Research Article

Self-Care Behavior Profiles With Arteriovenous Fistula in Hemodialysis Patients

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Abstract

Patients with end-stage renal disease should be educated and trained to take care of their own arteriovenous fistula (AVF) with the purpose of developing self-care behaviors concerning vascular access. This was a prospective and observational study. We designed this research to identify clinically meaningful self-care behavior profiles in hemodialysis (HD) patients, and it was carried out in a private dialysis unit in the Lisbon region, Portugal, involving 101 patients. The proportion of male patients was 66.3%, the mean age was 60.9 years, and the frequency of self-care behaviors was 71%. Cluster analysis based on the subscale scores grouped patients in two clusters named "moderate self-care" and "high self-care." Those profiles exhibit significant differences concerning gender, education, employment, dialysis vintage, AVF duration, and information on care with the AVF. Identification of self-care-behavior profiles in HD patients with AVF enables one to adjust education programs to the patients' characteristics.

Keywords

hemodialysis, vascular access, arteriovenous fistula, self-care, behaviors

Introduction

The arteriovenous fistula (AVF) is considered the best vascular access for hemodialysis (HD). Development of self-care behaviors with the AVF allows maintaining the access in good condition, prevents complications related to vascular access, and can contribute to AVF patency (Kukita et al., 2015; NKF-K/DOQI, 2006; Tordoir et al., 2007). Patients with end-stage renal disease (ESRD) should be educated and trained to take care of their own AVF, with the purpose of developing self-care behaviors with their vascular access (Sousa et al., 2014; Sousa et al., 2017). Furthermore, AVF-caring patients are more likely to identify complications with the vascular access.

Identification of HD patients' characteristics who are or who are not able of caring for the AVF is very important to adjust the education program type and duration. Different proportions of HD patients actually carry out self-care behaviors with the AVF, between 28.1% and 100% (Sousa et al., 2017). In another study with 30 ESRD patients on HD, 97.7% had inadequate self-care behaviors with the AVF (Pessoa & Linhares, 2015). We are not aware of any work in the literature providing the identification of patients' characteristics that enable them to develop higher levels of self-care behaviors with the AVF. As patients with ESRD have different profiles regarding such characteristics, understanding the relationship between those profiles and self-care behaviors is very important for the implementation of education programs. Our study was designed to identify clinically meaningful self-care behavior profiles in HD patients.

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Method

Study Design

This was a prospective and observational study in a dialysis unit involving patients who used an AVF for HD. The study started after approval by the institution ethics committee.

Study Setting and Population

The study was carried out in a private dialysis unit in the Lisbon region, Portugal. The criteria for participants to be eligible for the study were as follows: participants should be 18 years or older, have an AVF duration on HD greater than 6 months, have inexistence of memory problems, and be medically stable. Exclusion criteria of patients were double access vascular (central venous catheter and AVF) and grafts as vascular access. Participants were invited for the study. Those with no interpretation problems completed the questionnaire autonomously, and those with problems were assisted by the researcher. A total of 111 patients were included, and 10 patients refused to participate.

Data Collection and Instrument

The data were collected between January and February 2016. Information concerning demographic characteristics (age, gender, education, employment, marital status) and clinical characteristics (ESRD etiology, dialysis vintage, previous AVFs, AVF duration, information on care with the AVF) was collected from a questionnaire designed by the authors. Information concerning self-care behaviors with the AVF was collected from the *Scale of Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis* (ASBHD-AVF) (Sousa et al., 2015). This scale has 16 items in two subscales: subscale 1—Management of Signs and Symptoms (6 items) and subscale 2—Prevention of Complications (10 items). Responses to each item are based on a 5-point Likert-type scale. Higher scores show patients' higher frequency of self-care with the AVF. Memory problems were assessed by the *Six-Item Cognitive Impairment Test* (6CIT), Portuguese version (Apóstolo, Paiva, Silva, Santos, & Schultz, 2017).

Statistical Analysis

Quantitative variables were described by the mean and standard deviation. The distribution of categorical variables was described by proportions.

The overall scale is most likely unable to uncover the different patterns exhibited by the two subscales, and thus, we chose to analyze each subscale separately. A 10% p value was considered statistically significant. Hierarchical clustering with Ward's method was used for cluster analysis.

Analysis was performed with the Statistical Package for the Social Sciences software (version 23.0; IBM Co., USA) and with the R language (version 3.3.1, R Foundation for Statistical Computing, Austria).

Results

Patient Characteristics

This study involved 101 patients with AVF on HD treatment (Table 1). Two thirds of the patients were male (66.3%). Concerning sociodemographic characteristics, the mean age was 60.9 years (with an *SD* of 13.4), most ages ranged between 50 and 70 years, and few patients were less than 50 years old. The proportion of married patients was 51.4%, 39.6% of the patients had a 4-year education, and 20.8% had a college degree. Most patients (58.4%) were retired.

