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PREVALENCE AND FACTORS ASSOCIATED WITH THE OCCURRENCE OF ADVERSE EVENTS IN THE HEMODIALYSIS SERVICE[1]

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ABSTRACT

Objective: to analyze the prevalence and factors associated with the occurrence of adverse events in the hemodialysis service.

Method: a longitudinal descriptive study with a quantitative approach, whose sample consisted of 51 patients, the data were obtained through the daily recording of adverse events on a checklist between May and July 2016 the data were submitted to descriptive analysis and, for the categorical variables, the bivariate analysis was performed through the Pearson's Chi-Square Test of Independence in order to investigate the association of the occurrence of AE and demographic and clinical variables.

Results: 1110 adverse events with a prevalence in 98.03% of the patients were recorded, with the most frequent being medication error (45.2%) and inadequate blood flow (42.9%). Regarding the level of harm, most of the adverse events were mild (93.8%), followed by moderate (5.9%). The occurrence of the adverse event was associated with the female sex, younger than 40 years of age, absence of comorbidities, treatment time less than one year and use of long-term central venous catheter.

Conclusion: the prevalence of adverse events was considered high, with a predominance of mild adverse events. The study reinforces the need for management and assistance strategies in order to implement control measures regarding the occurrence of adverse events in hemodialysis, resulting in economic and social benefits for the institution and its clientele.

DESCRIPTORS: Patient safety. Nursing. Renal dialysis. Quality of health care. Iatrogenic disease. Medical errors.

PREVALÊNCIA E FATORES ASSOCIADOS PARA A OCORRÊNCIA DE EVENTOS ADVERSOS NO SERVIÇO DE HEMODIÁLISE

RESUMO

Objetivo: analisar a prevalência e os fatores associados para a ocorrência de eventos adversos no serviço de hemodiálise.

Método: estudo descritivo longitudinal com abordagem quantitativa, cuja amostra foi composta de 51 pacientes atendidos na unidade de hemodiálise entre maio e julho de 2016. Os dados foram obtidos por meio do registro diário de eventos adversos em um *checklist* e submetidos análise e, para as variáveis categóricas, foi realizada a análise bivariada, por meio do teste Qui-Quadrado de independência de Pearson.

Resultados: foram registrados 1110 eventos adversos com prevalência em 98,03% dos pacientes, sendo os mais frequentes: erro de medicação (45,2%) e fluxo sanguíneo inadequado (42,9%). Quanto ao grau de dano, a maioria dos eventos foi de grau leve (93,8%), seguido do moderado (5,9%). A ocorrência do evento adverso esteve associada ao sexo feminino, idade menor que 40 anos, ausência de comorbidades, tempo de tratamento menor que um ano e uso de cateter venoso central de longa permanência.

Conclusão: a prevalência de eventos adversos foi considerada alta, com predominância do grau leve. O estudo reforça a necessidade de estratégias de gestão e assistência para implantação de medidas de controle da ocorrência dos eventos adversos em hemodiálise, resultando em benefícios econômicos e sociais para a instituição e sua clientela.

DESCRITORES: Segurança do paciente. Enfermagem. Diálise renal. Qualidade da assistência à saúde. Doença iatrogênica. Erros médicos.

PREVALENCIA Y FACTORES ASOCIADOS A LA OCURRENCIA DE EVENTOS ADVERSOS EN EL SERVICIO DE HEMODIÁLISIS

RESUMEN

Objetivo: analizar la prevalencia y los factores asociados a la ocurrencia de eventos adversos en el servicio de hemodiálisis.

Método: Estudio descriptivo longitudinal con abordaje cuantitativo, cuya muestra fue compuesta de 51 pacientes atendidos en la unidad de hemodiálisis entre mayo y julio de 2016. Los datos fueron obtenidos por medio del registro diario de eventos adversos en un checklist y sometidos análisis y, para las las variables categóricas, se realizó el análisis bivariado, por medio del test Qui-cuadrado de independencia de Pearson.

