study conducted on 10 patients of total selected patients in the study setting to investigate and ensure the feasibility, objectivity, applicability, and clarity of the study tools, as well as to determine the time required for filling the questionnaire. The involved participants in the pilot study were included in the research sample because no modification was done on the tools.

Ethical consideration

Initial approval was obtained from the scientific research ethics committee in the Faculty of Nursing, Sohag University before starting the study. Explaining the purpose, nature of the study and its significance were assured. All participants were informed that their participation in the study is completely voluntary and they have the right to withdraw from the study at any time without explanation of the cause and without any penalty.

Procedure

I-Preparatory phase (Assessment phase): Researcher began assessment phase after obtaining official permission. The researcher made preliminary visit to hemodialysis unit, introduced himself for each patient who included in the study, explaining the purpose, nature of the study and were assured. All participants were informed that their participation in the study is completely voluntary and they have the right to withdraw from the study at any time without explanation of the cause and without any penalty. Patients who approved to participate in the study were asked to sign the written consent form and anonymity was assured. Researcher collected data from patients during three hemodialysis shifts (morning, afternoon and evening). After that the researcher proceed to filled out the questionnaire for every patient, this step will take about 30 minutes for each patient. After that, based on the accessible scientific literature review, the researcher started to prepare an Empowerment Protocol on Self- Care Behavior with Arteriovenous Fistula booklet containing multiple images and using a simple Arabic language.

II-Implementation phase: The study participants were divided into ten groups, each of them containing ten patients and every group was received four educational sessions. After that, the researcher started the educational sessions for each group

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that took about two hours for each session. **The first session**; covered the component of urinary system, function of kidney and urinary system, causes of renal failure, symptoms and stages of renal failure, and finally complications and available treatment for renal failure. **The second sessions**; included information about definition of hemodialysis and dry weight, indications and purposes of hemodialysis, how hemodialysis machines work, number of hemodialysis sessions each week, and complications of hemodialysis. **The third session;** focused on the different types of the available vascular access using images for each type of them, multiple ways to care for connections (catheters, grafts, and fistulas) and how to prevent complications in vascular access. And finally, **the fourth session** covered the following topics such as dietary guidelines and its importance for hemodialysis patients, and useful tips to limit fluid intake (Fluid Restriction).

III-Evaluation phase: After the implementation of the Empowerment Protocol on Self-Care Behavior with Arteriovenous Fistula, using the previous methods the researcher evaluated the impact of the designed protocol for each patient.

Statistical *Analysis*

Data was coded and analyzed using Statistical Package for Social Science (SPSS) version 20. Descriptive statistics, percentage distribution and standard deviation were used.

IV. RESULTS

Table (1): Distribution of demographic data among patient participant n=100

Variables	Number	Percent
Gender		
Male	50	50.0
Female	50	50.0
Educational status		
Illiterate	40	40.0
Primary school	25	25.0
Secondary school	16	16.0
Tertiary school	9	9.0
University	10	10.0
Current occupation		
Retired	7	7.0
House wife	36	36.0
Governmental	12	12.0
Special	34	34.0
Farmer	11	11.0
Marital status		
Single	21	21.0
Married	59	59.0
Widow	9	9.0
Divorce	11	11.0
Residence		
Rural	59	59.0
Urban	41	41.0
Smoking		
No	70	70.0
Yes	30	30.0
Mean age	44.64±11.490	
	Maximum	65.00
	Minimum	17.00
Mean income	2074.00±1014.70	
	Maximum	5000.00
	Minimum	300.00

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Table (1) Indicated that half of the patients were male. As regards to their level of education more than one third (40%) of the study group cannot read and write. Regarding the occupation (36%) were housewife, approximately one third (34.0%) working for special business and only (7%) were retired. Considering marital status more than half of the sample (59 %) was married and (9%) were widow. As regarded place of residence more than half (59%) of the sample living in rural area as well as, about three quarter of the patients were not smoking. It was observed also mean age was 44.64±11.490 and mean income was 2074.00±1014.70. As regard age minimum was 17 years and maximum 65years, with mean was 44.64± 11.49 respectively. As well as regarding income, minimum income was 300 L.E and maximum was 5000L.E and mean was 2074.00±1014.70.

