

RESEARCH ARTICLE (ORIGINAL) 

## Analysis of self-care behaviors in patients with arteriovenous fistula

*Analisar o autocuidado com a fistula arteriovenosa*

*Análisis del autocuidado de una fistula arteriovenosa*

Matilde Delmina da Silva Martins <sup>1,3</sup>

 <https://orcid.org/0000-0003-2656-5897>

Sandra Moura <sup>2</sup>

 <https://orcid.org/0000-0001-7306-5401>

<sup>1</sup> Polytechnic Institute of Bragança,  
School of Health, Nursing Sciences,  
Bragança, Portugal

<sup>2</sup> Northeastern Local Health Unit, Basic  
Emergency Service, Mogadouro, Portugal

<sup>3</sup> Health Sciences Research Unit: Nursing,  
Nursing School of Coimbra, Coimbra,  
Portugal

### Abstract

**Background:** Hemodialysis is a form of treatment for chronic kidney disease that requires arteriovenous fistula creation. Given that patients are required to care for their arteriovenous fistulae, nurses should teach them these self-care behaviors.

**Objective:** To analyze the self-care behaviors of patients with arteriovenous fistula undergoing hemodialysis.

**Methodology:** Analytical cross-sectional study with 131 patients from three hemodialysis clinics in the north of Portugal using of Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis Scale.

**Results:** Arteriovenous fistula-related self-care behaviors scored an average of 74.5 points, the Management of signs and symptoms subscale scored 85.27 points, and the Prevention of complications 68.26 points out of a maximum of 100 points. Education level and teaching agent were associated with self-care behaviors. Age and education level were related to the prevention of complications.

**Conclusion:** The self-care behaviors of patients with arteriovenous fistula were below expected levels. We suggest that a multidisciplinary team should provide self-care training to these patients adjusted to their age and education level.

**Keywords:** arteriovenous fistula; renal dialysis; self-care; nursing care

### Resumo

**Enquadramento:** A hemodiálise constitui uma forma de tratamento da doença renal crónica, exigindo a construção de fistula arteriovenosa. Esta requer cuidados por parte do doente, devendo o enfermeiro capacitar para comportamentos de autocuidado.

**Objetivo:** Analisar os comportamentos de autocuidado à fistula arteriovenosa da pessoa em programa de hemodiálise.

**Metodologia:** Estudo transversal analítico, realizado em 131 doentes de três clínicas de hemodiálise do norte de Portugal. Para tal recorreu-se à Escala de Avaliação de Comportamentos de Autocuidado com a Fistula Arteriovenosa.

**Resultados:** Os comportamentos de autocuidado à fistula arteriovenosa obtiveram uma média de 74,5 pontos, a gestão de sinais e sintomas 85,27 e a prevenção de complicações 68,26 num máximo de 100 pontos. O grau académico e o agente de ensinamento associaram-se com os comportamentos de autocuidado. A idade e grau académico relacionaram-se com a prevenção de complicações.

**Conclusão:** O autocuidado à fistula arteriovenosa ficou abaixo do pretendido. Sugerimos sessões de educação para o autocuidado em função da idade e das habilitações literárias por uma equipa multidisciplinar.

**Palavras-chave:** fistula arteriovenosa; diálise renal; autocuidado; cuidados de enfermagem

### Resumen

**Marco contextual:** La hemodiálisis es una forma de tratamiento de la enfermedad renal crónica que requiere la realización de una fistula arteriovenosa. Esto implica cuidados por parte del paciente, y los enfermeros deben formarlos en conductas de autocuidado.

**Objetivo:** Analizar las conductas de autocuidado de las personas sometidas a hemodiálisis por fistulas arteriovenosas.

**Metodología:** Estudio transversal analítico de 131 pacientes de tres clínicas de hemodiálisis del norte de Portugal. Para ello, se utilizó la Escala de Evaluación de Conductas de Autocuidado con Fistula Arteriovenosa.

**Resultados:** Las conductas de autocuidado de la fistula arteriovenosa obtuvieron una media de 74,5 puntos, la gestión de signos y síntomas 85,27 y la prevención de complicaciones 68,26 sobre un máximo de 100 puntos. El nivel académico y el agente docente se asociaron a las conductas de autocuidado. La edad y el nivel académico se asociaron a la prevención de complicaciones.

**Conclusión:** El autocuidado de la fistula arteriovenosa estuvo por debajo del objetivo. Proponemos sesiones de educación para el autocuidado según la edad y el nivel educativo a cargo de un equipo multidisciplinar.