Resultados: se registraron 1110 eventos adversos con prevalencia en 98,03% de los pacientes, siendo los más frecuentes: error de medicación (45,2%) y flujo sanguíneo inadecuado (42,9%). En cuanto al grado de daño, la mayoría de los eventos fueron de grado leve (93,8%), seguido del moderado (5,9%). La ocurrencia del evento adverso estuvo asociada al sexo femenino, edad menor que 40 años, ausencia de comorbilidades, tiempo de tratamiento menor que un año y uso de catéter venoso central largo plazo.

Conclusión: la prevalencia de eventos adversos se consideró alta, con predominancia de eventos leve. El estudio refuerza la necesidad de estrategias de gestión y asistencia para implantación de medidas de control de la ocurrencia de los eventos adversos en hemodiálisis, lo que resulta en beneficios económicos y sociales para la institución y su clientela.

DESCRIPTORES: Seguridad del paciente. Enfermería. Diálisis renal. Calidad de la atención de salud. Enfermedad iatrogénica. Errores médicos.

INTRODUCTION

Chronic Kidney Disease (CKD) consists of progressive and irreversible loss of renal function, including excretion of metabolite products and regulation of electrolytes and water. Thus, renal failure leads to the homeostasis of the organism being compromised and therapies are required in order to replace the lost renal function.[1-2]

The global prevalence rate of dialysis patients is 552 patients per million population, with hemodialysis (HD) being the most prevalent renal replacement therapy in the world. According to the 2014 dialysis census, there are an estimated 112,004 patients undergoing dialysis treatment in Brazil, with 91% of these patients receiving HD.[3]

HD involves a blood filtration process that occurs extracorporeally, with the help of a machine and a system of lines and capillaries, through a venous access.[2] Therefore, it is a complex, multidisciplinary treatment, which involves the use of advanced technology benefiting patients with serious and multiple health complications; it is a treatment that, when offered, increases the potential risk of adverse events (AEs).[4-5]

AEs are defined as incidents that result in harm to the patient, i.e. any action that causes the patient some physical, social or psychological impairment, including illness, injury, suffering, death or disability.[6]

A Brazilian study on the prevalence of incidents in the care of hospitalized patients found that 5,672 cases occurred in 750 hospitalizations in the Central West Region, where 18.7% of the incidents caused some type of harm.[7] A study performed in the Southeast region of Brazil found that 68.3% of AEs were preventable.[8]

In relation to mortality, an American study estimated 400,000 deaths per year associated with preventable harm.[9] A Scottish study on the incidence and factors related to AEs that contributed to the death of patients on renal replacement therapy showed that, 2.1% of the 1551 deaths caused by AEs were caused by complications such as hemorrhage due to venous access and falls, 9.6% were due to health care-related infections, and 9.6% were due to venous access failure or infection.[10]

In view of this problem in Brazil and in the world, the Brazilian Ministry of Health launched the National Patient Safety Program in 2013, which among other activities, establishes and guides the AE reporting system. The program emerged from the commitment made at the XXII Meeting of the MERCOSUL Health Ministries in the Global Alliance for Patient Safety, with the aim of contributing to the quality of health care in all national health facilities.[11]

In this perspective, the importance of studies on patient safety in hospital units, especially in the HD service is justified due to the susceptibility of AEs. The use of complex equipment, such as dialysis machines, performing invasive procedures in order to obtain vascular access, clinical characteristics of the patient, which are generally critical, and the presence of comorbidities, high patient turnover and the constant use of medications, such as anticoagulants, are factors that increase the risk for the development of AEs.[5,12]

Thus, studies that address nursing care based on patient safety are necessary, since their participation in the hemodialysis care process ranges from the arrival of the patient to his or her exit from the HD unit, therefore becoming the group most likely to cause incidents which harm these individuals.

Given the longer period of contact and exposure, nurses are also the main professional responsible for the identification of risk factors at an early stage, and can therefore minimize the occurrence of AEs.