II- Medical Data:

Table (2): Distribution of medical data among patient participant n=100

Medical data	Number	Percent
Chronic diseases		
Yes	71	**71.0**
No	29	29.0
Diabetes		
Yes	24	**24.0**
No	76	76.0
Hypertension		
Yes	42	**42.0**
No	58	58.0
Heart disease		
Yes	12	**12.0**
No	88	88.0
Liver cirrhosis		
Yes	8	**8.0**
No	92	92.0
Cancer		
Yes	15	**15.0**
No	85	85.0

Table (2): Mentioned that, (71%) of the sample had chronic disease. About one quarter (24 %) of the sample were diabetic while (42%) had hypertension. Regarding heart disease, liver cirrhosis and cancer, results were (12%, 8%, 15%) respectively.

Table (3): Distribution of hemodialysis data among patient participant n=100

Kidney transplant	N	%
Transplantation history		
Yes	28	28.0
No	72	**72.0**
-Duration of hemodialysis treatment		
less than one year	34	34.0
1-5yrs	35	35.0
more than5 year	31	31.0
History of previous vascular access		
Present shunt		
No	56	56.0
Yes	44	44.0
If Yes Number of previous accesses		
1-3 access	30	30.0
3-5 access	10	10.0
More than 5 access	4	4.0

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Duration of using current vascular access		
less than one year	65	65.0
1-5yrs	28	28.0
more than5 year	7	7.0
-Frequency of hemodialysis per week		
2time	5	5.0
3time	95	95.0
Number of hours in each session		
Three hours	13	13.0
Four hours	87	87.0

Table (3): Revealed that approximately three quarter (72%) of the sample had no history of kidney transplantation**.** As regard duration of hemodialysis treatment (35%) had duration from 1-5 years. Regarding history of previous vascular access more than one quarter (30%) had 1-3 access, while only (4%) had more than 5 accesses. More than half of the sample (65%) had duration of using current vascular access less than one year. Considering frequency of hemodialysis per week (95%) most of the sample had 3 sessions per week, were (87%) had 4 hours in each session.

Table (4) : Comparison between pre \ post intervention regarding Scale of Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis (ASBHD-AVF Scale) n=100

Statement		Never (n %)		Rarely (n %)		Occasionally (n %)		Frequently (n %)		Always (n %)		p.v
Self-care 1—Self-care in management of signs and symptoms												
1-I address nurses if the hand of the fistula arm exhibits wound	Pre	17	17.0	30	30.0	34	34.0	14	14.0	5	5.0	.000
	Post	4	4.0	6	6.0	20	20.0	26	26.0	44	44.0	
2-I protect the fistula arm from bumps and shocks	Pre	15	15.0	28	28.0	42	42.0	11	11.0	4	4.0	.000
	Post	3	3.0	6	6.0	14	14.0	25	25.0	52	52.0	
3-I address the nurse if the hand of the fistula arm starts to hurt.	Pre	23	23.0	34	34.0	23	23.0	4	4.0	16	16.0	.000
	Post	4	4.0	12	12.0	17	17.0	24	24.0	43	43.0	
4-I compress the puncture site at home if bleeding occurs	Pre	22	22.0	21	21.0	32	32.0	8	8.0	17	17.0	.000
	Post	4	4.0	7	7.0	18	18.0	36	36.0	35	35.0	
5-I address the nurse when I get a headache and chest pain during hemodialysis	Pre	15	15.0	23	23.0	29	29.0	7	7.0	26	26.0	.000
	Post	1	1.0	7	7.0	9	9.0	22	22.0	61	61.0	
6-I address the nurse when I have cramps during hemodialysis	Pre	12	12.0	18	18.0	29	29.0	12	12.0	29	29.0	.000
	Post	1	1.0	2	2.0	10	19.0	14	14.0	73	73.0	
Self-care 2—Self-care in prevention of complications												
1-I avoid places with different temperatures	Pre	38	38.0	30	30.0	18	18.0	10	10.0	4	4.0	.000
	Post	6	6.0	6	6.0	35	35.0	23	23.0	30	30.0	
2-I check for signs of redness and swelling at the puncture sites	Pre	29	29.0	29	29.0	25	25.0	11	11.0	6	6.0	.000
	Post	3	3.0	8	8.0	28	28.0	22	22.0	39	39.0	
3-I immediately go to a hospital or a clinic if the fistula has no thrill	Pre	16	16.0	19	19.0	14	14.0	18	18.0	33	33.0	.000
	Post	2	2.0	1	1.0	12	12.0	8	8.0	77	77.0	
4-I check every day for changes in the color of the hand of the fistula arm	Pre	26	26.0	24	24.0	26	26.0	14	14.0	10	10.0	.000
	Post	1	1.0	3	3.0	19	19.0	31	13.0	46	46.0	
5-Avoid blood sampling in the fistula arm	Pre	10	10.0	26	26.0	20	20.0	17	17.0	27	27.0	.000
	Post	4	4.0	2	2.0	11	11.0	7	7.0	76	76.0	
6-I protect the fistula arm from scratches, cuts and wounds	Pre	24	24.0	32	32.0	22	22.0	17	17.0	5	5.0	.000
	Post	2	2.0	6	6.0	17	17.0	40	40.0	35	35.0	
7-I apply ointment when hematoma occurs	Pre	29	29.0	30	30.0	21	21.0	15	15.0	5	5.0	.000
	Post	4	4.0	6	6.0	18	18.0	32	32.0	40	40.0	
8-I feel the thrill at the fistula site twice a day	Pre	10	10.0	18	18.0	16	16.0	25	25.0	31	31.0	.000
	Post	2	2.0	2	2.0	8	8.0	7	7.0	81	18.0	
9-Avoid sleeping on the fistula arm	Pre	20	20.0	31	31.0	16	16.0	15	15.0	18	18.0	.000
	Post	4	4.0	2	2.0	16	16.0	9	9.0	69	69.0	
10-I check every day if the hand of the fistula arm cools	Pre	26	26.0	28	28.0	13	13.0	20	20.0	13	13.0	.000
	Post	3	3.0	7	7.0	13	13.0	24	24.0	53	53.0	
11-Avoid measuring blood pressure in the fistula arm	Pre	16	16.0	15	15.0	14	14.0	15	15.0	40	40.0	.000
	Post	3	3.0	2	2.0	6	6.0	7	7.0	82	82.0	