**Palabras clave:** fistula arteriovenosa; diálisis renal; autocuidados; cuidados de enfermería

### Corresponding author

Sandra Moura

E-mail: [mmoura.sandra@gmail.com](mailto:mmoura.sandra@gmail.com)

Received: 12.01.23

Accepted: 28.09.23



**How to cite this article:** Martins, M. D., & Moura, S. (2023). Analyze self-care with with arteriovenous fistula. *Revista de Enfermagem Referência*, 6(2), e29211. <https://doi.org/10.12707/RV123.11.29211>



## Introduction

Chronic kidney disease (CKD) is a critical issue today. It is defined as the slow, progressive, and irreversible loss of kidney function. In addition to being a medical problem, it is also a public health problem (Nolasco et al., 2017). Renal replacement therapy is required for patients in advanced stages of CKD. Hemodialysis is the treatment of choice and the most common type of dialysis, for which patients require vascular access. An arteriovenous fistula (AVF) is the preferred vascular access because it is the safest and longest-lasting access option for hemodialysis (Pereira, 2018). An AVF requires both direct nursing care and patient self-care, particularly for preventing infection and thrombosis of the vascular access (Clementino et al., 2018). Nurses are responsible for teaching patients with CKD undergoing hemodialysis about the self-care behaviors to care for the AVF, so that it works effectively (Sousa et al., 2015). This study aims to analyze the self-care behaviors of patients with AVF undergoing hemodialysis.

## Background

CKD is defined as kidney damage that causes a progressive and irreversible loss of renal, glomerular, tubular, and endocrine functions, evolving through several stages (Mira et al., 2017; Ordem dos Enfermeiros [OE], 2016). The kidney is an essential organ for homeostasis and maintaining the balance of the intracellular environment (Mira et al., 2017). When it stops working and cannot maintain homeostasis, renal replacement therapy is usually required. Hemodialysis is the treatment of choice and the most common form of therapy (Fielding, 2019). According to international guidelines, such as the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-KDOQI), AVFs are the gold standard vascular access for hemodialysis (Iglesias et al., 2016). They are created via a surgical anastomosis by subcutaneously connecting an artery to a large vein (OE, 2016). Creating a well-functioning AVF is no easy task, so an AVF should be created at least six months before its first use (Iglesias et al., 2016). Complications of AVFs are a leading cause of morbidity in patients undergoing hemodialysis, resulting in high costs of treating CKD. These complications include stenosis, vascular access thrombosis, aneurysm, cardiac complications, congestive heart failure, and steal syndrome (Iglesias et al., 2016). Nurses who care for patients with CKD undergoing hemodialysis play a key role in providing specific nursing care related to dialysis techniques. In addition to these techniques, nurses should develop and implement mechanisms to train the self-care behaviors with AVF of patients with CKD on hemodialysis with a view to preventing complications such as infection and thrombosis (Clementino et al., 2018; Sousa et al., 2015). These spontaneous and intentional self-care behaviors aim to promote health and well-being and preserve a well-functioning vascular

access. Therefore, patients with CKD should be aware of the behaviors they need to adopt to keep their vascular access well-functioning and in good conditions (Sousa et al., 2015). There is a clear and emerging need to implement measures or strategies capable of promoting self-care behaviors in patients with AVF to prevent and/or identify AVF-related complications at an early stage and increase patients' quality of life (Sousa, 2012).

## Research question

What are the self-care behaviors of patients with AVF undergoing hemodialysis?

## Methodology

We conducted an analytical cross-sectional study. The population consisted of 218 patients with CKD on hemodialysis. To obtain the sample, we defined the following inclusion criteria: being a patient with CKD on a hemodialysis program; having an AVF; and having the cognitive ability to understand the questions in the questionnaire, assessed through the Five-Item Cognitive Impairment Test. After applying these criteria, we obtained a sample of 131 participants. Data were collected using a form consisting of three parts: the first part concerns the participants' sociodemographic characteristics, including gender, age, marital status, education level, professional status, and monthly income; the second concerns the clinical characteristics, including cause of CKD, hemodialysis vintage, hemodialysis session length, time from current AVF creation, previous AVFs, and teaching agent; the third part includes Sousa's (2015) Scale of Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis (ECAHD-FAV) validated for the Portuguese population. These items are scored on a 5-point Likert scale, where 1 = *Never*, 2 = *Rarely*, 3 = *Sometimes*, 4 = *Often*, and 5 = *Always*, with *always* being understood as the best care. The ECAHD-FAV consists of two domains or subscales: the Management of Signs and Symptoms subscale (items 1, 3, 6, 11, 13, and 16) that assesses self-care behaviors to identify changes in AVF functioning and the Prevention of Complications subscale (items 2, 4, 5, 7, 8, 9, 10, 12\*, 14, and 15) that assesses self-care behaviors to prevent or identify AVF complications, such as infection, thrombosis, or steal syndrome. Item 12 is reversed. Higher scores indicate better self-care behaviors with the AVF. The total score is calculated by summing the scores of the 16 items distributed across its two domains. The results are organized in such a way as to produce a total score and domain scores. Considering that the number of items is different in the two subscales, the scores were transformed into intervals from 1 to 100 points for comparison. Thus, higher mean scores in the overall scale and the subscales correspond to a better perception of self-care behaviors with AVF. Scores will be calculated as follows:

$$\text{Score of the Overall Scale} = \frac{\text{total points} - 16}{64} \times 100$$

$$\text{Score of the Management of Signs and Symptoms subscale} = \frac{\text{total points} - 6}{24} \times 100$$