In this context, further research related to the identification of the factors associated with the occurrence of AEs in hemodialysis is required, which can thus support the planning of preventive and control measures regarding their occurrence as well as assisting management, teaching and research. In addition, it is aimed to contribute to the scientific production in nursing in view of the reduced amount of researches and articles published in Brazil on the subject of hemodialysis services

Considering the high number of AEs in patients receiving hemodialysis, the following was questioned: What is the prevalence and factors associated with the occurrence of AEs in the HD service? Therefore, the objective of this study is to analyze the prevalence and factors associated with the occurrence of AEs in the HD service.

METHOD

A descriptive, longitudinal study with a quantitative approach, performed at the HD Unit of a University Hospital in the city of Recife, Pernambuco.

The HD unit has the capacity for the weekly attendance of 72 adult and elderly patients with acute or chronic renal disease in outpatient or inpatient hemodialytic therapy. The HD sessions take place in three shifts, from Monday to Saturday, with a capacity of 36 patients per day, who usually perform three sessions per week, with an estimated 216 sessions/week and 11,232 sessions/year. However, the sector does not have a fixed patient list, with the number of sessions varying per month. The multiprofessional team consists of nephrologists, nurses, nursing technicians and social workers.

The census-type sample included 62 individuals, over 18 years of age, of both sexes, with CKD, in outpatient or inpatient hemodialytic therapy. Patients admitted to the service from May 2016 (initial period of follow-up in the study) or those who performed HD in the Intensive Care Unit of the referred hospital were excluded. Eight patients did not meet the inclusion criteria and three did not sign the Informed Consent Form. The sample consisted of 51 patients.

Data were collected from May to July 2016, using a structured instrument composed of thematic blocks, which included demographic variables, clinics and AEs occurring in hemodialysis. It should be noted that, prior to the beginning of the data collection, a pre-test was carried out in order to ascertain the suitability of the instrument and to train the interviewers.

The independent variables analyzed in the study were demographic (age, sex) and clinical characterization (baseline diagnosis, presence of comorbidities, treatment time, access route and final situation of the patient), which were collected through the medical records. The dependent variable was the occurrence of AE during HD, identified by the help of a checklist which was based on the results of a study by Sousa (2014).[13] The recording of the AE occurred either through direct observation or through the information described on the dialysis patient follow-up form.

The AEs were classified according to type: inadequate blood flow; extracorporeal system coagulation; bleeding from venous access; infiltration; infection/signs of infection; skin injury; inadequate fixation of the short-term CVC/long-term CVC; inadequate short-term CVC/long-term CVC implant; water distribution system failure; accidental disconnection of arteriovenous fistula needle (AVF); HD machine failure; defective material; error during AVF puncture; falls; medication errors; allergic reaction; inadequate short-term CVC/long-term CVC connection; accidental withdrawal of the short-term CVC/long-term CVC; exchange of dialysis systems, loss of AVF; air in the system; open short-term CVC/long-term CVC catheter clamps. Regarding the level of harm, the AEs were classified as mild, moderate, serious and fatal.

After the data collection, in order to check consistency and validation the data were entered on a Windows Excel® spreadsheet twice, and verified by Validate, a module of the Epi-Info Program, version 6.04. The data were then transferred to the Statistical Package for the Social Sciences SPSS®, version 18.0.

The prevalence of AEs in HD was calculated using a mathematical ratio, in which the numerator corresponded to the number of patients with at least one recorded AE, while the denominator corresponded to the total number of patients who participated in the study.

The data were submitted to descriptive analysis (absolute and percentage frequencies) and, for the categorical variables, the bivariate analysis was performed through the Pearson's Chi-Square Test

of Independence in order to investigate the association of the occurrence of AE and the demographic and clinical variables, with the level of significance being considered as lower than 5%.

The study was approved by the Human Research Ethics Committee of the *Universidade Federal de Pernambuco* (CAEE 52241815.6.0000.5208). All patients were previously informed of the research objectives and, consent was given via signature or fingerprint on the Informed Consent Form.

RESULTS

The majority of the study participants were female (60.8%), older than 60 years of age (41.2%), with undetermined origin as the main etiology for chronic kidney disease (33.3% %), without comorbidities (60.8%), receiving hemodialysis treatment for between 1 and 5 years (41.5%), arteriovenous fistula as the main access route for HD (39.2%) and at the end of the study remained on dialysis in the institution (82.4%) (Table 1).