Concerning the study clinical characteristics, 26.7% of the patients had hypertension, and 52.5% were in HD treatment for more than 5 years. The fistula duration mean was 71.3 months (with an *SD* of 78.3 months; range: 6-432 months), but the median duration was 48 months (i.e., 50% of the patients had the fistula for 48 months or less). A small number of patients had a previous fistula (25.6%), 20.4% had two AVFs, and 5.2% had three or more AVFs (Table 1). Information on care with the fistula was provided by the nephrologist, nurse, doctor, and no one in 50.5%, 28.7%, 4%, and 15.8% of the patients, respectively.

Self-Care Behavior Profiles

The description of fistula self-care behaviors for the overall scale and the subscales is provided in Table 2.

The proportion of patients who performed self-care behaviors with the fistula was 71%. However, analysis of the two subscales shows that patients performed less self-care behaviors concerning the Prevention of Complications subscale than concerning the Management of Signs and Symptoms subscale (63.9% and 82.8%, respectively). The percentage below the mean was 49.5% and 31.7%, respectively.

Cluster analysis based on the subscale scores grouped patients in a two-cluster solution (Table 3). Cluster 1 is characterized by "moderate self-care" as the mean scores of the Management of Signs and Symptoms subscale and of the Prevention of Complications subscale were 72.4% and 51.2%, respectively, whereas cluster 2 is characterized by "high self-care" as the mean scores of the two subscales were respectively very high (91.1%, $p = .000$) and high (74.2%, $p = .000$).

Clusters 1 and 2 lead to different patient profiles as they exhibit significant differences concerning gender, education, employment, dialysis vintage, AVF duration, and information on care with the AVF (the remaining variables did not show significant differences). As displayed in Table 3, the comparison of both clusters shows that cluster 1 is mainly characterized by a larger proportion of male patients (80.0%, $p = .009$), a higher education level (31.1%, $p = .069$), a larger proportion of employed patients and a smaller proportion of

Table 1. Sample Descriptive Measures.

	All patients (n = 101)
Gender (M/F) %	66.3/33.7
Age in years, mean (*SD*)	60.9 (13.4)
Marital status (%)	
Married	51.4
Divorced	8.9
Widow	12.9
Single	26.8
Education (%)	
⩽4 years	39.6
5-9 years	19.8
10-12 years	19.8
College	20.8
Employment (%)	
Employed	27.7
Unemployed	12.9
Retired	58.4
Student	1.0
ESRD etiology (%)	
Diabetes mellitus	6.9
Arterial hypertension	26.7
Polycystic kidney	12.9
Autoimmune disease	6.0
Glomerular	11.9
Other kidney disease	35.6
Dialysis vintage (%)	
⩽1 years	9.9
1-5 years	37.6
⩾5 years	52.5
AVF duration in months, mean (*SD*)	71.3 (78.3)
Number previous AVFs (%)	
1	74.4
2	20.4
⩾3	5.2
Information about care with AVF (%)	
No one	15.8
Doctor	4.0
Nephrologist	50.5
Nurse	28.7
Other patients	1.0

Note. M = male; F = female; ESDR = end-stage renal disease; AVF = arteriovenous fistula.

retired patients (42.2% and 44.4%, respectively, $p = .014$), shorter dialysis vintage ($p = .086$), lower AVF duration (61.4%, $p = .053$), and a lower proportion of patients whose information on care with the AVF was provided by the nephrologist (40.0%, $p = .074$).

Discussion

We are not aware of any study on self-care-behavior profiles in hemodialysis patients with AVF. Very few studies analyzed the frequency of self-care behaviors (Ozen et al., 2017; Sousa et al., 2017), and only another one identified the variables affecting that frequency (Sousa et al., 2017). Our study assessed which patients' characteristics are clinically meaningful in the identification of AVF self-care-behavior profiles.

The frequency of self-care behaviors with the AVF was 71% (minimum of 28.1% and maximum of 96.6%). Concerning the subscales, patients exhibit higher frequencies of self-care behaviors in the Management of Signs and Symptoms subscale than in the Prevention of Complications subscale (82.8% vs. 63.9%, respectively). Therefore, patients perform less self-care behaviors concerning AVF infection and thrombosis prevention (subscale 2). In a study with 335 ESRD patients in hemodialysis, 89 (29.6%) and 127 (37.9%) patients had some knowledge concerning AVF infection and thrombosis prevention, respectively (Ozen et al., 2017). A very large number of patients had no knowledge about Prevention of Complications with the AVF, and consequently, they did not carry out such self-care behaviors. In a sample of 30 ESRD patients on HD, two patients (6.7%) said they felt the thrill of the fistula (Pessoa & Linhares, 2015) and, in another study, only one patient out of 21 assessed the thrill (Furtado & Lima, 2006). In our study, 49.5% of the patients exhibited self-care behaviors below the mean. This emphasizes the relevance of implementing programs that can alert patients to the importance of self-care behaviors concerning AVF Prevention of Complications.