(1; 3; 6; 11; 13; 16)

$$\text{Score of the Prevention of Complications subscale} = \frac{\text{total points} - 10}{40} \times 100$$

(2; 4; 5; 7; 8; 9; 10; 12; 14; 15)

Permission was obtained from the scale's author. The study was submitted to the ethics committee for appraisal and authorization, obtaining a favorable opinion under No. 56/2021. After scheduling a site visit with those responsible, the researcher went to each clinic to collect data. Data collection began 1 hour and 30 minutes after the dialysis session started and ended 30 minutes before its end, so as not to interfere with the period when the patient receives more care, that is, at the beginning and end of each session. Before data collection, the participants were informed about the study and asked for their cooperation. Their cognitive ability to participate was assessed using simple questions such as: What year is it? What month is it? What time is it? Please count backward from 20 to 1, and Please say the months of the year in reverse order. Participants signed an informed consent form, and then the researcher filled in the data collection tool, which took approximately 10 minutes each. Each data collection tool was coded with a number in sequential order.

Then, data were analyzed using IBM SPSS software, version 26.0, by coding number to ensure participants' confidentiality and anonymity. Absolute and relative frequencies and mean and standard deviation were calculated for the continuous variables. The Shapiro-Wilk or the Kolmogorov-Smirnov tests were used to assess the

distribution of the variables. The *t*-test or, alternatively, the non-parametric Mann-Whitney's *U*-test were used to compare means. The ANOVA test or, alternatively, the non-parametric Kruskal-Wallis test were used to compare three or more groups. Spearman's correlation coefficient was used to analyze the correlation between variables. The significance level was set at 0.05%.

## Results

A total of 131 patients with CKD participated in the study, distributed across three hemodialysis clinics in the north of Portugal, with the highest frequency in clinic 3 (39.7%). The majority (59.5%) of them were men, aged 50 to 75 years (58.8%), from rural areas (61.8%), married/living in a civil partnership (63.4%), living with their partner or spouse (47.3%), with 4<sup>th</sup> grade (55.7%), not professionally active (77.1%), and had an income > 250€ ≤ 530€ (42.0%). Diabetes was the most common cause of CKD (29.0%). Most of them had been on hemodialysis for ≥ 2 < 6 years (38.2%), with sessions lasting ≥ 240 minutes (85.5%), with up to 2 years since AVF creation (35.9%), no previous AVFs (69.5%), and AVF failure due to thrombosis (45.3%; Table 1).

**Table 1***Distribution of the sociodemographic and clinical variables*

Variable	<i>n</i>	%	
Treatment site	Clinic 1	44	33.6
	Clinic 2	35	26.7
	Clinic 3	52	39.7
Gender	Female	53	40.5
	Male	78	59.5
Age	<50 years	18	13.7
	50-65 years	30	22.9
	65-75 years	47	35.9
	> 75 years	34	26.0
	Did not answer	2	1.5
Geographical context	Rural	81	61.8
	Urban	50	38.2
Marital status	Single	21	16.0
	Married/Civil partnership	83	63.4
	Divorced	10	7.6
	Widowed	17	13.0
Living arrangements	Alone	24	18.3
	Spouse/partner	62	47.3
	Spouse and children	25	19.1
	Parents	8	6.1
	Others	12	9.2
Education level	None	14	10.7
	4 <sup>th</sup> grade	73	55.7
	6 <sup>th</sup> or 9 <sup>th</sup> grade	23	17.7
	Secondary or higher	21	16
Professional status	Active	30	22.9
	Not active	101	77.1
Monthly income	< 250€	18	13.7
	≥ 250€ < 530€	55	42.0
	≥ 530€ < 1000€	36	27.5
	≥ 1000€	22	16.7
Cause of chronic kidney disease	Diabetes	38	29.0
	Hypertension	22	16.8
	Inflammation of kidney cells	8	6.1
	Polycystic kidney disease	11	8.4
	Autoimmune disease	7	5.3
	Infectious disease	4	3.1
	Others	39	29.8
	Did not answer	2	1.5
Hemodialysis vintage	< 2 years	46	35.1
	≥ 2 > 6 years	50	38.2
	≥ 6 years	34	26.0
	Did not answer	1	0.8
$\bar{X} = 5,51; SD \pm 5,794$			

Hemodialysis session length	< 240 minutes	17	13.0
	≥240 minutes	112	85.5
	Did not answer	1	1.5
Time from current AVF creation	< 2 years	47	35.9
	≥ 2 > 6 years	39	29.8
	≥6 years	31	23.7
	Did not answer	14	10.7
$\bar{X} = 5,17; SD \pm 5,346$			
Previous AVFs	Yes	40	19.1
	No	91	69.5
	One	25	62.5
	Two or more	15	37.5
AVF failure due to:	Thrombosis	24	45.3
	Steal syndrome	1	1.9
	Infection	1	1.9
	Hemorrhage	1	1.9
	Aneurysm	1	1.9
	Stenosis	13	24.5
	Others	12	22.6

Note. *n* = Absolute frequency; % = Relative frequency;  $\bar{X}$  = Mean; *SD* = Standard deviation; AVF = Arteriovenous fistula.