Table 1 - Demographic and clinical characterization of hemodialysis patients. Recife,PE, Brazil, 2016. (n=51)

Variables	N	%
Sex		
Female	31	60.8
Male	20	39.2
Age group		
Younger than 40 years of age	16	31.4
40 - 59 years of age	14	27.4
60 or older	21	41.2
Underlying diagnosis		
Diabetes mellitus	7	13.7
Systemic Arterial Hypertension	4	7.8
Chronic glomerulonephritis	8	15.7
Undetermined	17	33.3
Others	15	29.4
Comorbidities		
Yes	20	39.2
No	31	60.8
Treatment time		
< 1 year	18	35.3
1 - 5 years	21	41.2
> 5 years	12	23.5
Access route		
Short-term CVC	2	3.9
Long- term CVC	14	27.4
Arteriovenous fistula	20	39.2
Expanded polytetrafluoroethylene prosthesis	1	2.0
Short-term CVC* + Long-term CVC†	6	11.8
Short-term CVC* + AVF‡	4	7.8
Long-term CVC† + AVF‡	2	3.9
Long- term CVC † + PTFE§	1	2.0
Short-term CVC* + Long-term CVC† + AVF‡	1	2.0
Final situation of patient		
Remains on heamodialysis	42	82.4
Transferred to other heamodialysis unit	5	9.8
Received transplant	3	5.8
Died	1	2.0

*Short-term CVC:Short-term central venous catheter; †Long-term CVC: Long-term central venous catheter; ‡AVF: Arteriovenous fistula; §PTFE: Expanded polytetrafluoroethylene prosthesis.

A total number of 1110 AEs was recorded with only one patient not having an AE during the same period. A prevalence of 98.03% of AEs regarding hemodialysis was identified, with a mean per patient of 21.76 (±13.57). It is verified that the most frequent adverse event was medication error (502), followed by inadequate blood flow (476). It is also observed that most of the adverse events were classified as mild (93.8%), followed by moderate (5.9%). The events that corresponded to serious damage were: infiltration, inadequate short-term CVC/Long-term CVC implant and loss of arteriovenous fistula. However, there was no record of skin injuries, water distribution system failure or falls (Table 2).

Table 2 - Distribution of adverse event type and degree of harm during hemodialysis. Recife, PE, Brazil, 2016. (n = 1110)

Adverse event type	n	%	Level of harm					
			Mild		Moderate		Serious	
			N	%	N	%	N	%
Medication error	502	45.2	477	95.0	25	5.0	-	-
Inadequate blood flow	476	42.9	459	96.4	17	3.6	-	-
Blood clotting	42	3.8	42	100.0	-	-	-	-
Infection/signs of infection	24	2.2	9	37.5	15	62.5	-	-
Bleeding from venous access	22	2,0	20	90.9	2	9.1	-	-
Infiltration	11	1.0	9	81.8	1	9.1	1	9.1
Puncture error of AVF*/PTFE†	10	0.9	10	100.0	-	-	-	-
Defective material	6	0.5	6	100.0	-	-	-	-
Accidental disconnection of AVF*/PTFE†	3	0.3	3	100.0	-	-	-	-
Technical failure of machine	3	0.3	3	100.0	-	-	-	-
Inadequate fixation of Short-term CVC‡/Long-term CVC§	2	0.2	-	-	2	100.0	-	-
InadequateShort-term CVC‡/Long-term CVC§ implant	2	0.2	-	-	1	50.0	1	50.0
Allergic reaction	1	0.1	-	-	1	100.0	-	-
Inadequate catheter connection	1	0.1	1	-	-	-	-	-
Accidental removal of Short-term CVC‡/Long-term CVC§	1	0.1	-	-	1	100.0	-	-
Exchange of dialysis systems	1	0.1	1	100.0	-	-	-	-
Loss of AFV*	1	0.1	-	-	-	-	1	100.0
Presence of air in the system	1	0.1	1	100.0	-	-	-	-
Open Short-term CVC‡/Long-term CVC§ clamps	1	0.1	-	-	1	100.0	-	0.0

*AVF:Arteriovenous fistula; †PTFE: Expanded polytetrafluoroethylene prosthesis; ‡Short-term CVC: Short-term central venous catheter; §Long-term CVC: Long-term central venous catheter

Regarding the factors associated with the occurrence of AEs in HD, a higher prevalence was observed in females (p<0.001), younger than 40 years of age (p<0.001), no comorbidities (p<0.001), treatment time less than 1 year (p<0.001) and with a Long-term CVC in use (p <0.001) (Table 3).