The identification of AVF self-care-behavior profiles in HD patients is one of the most relevant findings in this study. Two profiles were identified in our sample: "moderate self-care" and "high self-care." The "moderate self-care" profile shows that patients in this cluster had high self-care behaviors in Management of Signs and Symptoms and moderate self-care behaviors in Prevention of Complications. This profile is mainly characterized by patients of male gender (80%), with higher education, employed, with lower AVF duration and dialysis vintage, and being provided information, fewer times, about care with the AVF by the nephrologist. However, patients with "high self-care" profile exhibit very high self-care behaviors in Management of Signs and Symptoms and high self-care behaviors in the Prevention of Complications. This profile is mainly characterized by patients of female gender, with lower education, retired, with higher AVF duration and dialysis vintage, and being provided information, more often, about care with the AVF by the nephrologist.

Our results enabled us to identify the profiles of self-care behaviors with the AVF through patients' individual characteristics. Those profiles can help adjusting education programs to such characteristics, that is, the implementation of these programs in dialysis units should take into account patients' individual characteristics, AVF self-care behavior profiles and patients' ability to carry out self-care behaviors. It will be important to run prospective randomized studies in the future to investigate the impact of vascular access education programs on self-care profiles and to find out whether

Table 2. Self-Care Behaviors With Arteriovenous Fistula.

	Overall scale	Management of Signs and Symptoms (subscale 1)	Prevention of Complications (subscale 2)
Self-care behaviors (%)			
M (*SD*)	71.0 (13.6)	82.8 (18.1)	63.9 (16.9)
Minimum	28.1	29.2	25.0
Maximum	96.6	100.0	100.0
Percentage below mean	44.6	31.7	49.5
First quartile	62.5	75.0	52.5
Median	71.9	87.5	65.0
Third quartile	81.3	100.0	75.0

Table 3. Cluster Description and Comparison.

Variable	Cluster 1 Moderate self-care ($n = 45$)	Cluster 2 High self-care ($n = 56$)	*p* value
Scales			
Subscale 1, mean (*SD*)	72.4 (20.9)	91.1 (9.4)	.000
Subscale 2, mean (*SD*)	51.2 (14.4)	74.2 (10.7)	.000
Gender (M) %	80.0	55.4	.009
Age in years, mean (*SD*)	59.5 (15.3)	62.1 (11.8)	.393
Marital status (%)			.154
Married	42.2	58.9	
Divorced	8.9	8.9	
Widow	11.1	14.3	
Single	37.8	17.9	
Education (%)			.069
⩽4 years	33.3	44.6	
5-9 years	17.8	21.4	
10-12 years	17.8	21.4	
College	31.1	12.5	
Employment (%)			.014
Employed	42.2	16.1	
Unemployed	11.1	14.3	
Retired	44.4	69.6	
Student	2.2	0.0	
ESRD etiology (%)			.355
Arterial hypertension	17.8	33.9	
Polycystic kidney	13.3	12.5	
Glomerular	13.3	10.7	
Other kidney disease	40.0	32.1	
Dialysis vintage (%)			.086
⩽1 years	15.6	5.4	
1-5 years	40.0	35.7	
⩾5 years	44.4	58.9	
AVF duration in months, mean (*SD*)	61.4 (78.7)	79.3 (77.7)	.053
Number previous AVFs (%)			.165
1 AVF	31.1	44.6	
2 AVF	68.9	55.4	
Information about care with AVF (%)			.074
No one	20.0	12.5	
Nephrologist	40.0	58.9	
Nurse	28.9	28.6	

Note. M = male; ESDR = end-stage renal disease; AVF = arteriovenous fistula.

specific education programs should be designed for patients with a "moderate self-care" profile.

The significant differences between "moderate self-care" and "high self-care" profiles suggest that there are clinically meaningful subgroups (clusters). Replicating the cluster analysis with other independent and larger samples is required before assuming that the defined subgroups are stable and thereby meaningful in a clinical and empirical sense. This study should be considered as a first step in the identification of self-care-behavior profiles in HD patients with AVF.

Conclusion

We identified two self-care-behavior profiles in HD patients, namely "moderate self-care" and "high self-care." The "moderate self-care" profile mainly consists of male patients, with higher education level, employed, with shorter dialysis vintage, with lower AVF duration, and being provided information, fewer times, about care with the AVF by the nephrologist. However, the "high self-care" profile mainly consists of female patients, with lower education level, retired, with longer dialysis vintage, with higher AVF duration, and being provided information, more often, about care with the AVF by the nephrologist. Further studies are required to better identify self-care-behavior profiles. Furthermore, studying the impact of education programs on how patients acquire AVF self-care behaviors is also essential.

Declaration of Conflicting Interests

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