There was a high frequency of various self-care behaviors. of 5, indicating good self-care (Table 2). Mean scores were above 4, close to the maximum score

**Table 2**

*Distribution of the items of the Scale of Assessment of Self-Care Behaviors with Arteriovenous Fistula in Hemodialysis (ECAHD-FAV)*

Items	Never		Rarely		Sometimes		Often		Always		$\bar{X} \pm s$
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
1. I address the nurse when I have cramps during hemodialysis.	3	2.3	5	3.8	19	14.5	5	3.8	99	75.6	4.47 ± 1.025
2. I do compression of puncture sites with the fingers.	22	16.8	7	5.3	12	9.2	7	5.3	83	63.4	3.93 ± 1.570
3. I address the nurse when I get a headache and chest during hemodialysis.	5	3.8	2	1.5	14	10.7	10	7.6	100	76.3	4.51 ± 1.010
4. I apply ointment when hematoma occurs.	17	13.0	19	14.5	26	19.8	11	8.4	58	44.3	3.56 ± 1.489
5. I feel the thrill at the site of the fistula twice a day.	11	8.4	20	15.3	35	26.7	26	19.8	39	29.8	3.47 ± 1.291
6. I do compression at home at puncture site if bleeding occurs.	10	7.6	13	9.9	13	9.9	10	7.6	85	64.9	4.12 ± 1.353
7. I check every day if the hand of the fistula arm cools.	13	9.9	26	19.8	29	22.1	18	13.7	45	34.4	3.43 ± 1.392
8. I observe signs of redness and swelling at the puncture sites.	10	7.6	23	17.6	32	24.4	17	13.0	49	37.4	3.55 ± 1.349
9. I protect the fistula arm from scratches, cuts and wounds.	3	2.3	8	6.1	16	12.2	15	11.5	89	67.9	4.37 ± 1.326
10. I check every day if the color of the hand from the fistula arm changes.	10	7.6	29	22.1	34	26.0	18	13.7	40	30.5	3.37 ± 1.326
11. I protect the fistula arm from bumps and shocks.	5	3.8	9	6.9	11	8.4	16	12.2	90	68.7	4.35 ± 1.129
12. I allow blood sampling in the fistula arm*	122	93.1	2	1.5	6	4.6	0	0.0	1	0.8	1.14 ± 0.551
13. I address the nurse if the hand of the fistula arm starts to hurt.	2	1.5	8	6.1	14	10.7	6	4.6	101	77.1	4.50 ± 1.011
14. I avoid getting into places with different temperatures.	32	24.4	39	29.8	31	23.7	8	6.1	21	16.0	2.60 ± 1.352
15. I immediately go to hospital or a clinic if fistula has not thrill.	14	10.7	9	6.9	9	6.9	9	6.9	90	68.7	4.16 ± 1.408
16. I address nurses if the hand of the fistula arm appears with wounds.	3	2.3	9	6.9	11	8.4	2	1.5	106	80.9	4.52 ± 1.055

Note. *n* = Absolute frequency; % = Relative frequency;  $\bar{X}$  = Mean; *SD* = Standard deviation; \* = Item to reverse.

Statistically significant differences were found between the Management of signs and symptoms subscale, the education level, and the teaching agent ( $p > 0.005$ ). Statis-

tically significant differences were also found between the Prevention of complications subscale, age, and education level ( $p < 0.005$ ; Table 3).



**Table 3***Association between the self-care behaviors of patients with AVF, sociodemographic/clinical characteristics, and teaching agent*