Table 3 - Factors associated with the occurrence of adverse events in hemodialysis. Recife-PE, Brazil, 2016. (h = 1110)

Variables	Adverse event		p-value*
	N	%	
Sex			
Female	662	59.6	<0.001
Male	448	40.4	
Age group			
Younger than 40 years of age	451	40.6	<0.001

40 - 59 years of age	246	22.2	
60 years of age or older	413	37.2	
Comorbidities			
Yes	277	25.0	<0.001
No	833	75.0	
Treatment time			
<1 year	514	46.3	<0.001
1 - 5 years	446	40.2	
> 5 years	150	13.5	
Access type			
Short-term central venous catheter	203	18.3	<0.001
Long- term central venous catheter	555	50,0	
Arteriovenous fistula	324	29.2	
Expanded polytetrafluoroethylene prosthesis	28	2.5	

*Pearson's chi square testofindependence

DISCUSSION

The HD department has particular characteristics which are not encountered in other health care services. Therefore, the identification of AEs and the factors associated to their occurrence is relevant to broadening the knowledge regarding the shortcomings of the service.

The incidence rates of AEs in critical care can range from 5-15% of all Intensive Care Unit hospitalizations.[14] The high prevalence of AEs in HD has also been found in a Brazilian study that identified 80.3% of AEs per patient,[15] corroborating with the findings of this study.

The triad consisting of the interaction between dialysis personnel, machines and the environment may be a factor for the occurrence of AEs in HD.[16] Integrative literature review aimed to identify the causes of errors involving the nursing team in their professional practice. It observed that the characteristics of the patients themselves can be included in the causes, which in HD are considered critical, as well as fatigue and stress, which may be related to the intensity of the activities and to the high turnover of the patients.[17]

The type of AE with the highest prevalence found in this study is similar to the data found in literature, which also indicates medication error in patients on hemodialysis treatment as the most common type of AE .[4,14,18-19]

The National Agency of Sanitary Surveillance defines medication error as any preventable event that may lead to the inappropriate use of a medication under the control of the health team or even the patient himself, that leads to, or has the potential to lead to, harm to the patient.[20] In view of this concept, during data collection it was noticed that most medication errors occurred due to noncompliance with the prescription, mainly the omission of administrating erythropoietin and iron hydroxide saccharate, which may be justified by the fact that the patients of the service are responsible for bringing the medications that will be administered by the nursing staff during the HD sessions, according to their monthly prescription.

A study that aimed to identify and describe the factors associated with non-compliance in chronic patients receiving HD showed that 23% of the participants reported not adhering to the medications and the most common non-adherent behaviors were: changing the frequency of taking the medication and "skipping" doses. It is evident that the nurse must be aware of the prescribed medical treatment of each patient, reinforcing the medical prescription and the guidelines regarding the use of the prescribed medications. Through health education, nurses can help patients to understand the importance of adhering to medications administered in the HD unit and also to those self-administered, outside the health service.[19]

Regarding nursing, the majority of professionals working with HD believe that they have never given incorrect medication or medication at the wrong time.[12] In an attempt to reduce errors in medication administration, a strategy was implemented in their service which consisted of nursing team education activities and utilizing a "Medication Omission Reminder Card" and performing a regular weekly audit with the intention of identifying the occurrence of adverse events. The strategy obtained satisfactory results in reducing medication errors.