Table (4): Illustrates that, there are significant differences between pretest & posttest about self-care behaviors with arteriovenous fistula in hemodialysis regarding self-care in management of signs and symptoms as well as self-care in prevention of complications (p=0.000). Regarding self-care in management of signs and symptoms after implementation of

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empowerment protocol (44.0%) always of the sample address nurses if the hand of the fistula arm exhibits wound, about half of the sample (52.0%) protect the fistula arm from bumps and shocks. As well as (35.0%) always address the nurse if the hand of the fistula arm starts to hurt. Considering (73.0%) always address the nurse when they have cramps during hemodialysis. Regarding self-care in prevention of complications after protocol implementation about three quarter (77.0%) of the sample immediately go to a hospital or a clinic if the fistula has no thrill. Nearly three quarter of the sample (76.0%) always avoid blood sampling in the fistula arm. As regard, more than two third of the sample (69.0%) always avoid sleeping on the fistula arm. Also, (82.0) always avoid measuring blood pressure in the fistula arm.

Table (5): Comparison means score between pre \ post intervention regarding total Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis (ASBHD-AVF Scale) n=100

Items	No	Mean	Std. Deviation	P.V
Assessment of Self-Care Behaviors with Arteriovenous Fistula among Hemodialysis patient (ASBHD-AVF Scale)				
Self-Care Behaviors	Pre	16.8800	6.57402	.000**
	Post	24.8900	5.38591	
Self-care in prevention of complications	Pre	30.9100	11.60033	.000**
	Post	46.5300	9.09707	
Self-Care Behaviors total	Pre	47.7900	17.41490	.000**
	Post	71.4200	13.80322	

Independent t-test *=Significant difference *p≤0.05 **= highly significance *p≤0.01 Ns= Non significant difference P>0.05.

Table (5): Added that there are highly statistically significant differences in self-care behaviors after implementation of empowerment protocol (P = .000).

V. DISCUSSION

Even though AVFs are the best venous access option for HD, there are several risks associated with their use, including aneurysms, hemorrhage, ischemic neuropathies, lymphedema, and venous hypertensive episodes (Aljuaid, et al., 2020). It is crucial that patients implement self-care routines focused at AVF in an attempt to minimize these problems (Pessoa, et al., 2020).

In consideration to the current study's demographic data, the results indicated that half of study sample were males, this result agreed with El Sayed, (2018), who revealed that approximately 55% of sample were male as well as study done by Goma, et al. (2021), regarding the research they carried out in Tanta, Egypt, the mean age of the patients were 44.78±6.52.

Concerning level of education and occupation, according to this study, about one-third of the study population was illiterate and employed in special jobs. These results comply with Mosavi et al., (2020) who stated that more than three quarters of patients undergoing hemodialysis were illiterate. These findings disagreed with the study conducted by Atta, et al., (2023), who found that less than two thirds of the sample had secondary education and just over half were employed by the government. This could be as a result of the fact that about one-third of the sample was housewives, and residing in a rural region which could have an impact on their educational level.

With respect to residence, this study reported that just over half of the sample stayed in a rural place of residence. This result agreed with Hamza et al., (2021) who disclosed that the great majority of hemodialysis patients living in rural areas.