		ECAHD-FAV		Management of Signs and Symptoms		Prevention of Complications	
		$\bar{X} \pm s$	<i>p</i>	$\bar{X} \pm s$	<i>p</i>	$\bar{X} \pm s$	<i>p</i>
Gender	Female	77.24 ± 18.005	1.480 <sup>a</sup>	86.08 ± 16.585	0.464 <sup>a</sup>	71.93 ± 20.625	1.822 <sup>a</sup>
	Male	72.88 ± 14.180	(0.142)	84.72 ± 16.458	(0.644)	65.77 ± 16.343	(0.072)
Age (years)	<50	75.78 ± 10.016		89.35 ± 11.630		67.63 ± 11.196	
	50-65	77.97 ± 17.888	5.279 <sup>c</sup>	85.14 ± 18.135	0.645 <sup>c</sup>	73.67 ± 20.769	8.975 <sup>c</sup>
	65-75	76.36 ± 15.370	(0.152)	85.82 ± 15.727	(0.886)	70.69 ± 17.874	(0.030)
	>75	69.99 ± 16.232		83.82 ± 17.878		61.69 ± 17.930	
Marital status	Single	70.31 ± 19.295		82.14 ± 23.253		63.21 ± 19.214	
	Married/Civil partnership	76.26 ± 14.892	2.336 <sup>c</sup>	85.24 ± 15.403	1.346 <sup>c</sup>	70.87 ± 17.034	1.595 <sup>b</sup>
	Divorced	75.63 ± 15.680	(0.506)	92.08 ± 7.204	(0.718)	65.75 ± 22.362	(0.94)
	Widowed	71.51 ± 16.411		85.29 ± 15.247		63.24 ± 20.325	
Education level	None	61.94 ± 20.393		72.92 ± 23.098		55.36 ± 20.682	
	4 <sup>th</sup> grade	76.73 ± 16.115	8.629 <sup>c</sup>	86.82 ± 15.544	11.112 <sup>c</sup>	70.68 ± 18.793	7.987 <sup>c</sup>
	6 <sup>th</sup> or 9 <sup>th</sup> grade	76.77 ± 11.921	(0.035)	92.21 ± 9.510	(0.011)	67.50 ± 16.272	(0.046)
	Secondary or higher	73.51 ± 12.416		80.56 ± 15.830		69.29 ± 14.343	
Professional status	Active	75.57 ± 12.776	-0.115 <sup>d</sup>	87.22 ± 13.967	-0.318 <sup>d</sup>	68.58 ± 14.734	-0.088 <sup>d</sup>
	Not active	74.37 ± 16.785	(0.908)	84.69 ± 17.150	(0.751)	68.17 ± 19.387	(0.930)
Monthly income	<250€	69.53 ± 15.774		85.19 ± 13.116		60.14 ± 19.145	
	≥ 250€ < 530€	72.73 ± 17.685	1.755 <sup>b</sup>	81.89 ± 20.018	2.761 <sup>c</sup>	67.23 ± 19.309	1.943 <sup>b</sup>
	≥ 530€ < 1000€	78.17 ± 14.318	(0.159)	88.31 ± 13.056	(0.430)	72.08 ± 17.964	(0.126)
	≥ 1000€	77.89 ± 13.164		88.96 ± 13.401		71.25 ± 15.055	
Hemodialysis vintage (years)	< 2 years	73.85 ± 16.406		83.24 ± 16.976		68.21 ± 18.609	
	2-6 years	74.38 ± 16.068	0.386 <sup>c</sup>	85.83 ± 15.793	1.947 <sup>c</sup>	67.50 ± 19.046	0.166 <sup>b</sup>
	> 6 years	76.06 ± 15.643	(0.824)	87.01 ± 17.126	(0.378)	69.49 ± 17.793	(0.891)
Hemodialysis session length	< 240 minutes	79.41 ± 18.605	-1.679 <sup>d</sup>	89.71 ± 18.288	-1.709 <sup>d</sup>	73.24 ± 21.319	-1.440 <sup>d</sup>
	≥240 minutes	73.70 ± 15.428	(0.093)	84.41 ± 16.217	(0.088)	67.28 ± 17.85	(0.150)
Time from current AVF creation	< 2 years	74.10 ± 16.957		83.16 ± 17.527		68.67 ± 18.895	
	2-6 years	73.68 ± 15.665	0.131 <sup>c</sup>	86.11 ± 15.600	0.661 <sup>c</sup>	66.22 ± 19.338	0.286 <sup>c</sup>
	> 6 years	75.35 ± 15.324	(0.937)	87.37 ± 17.196	(0.519)	68.15 ± 17.102	(0.867)
Previous AVFs	Yes	71.13 ± 15.653	-1.685 <sup>a</sup>	81.98 ± 17.561	-1.527 <sup>a</sup>	64.63 ± 17.251	-1.510 <sup>a</sup>
	No		(0.094)		(0.129)		(0.129)
Teaching agent							
Resident physician	Yes	74.88 ± 15.671	0.114 <sup>a</sup>	86.35 ± 13.410	0.552 <sup>a</sup>	68.00 ± 18.778	-0.108 <sup>a</sup>
	No	74.54 ± 16.111	(0.909)	84.80 ± 17.681	(0.582)	68.38 ± 18.297	(0.914)
Nephrologist	Yes	75.30 ± 13.738	0.482 <sup>a</sup>	88.67 ± 12.922	2.593 <sup>a</sup>	67.16 ± 16.479	-0.696 <sup>a</sup>
	No	73.95 ± 18.006	(0.631)	81.51 ± 18.867	(0.011)	69.41 ± 20.235	(0.488)
Nurse	Yes	73.30 ± 15.869	-1.514 <sup>a</sup>	83.78 ± 16.818	-1.634 <sup>a</sup>	67.02 ± 18.242	-1.218 <sup>a</sup>
	No	77.92 ± 15.769	(0.133)	88.93 ± 15.141	(0.105)	71.32 ± 18.579	(0.226)
Other professionals	Yes	79.19 ± 12.720	2.242 <sup>a</sup>	90.65 ± 12.104	2.953 <sup>a</sup>	72.32 ± 16.624	1.717 <sup>a</sup>
	No	72.57 ± 16.839	(0.027)	82.82 ± 17.621	(0.004)	66.42 ± 18.918	(0.088)

Note. Mean; SD = Standard deviation; *p* = *p*-value; a = *t*-test; b = ANOVA test; c = Kruskal-Wallis test; d = Mann-Whitney's test.