Another adverse event with a high prevalence in this study was "inadequate blood flow" which is considered when the patient has a blood flow of less than 300 ml/min, considering that dialysis is more

effective with higher blood flows (400 to 450 ml/min). The best access route to obtain these results is the AVF, however in this research the majority of the individuals had central venous catheters access in at least one period of the research.[2,22]

Catheters, on the other hand, due to their own characteristics, generally do not allow an ideal blood flow; in addition, there are common complications such as clot obstruction and the consequent presence of hypoflow.[2,22] A study that evaluated transjugular catheter tips used in chronic dialysis by means of imaging tests, identified at least one thrombotic complication in 25 of the 38 study participants.[23] Another study conducted in China with 865 patients undergoing dialysis using catheters found that 56.65% of the sample had catheter dysfunction and 38.61% of the patients developed a catheter infection.[24]

Problems with central venous catheters can be reduced by correct handling of the device. In order to guarantee its permeability and prevent catheter dysfunction, solutions such as are heparin are commonly used in clinical practice.[25] However, studies have compared the efficacy of this drug in relation to 4% trisodium citrate for catheter occlusions, which is proving to be promising as, in addition to the anticoagulant action, it can prevent the formation of a biofilm due to the chelating effect of calcium and magnesium, thus avoiding colonization bacterial colonization.[26-27]

In turn, the presence of infection was the fourth most prevalent AE in this study, with antibiotic therapy often being necessary, with 62.5% of the cases being confirmed as moderate level AEs. In this study, the majority of infections occurred in patients with venous catheters.

The principle of infection prevention that requires patient care refers to: reduction of catheter use and, when necessary, the withdrawal of the catheter implant as early as possible, prioritizing the AVF as access of choice; applying protocols for catheter dressings, as well as rubbing the catheter hub with antiseptic solutions such as >5% chlorhexidine gluconate, 70% alcohol or 10% iodine-povidone; AVF care, such as frequent hand washing, cleaning of the access site before starting HD, and knowledge of the signs and symptoms of infections, in order for early diagnosis and treatment; immunization, screening for Hepatitis B and Hepatitis C viruses and vaccination for Hepatitis B, Influenza and Pneumonia.[28]

The classification of the AEs regarding the levels of harm is one of the highlights of this study. This is a classification described by the World Health Organization, however gaps in the literature are still present. Thus, the level of harm is classified by the impact or intensity of the AE to the patient.[6]

Therefore, the findings of this research with respect to the level of harm corroborate Brazilian studies on HD and in the surgical department, which, for the most part, were classified as a mild AEs.[7,15]

On the other hand, serious AEs, due to having greater repercussion to health, deserve special attention. In this study the AEs classified with this severity, were: infiltration, loss of AVF and inadequate Short-term CVC/Long-term CVC implantation, due to the need for surgical intervention and/or ICU care. [6]

Infiltration is a common incident related to AVF, especially during cannulation for the purpose of treatment.[14] Nurses or technicians who perform AVF cannulation may, at some point, experience problems in performing the technique, requiring more than two attempts.[4]

Another study reported 10,807 cannulation procedures, where 367 were associated with some type of complication. When analyzing the proportion of patients with cannulation complications by type of vascular access, it was verified that there were multiple cannulations in 3.2% of the patients with autologous fistulas and 1.8% of those had fistulas with prosthesis; isolated infiltration occurred in 0.9% and hematomas formed in 1.2% of autologous fistulas, and in fistulas with prosthesis, isolated infiltration occurred in 0.1% and hematoma occurred in 0.6%.[29]

Thus, in cases of infiltration the following should be considered as immediate care: effective direct compression for hemostasis,[30] thus preventing the formation or worsening of the hematoma. Another recommended practice is the adequate use of cryotherapy, which reduces local inflammatory markers, [31] which, in the AVF, can lead to vascular wall damage,[32] resulting in its failure.