In the context of smoking cigarettes, the current study determined that more than seventy of the patients did not smoke. This outcome is consistent with Ramezani et al., (2019) who stated that two thirds of patients are non-smoker and slightly over one tenth are smoker. These results are similarly consistent with research conducted in Egypt by Abo Deif, (2015) who concluded that twenty-five percent of the study participants were smokers.

As regard medical data, approximately one quarter of the sample had diabetes, and almost fifty percent of the patients suffered from hypertension as a chronic medical condition. These outcomes corresponded with Atta, et al., (2023), who

proved that diabetes mellitus and nephritis were the most common long-term illnesses, as well as hypertension. Even so, the research conducted by İkiz et al. (2021), contradicts the previous findings, as he stated that the most common cause of renal failure was cardiovascular disease. This might be due to the fact that population growth, ageing and the increasing burden of chronic disease as (diabetes, heart disease and hypertension) which is the best-recognized reason of CKD incidence, especially in regions with advanced economies.

Regarding the length of hemodialysis therapy, the study found that thirty-five percent of the patients had duration of 1 to 5 years. The result is consistent with Atashpeikar, Jalilazar, & Heidarzadeh, (2021), who found that above one third of hemodialysis patients initiated sessions since 1-5 years ago but this result is not correspond with İkiz et al. (2021), who mentioned that nearly half of the patients had hemodialysis sessions between one and three years.

Additionally to hemodialysis treatment, the results mentioned that about seventy five of the patients had never received a kidney transplant. These outcomes are consistent with Khamis, et al., (2021) & Shih et al., (2016) who stated that just ten percent of the group under study had a kidney transplant. This might be due to the fact that kidney transplantation (KT) is initially the more expensive modality for renal replacement therapy as compared to hemodialysis as well as need for matched donor for kidney, and patients' quality of life cannot tolerate surgical procedure.

According to number of dialysis treatment every week, this study approved that vast majority of patients had three hemodialysis sessions each week, and about nighty of the patients had 4 hours duration in each session. These finding is in the same line with Atta, et al., (2023), who stated that every patient had a three-time-a-week session that lasted four hours. Conversely, not agreed with the study that was done in Lahore which revealed that vast majority of the sample was planned for two times to hemodialysis treatment every week Mehmood et al., (2019). Similarity in number of hemodialysis sessions three times every week and four hours in every session may be due patients' tolerance, physical disability and presence of other complications that may affect the total health conditions of the patients as well as disturbance of patients life.

Regarding self-care behaviors with arteriovenous fistula. The results approved that, there are significant differences between pretest & posttest about self-care behaviors with arteriovenous fistula (p=0.000).As after implementation of empowerment protocol, less than half of the patients always address nurses if the hand of the fistula arm exhibits wound, slightly more than half protect the fistula arm from bumps and shocks. As well as more than one third always address the nurse if the hand of the fistula arm starts to hurt. Also, slightly less than three quarters always address the nurse when they have cramps during hemodialysis. The previous finding was similar to Whdan et al. (2019) & Abdel Hakeim, Desoky and Hamza (2024) who carried out a study about "The Effect of Nursing Intervention Guidelines on Vascular Access Self-Care Practices and Quality of Life Among Patients on Maintenance Hemodialysis" who mentioned that post implementation of nursing intervention guidelines, all patient performed vascular access care correctly in 11 items, as compression the puncture site at home if bleeding occurs, address to the nurse there is a headache, chest pain, cramps during hemodialysis, checked signs of redness and swelling at the puncture site, immediately go to hospital if the fistula has no thrill, and check every day the color of fistula.

The current study revealed that there was a highly statistically significant difference in self-care behaviors after implementation of empowerment protocol, this may be due to patients were not given the appropriate information before hemodialysis. Also, due to patients educational level and lack of knowledge about self-care behavior. This finding, aligns with those Atta et al., (2023) & Mosavi et al., (2020) who indicated that hemodialysis patients' levels of self-care behaviors were improved by a health education programme based on the PRECEDE model.

VI. CONCLUSION

The current study concluded that after implementation of the designed enhancement protocol patients had a positive significant difference in self-care behavior with arteriovenous Fistula.

VII. RECOMMENDATION

1- Reapplication of the study on a large sample at different geographical hospitals for generalization of the results

2- Availability of Arabic booklet regarding hemodialysis treatment and multiple ways to care for vascular access to increase patients' knowledge

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3- Educational guidelines about self-care behavior should be continuous and provided for patients who admitted newly for hemodialysis unit**.**

4- Continuous educational program for nurses about care for vascular access**.**

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