The mean self-care score was 74.64 ± 15.919. The Management of signs and symptoms subscale had the highest self-care score (85.27 ± 16.459). A moderate positive and statistically significant correlation was found between the Prevention of complications domain

and the Management of signs and symptoms domain (0.600; *p* < .05), as well as a strong positive and statistically significant correlation between the overall scale and the Prevention of complications domain (0.953; *p* = 0.05; Table 4).

**Table 4***Characterization of the overall scale and its domains (n = 131)*

Domains	Correlation coefficients $\rho$			Cronbach's alpha	Descriptive measures	
	Management of Signs and Symptoms	Prevention of Complications	Overall scale	$\alpha$	Min-Max	$\bar{X} \pm s$
Management of Signs and Symptoms	1	.600** (.000)	0.799** (0.000)	0.638	29.17-100	85.27 $\pm$ 16.459
Prevention of Complica- tions		1	0.953** (0.000)	0.759	20.00-100	68.26 $\pm$ 18.374
Overall Scale			1	0.816	23.44-100	74.64 $\pm$ 15.919

Note.  $\rho$  = Spearman's correlation coefficient ( $p$ -value);  $\alpha$  = Cronbach's alpha; Min-Max = Minimum-Maximum;  $\bar{X}$  = Mean;  $SD$  = Standard deviation.

## Discussion

The majority of participants were male patients, aged 50 to 75 years, with 4<sup>th</sup> grade, and professionally inactive. Recent data from 2020 shows that CKD is more prevalent in men and older people. Of the 12,495 patients undergoing hemodialysis in Portugal, 38.74% were over 75 years old (Autoridade da Concorrência, 2020). The Portuguese Society of Nephrology also revealed that, in 2018, patients with CKD were, on average, 68 years old, and 59.51% were men (Autoridade da Concorrência, 2020). These data are corroborated by Sousa et al. (2018) and Sousa et al. (2017). Almost half of the sample earned low monthly incomes between €250 and €530, which may be explained by the fact that Portugal has a very old population, living mainly in rural areas, with low incomes in those areas (EAPN Portugal, 2018; Instituto Nacional de Estatística, 2021). The main cause of CKD was diabetes and hypertension. Portugal has the highest prevalence of diabetes and the third highest prevalence of hypertension in Europe, diseases that often cause CKD (Nolasco et al., 2017). In this sample, several participants had previous AVFs, with 37.5% having had at least two episodes of AVF failure due to thrombosis and stenosis. AVF requires both nursing care and self-care, especially for preventing infection and thrombosis (Clementino et al., 2018). According to the literature, thrombosis and stenosis are the main complications that cause AVF failure (Iglesias et al., 2016). Nurses were the most frequent teaching agents. The nurse's role in accompanying and monitoring CKD patients with AVF on hemodialysis is crucial and part of their professional practice (OE, 2016). Nurses should involve patients in the dialysis treatment, negotiating and reviewing new intervention strategies, proposing home hemodialysis programs, facilitating and promoting the link between dialysis units, managing human and material resources to meet the needs of patients undergoing hemodialysis, and carrying out health education activities about AVF self-care (OE, 2016). The nurses caring for patients with CKD on hemodialysis play a crucial role in providing

specific care regarding dialysis techniques, but also in developing strategies for patients to acquire self-care behaviors (Clementino et al., 2018). Sousa et al. (2013) highlight the importance of interventions for promoting AVF self-care behaviors, with a greater predominance of these actions in the period after AVF creation. Thus, it is crucial to design nursing care to develop high standards of quality of care for these patients (Feitoza et al., 2019; OE, 2016). It is also important to create facilities where individualized and systematized care can be provided, facilitating the teaching and acquisition of AVF self-care behaviors, as well as the early identification, diagnosis, and intervention in case of AVF changes, thus increasing its longevity (Sousa, 2012). These results show that the respondents display appropriate behaviors related to the management and prevention of complications with the AVF, which indicates that they are aware of the self-care behaviors necessary to identify any changes in AVF functioning and prevent or detect any complications. Moreover, the domains of the scale - Management of signs and symptoms, Prevention of complications, and Overall scale - have a moderate positive correlation, and the overall scale and the Prevention of complications domain are strongly correlated. These results are in line with those obtained by Pereira (2018), who identified good levels of knowledge and self-care behaviors with AVF, particularly regarding the prevention, monitoring, and identification of signs and symptoms of complications. However, Sousa et al. (2017), who assessed the frequency of self-care behaviors and the factors influencing it, found a lower frequency of self-care behaviors than expected and below an adequate standard. Like Sousa (2012), Sousa et al. (2017) highlighted the need for and importance of education programs that promote AVF self-care behaviors. The same idea is reinforced by Sousa et al. (2020), who assessed the effectiveness of a structured intervention on the frequency of AVF self-care behaviors among hemodialysis patients. Those authors found that patients who underwent a structured intervention of AVF self-care behaviors showed better overall self-care behaviors and better self-care concerning the