Intensive care of AVF reduces the incidence of complications, thus increasing the survival of this access. In view of this, using appropriate cannulation technique is characterized as essential care in access preservation. For its implementation, it is important to prepare the skin with antiseptic solutions before cannulation, this reduces the transient bacterial flora and thus reduces the risk of infection; guarantee the stability of the AVF in order to cannulate, using a tourniquet, when necessary; choose the most appropriate cannulation technique for each

patient, respecting the minimum distance (5cm) between the cannulation of the arterial branch and the venous branch; fix and secure the access.[33]

In addition, Koirala[34] describes a method consisting of a complete physical examination and complementary imaging tests as a strategy to reduce the incidence of clots and the early detection of stenosis. During the physical examination, the nurse should use propaedeutic techniques, such as: inspection for the presence of edema, swelling or bruising and also visualization of the collateral circulation in the arm or chest region that indicates central stenosis; auscultation of the murmur produced by the access which has a high pitch in the presence of stenosis; palpation, identifying the presence and intensity of the pulse/tremor.[34]

Inadequate implantation of the Short-term CVC/Long-term CVC represents immediate complications to catheter insertion, which in some cases may be complex, such as: accidental arterial puncture, hematoma formation, failure of guide progression, pneumothorax and hemothorax.[35-37] As a measure to avoid such problems, a Brazilian study shows good results when this procedure is accompanied by ultrasound, which serves as a guide for catheter implantation.[35]

As for the factors associated with the occurrence of AEs in the HD unit, studies show that there is a greater chance of AEs occurring in males and older individuals.[15,38] The data presented does not corroborate the findings in our study, in which the AEs presented a statistical significance in females and participants younger than 40 years of age.

In the presented research, highlighting the age variable, such association is justified because older patients are submitted to a greater number of procedures or because they have more comorbidities thus increasing their vulnerability.[15,38] The divergence of the results found in the current research can therefore be explained by the fact that emotional factors among younger people affect their quality of life,[39] leading to the non-acceptance of the disease and HD, drug compliance and care with venous accesses, thus being vulnerable to the occurrence of AEs.[40-42]

The presence of comorbidities among the factors associated with the occurrence of AE, found in this study, was also discordant in relation to the literature.[16,43] "Hidden" diseases and personal factors such as age, presence of some deficiency, hyperkalemia, diabetes and instability vascular disease increase the risk for the occurrence of AEs.[16] This difference between the literature and the findings of this study may be related to the high prevalence (60.8%) of patients with no record of comorbidities in the medical records.

In the researched literature, there was no association between the occurrence of AEs and the variables: treatment time and type of access. One hypothesis raised by this study is that access to Long-term CVC is related to the occurrence of AEs due to its own characteristics, leading to obstruction and difficulty in maintaining high blood flows, as previously discussed.[22]

In turn, the variable treatment time of less than one year, may be related to the occurrence of AEs due to the first year of hemodialysis treatment being a period of adaptation for these patients. Firstly, because they are patients who frequently arrive at the service on an emergency basis, with complications related to uremia, which requires more complex care.[2] Another point that may be implicated in intradialytic complications concerns psychological factors and emotional problems of the patients when they discover that they have chronic kidney disease and will need to undergo permanent hemodialysis treatment.[39]

As limitations of this study, the use of secondary data should be highlighted, as the absence of records in the medical records may have contributed to underestimating the occurrence of comorbidities in the study population. Other limiting factors include only identifying the adverse event, without describing the circumstances for their occurrence, as well as the scarcity of published articles on the subject.

CONCLUSION

The prevalence of AEs was high in the studied population, but the severity was predominantly mild. The most prevalent AEs were: medication error and inadequate blood flow. The occurrence of AEs was more associated with females, younger than 40 years of age, with an absence of comorbidities, with less than one year of treatment and the use of a long-term CVC.

The impact of these results on nursing management and care is to identify the main factors associated with the occurrence of AEs within the hemodialysis service, so that measures can be taken to minimize such occurrences. Thus, the development of duly validated protocols that define roles and organize the processes related to patient care is suggested, as well as the practice of permanent education for professionals.

In addition, these data reinforce, for nursing

managers, the need for compulsory reporting of AEs occurring in the service and the development of quality indicators of care, as well as the implementation of goals for the nursing team aimed at patient safety.

As the literature on this subject in Brazil is limited, especially in regards to the practice of nursing care, these results broaden knowledge on patient safety in nursing research. Other studies are recommended, with representative samples of hemodialysis services, in order to understand the national reality of this important area of health in greater depth.

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