management of signs and symptoms and the prevention of complications. The analysis of the association between AVF self-care behaviors, sociodemographic and clinical characteristics, and teachings showed that women had higher mean scores for overall AVF self-care behaviors, management of signs and symptoms, and prevention of complications. Sousa et al. (2017) also found that self-care behaviors were associated with female gender, etiology of CKD (such as hypertension, polycystic kidney disease, and other kidney diseases), and duration of AVF. Moreover, Sousa et al. (2018) conducted a study to identify clinically meaningful self-care behaviors in hemodialysis patients. They found that male patients had a moderate self-care profile, while female patients had a high self-care profile, namely regarding the prevention of complications. Women have higher scores for overall self-care behaviors with AVF, management of signs and symptoms, and prevention of complications. Women are intrinsically more caring and worry more about health issues than men, who assume an invulnerable social position that exposes them more to high-risk situations (Sousa et al., 2017). Participants whose hemodialysis sessions lasted less than 240 minutes showed higher scores for self-care behaviors with AVF. These participants seem to adhere more to measures for preventing kidney complications, such as diet, exercise, and even self-care with AVF, and show greater concern and, consequently, better kidney function, requiring shorter dialysis sessions (Sousa et al., 2018). The limitations of this study are the small sample size, its concentration in predominantly rural areas in the interior of mainland Portugal, and its implementation in three private clinics, which does not allow inferences to be made for the general population.

## Conclusion

Self-care with AVF was, on average,  $74.64 \pm 15.919$  out of 100 points. Higher mean scores were found in the Management of signs and symptoms domain and lower mean scores in the Prevention of complications domain. Higher mean scores for self-care with AVF were found in women, aged 50–65 years, married/living in a civil partnership, with 6<sup>th</sup> or 9<sup>th</sup> grade, professionally active, with a monthly income between €530 and €1,000, with more than six years of hemodialysis, with hemodialysis sessions of less than 240 minutes, and with more than six years since AVF creation. Self-care behaviors and the Management of signs and symptoms domain were related to education level and the teaching agent. The Prevention of complications domain was associated with age and education level. We therefore suggest implementing and reinforcing interventions to promote self-care behaviors that are adjusted to patients' age, gender, and education level, with greater investment in educating male and older patients. These education programs for promoting self-care with AVF should start from the very beginning of the process, given that the overall scores for self-care behaviors with AVF, the management of signs and symptoms, and the prevention of complications were higher in patients

who had been undergoing hemodialysis for more than six years. It is also essential to raise nurses' awareness of this issue and conduct other studies with larger samples that can be generalized to the general population.

## Author contributions

Conceptualization: Martins, M. D., Moura, S.

Data curation: Moura, S.

Formal analysis: Martins, M. D., Moura, S.

Investigation: Martins, M. D., Moura, S.

Methodology: Martins, M. D., Moura, S.

Supervision: Martins, M. D.,

Validation: Martins, M. D.,

Visualization: Martins, M. D.,

Resources: Moura, S.

Writing – original draft: Moura, S.

Writing – review and editing: Martins, M. D., Moura, S.

## References

- Autoridade da Concorrência. (2020). *Análise às condições de concorrência na prestação de cuidados de hemodiálise em Portugal: Versão preliminar para consulta pública*. <https://www.concorrenca.pt/sites/default/files/imported-media/Análise%20às%20condições%20de%20concorrência%20na%20prestação%20de%20cuidados%20de%20hemodiálise%20em%20Portugal.pdf>
- Clementino, D., Souza, A., Barros, D., Carvalho, D., Santos, C., & Fraga, S. (2018). Pacientes em hemodiálise: Importância do autocuidado com a fistula arteriovenosa. *Revista de Enfermagem UFPE Online*, 12(7), 1841-1852. <http://doi.org.10.5205/1981-8963-v12i7a234970p1841-1852-2018>
- Feitoza, S. N., Noleto, N. V., & Teixeira, L. L. (2019). Autocuidado com fistula arteriovenosa em terapia renal substitutiva. *Revista Recien: Revista Científica de Enfermagem*, 9(26), 60–67. <http://doi.org.10.24276/rrecien2358-088.2019.9.26.60-67>
- Fielding, C. (2019). Haemodialysis. In N. Thomas (Ed.), *Renal nursing: Care and management of people with kidney disease* (pp. 179-233). Wiley Blackwell.
- Freitas, E., Bassoli, F., & Vanelli, C. (2013). Perfil sociodemográfico de indivíduos com doença renal crônica em tratamento dialítico em clínica de Juiz de Fora, Minas Gerais. *HU Revista*, 39(1-2), 20.
- Iglesias, A., Mirinunis, C., Pelliccia, F., Morris, I., Romach, I., Matos, J., Preda, M., Ward, N., Beltrandi, R., Peralta, R., & Kafkia, T. (2016). *Acesso vascular: Canulação e cuidados: Manual de boas práticas de enfermagem para a fistula arteriovenosa*. EDTNA/ERCA.
- Instituto Nacional de Estatística. (2022). *Censos 2021: Resultados definitivos*. [https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine\\_publicacoes&PUBLICACOESpub\\_boui=65586079&PUBLICACOESmodo=2](https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=65586079&PUBLICACOESmodo=2)
- Mira, A., Garagarza, C., Correia, F., Fonseca, I., & Rodrigues, R. (2017). *Manual de nutrição e doença renal*. Associação Portuguesa dos Nutricionistas.
- Nolasco, F., Loureiro, A., Ferreira, A., Macário, F., Barata, J., Sá, H., Sampaio, S., & Matias, A. (2017). *Rede nacional de especialidade hospitalar e de referência: Nefrologia*. <https://www.sns.gov.pt/wp-content/uploads/2017/06/RNEHR-Nefrologia-Aprova-da-19-06-2017.pdf>
- Ordem dos Enfermeiros. (2016). *Cuidados à pessoa com doença renal*

*crónica terminal em hemodiálise: Guia orientador de boa prática.* [https://www.ordemenfermeiros.pt/media/8883/gobphemodiálise\\_vf\\_site.pdf](https://www.ordemenfermeiros.pt/media/8883/gobphemodiálise_vf_site.pdf)

- Patat, C., Stumm, E., Kirchner, R., Guido, L., & Barbosa, D. (2012). Análise da qualidade de vida de usuários em hemodiálise. *Enfermería Global*, 27, 66-76. [https://scielo.isciii.es/pdf/eg/v11n27/pt\\_clinica4.pdf](https://scielo.isciii.es/pdf/eg/v11n27/pt_clinica4.pdf)
- Pereira, H. (2018). *Autocuidado com a fistula arteriovenosa da pessoa em programa regular de hemodiálise* [Master's dissertation, Polytechnic Institute of Viana do Castelo]. Repositório Institucional do Instituto Politécnico de Viana do Castelo [http://repositorio.ipvc.pt/bitstream/20.500.11960/2017/1/Helena\\_Pereira.pdf](http://repositorio.ipvc.pt/bitstream/20.500.11960/2017/1/Helena_Pereira.pdf)
- Rede Europeia Anti-Pobreza. (2018). *Pobreza e exclusão social em Portugal: 2016-2017.* <https://on.eapn.pt/wp-content/uploads/Pobreza-e-Exclusão-Social-em-Portugal-2016-2017.pdf>
- Sousa, C. (2012). Cuidar da pessoa com fistula arteriovenosa: Modelo para a melhoria contínua. *Revista Portuguesa de Saúde Pública*, 30(1), 11-17. <http://doi.org.10.1016/j.rpsp.2011.11.001>
- Sousa, C., Apóstolo, J., Figueiredo, M., Martins, M., & Dias, V. (2013). Interventions to promote self-care of people with arteriovenous fistula. *Journal of Clinical Nursing*, 23(13-14), 1796-1802. <http://doi.org.10.1111/jocn.12207>
- Sousa, C., Apóstolo, J., Figueiredo, M., Dias, V., Teles, P., & Martins, M. (2015). Construction and validation of a scale of assessment of self-care behaviors with arteriovenous fistula in hemodialysis. *Hemodialysis International*, 19(2), 306-313. <http://doi.org.1111/hemodiálisei.12249>
- Sousa, C., Marujo, P., Teles, P., & Lira, M. (2018). Self-care behavior profiles with arteriovenous fistula in hemodialysis patients. *Clinical Nursing Research*, 29(6), 363-367. <http://doi.org.10.1177/1054773818787110>
- Sousa, C., Marujo, P., Teles, P., Lira, M., & Novais, M. (2017). Self-care on hemodialysis: Behaviors with the arteriovenous fistula. *Therapeutic Apheresis and Dialysis*, 21(2), 195-199. <http://doi.org.10.1111/1744-9987.12522>
- Sousa, C., Paquete, A., Teles, P., Pinto, C., Dias, V., Ribeiro, O., Manzini, C., Nicole, A., Souza, L., & Ozen, N. (2020). Investigating the effect of a structured intervention on the development of self-care behaviors with arteriovenous fistula in hemodialysis patients. *Clinical Nursing Research*, 30(6), 866-874. <http://doi.org.10.1177/105477382097483>