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ACCURACY OF THE NURSING DIAGNOSIS OF EXCESS FLUID VOLUME (00026) IN CHRONIC HEMODIALYSIS PATIENTS

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ABSTRACT

Objective: to analyze the prevalence and accuracy of the elements of the Nursing Diagnosis of Excess Fluid Volume (00026) in chronic hemodialysis patients. **Data collection:** cross-sectional study with 127 patients. Data were collected by trained nurses, using an instrument containing sociodemographic variables, antecedent and consequent factors for the occurrence of the event. For analyzing accuracy measures, sensitivity, specificity, positive predictive value, and negative predictive value were calculated. **Synthesis of data:** 79.5% of the sample presented the referred diagnosis. The most prevalent elements were "Compromised regulatory mechanism" and "Azotemia". "Compromised regulatory mechanism," "Azotemia," "Decreased hematocrit," and "Decreased hemoglobin" presented high sensitivity values, while "Paroxysmal nocturnal dyspnea," "Adventitious respiratory sounds," "Orthopnea," "Pulmonary congestion," "Dyspnea," "Anxiety," "Restlessness," "Hepatomegaly," and "Pleural effusion" presented high specificity values. **Conclusion:** the elements "Excessive fluid intake" and "Excessive sodium intake," "Compromised regulatory mechanism," "Azotemia," "Decreased hematocrit," "Decreased hemoglobin," "Intake greater than elimination," "Electrolytic imbalance," and "Alteration in blood pressure" presented relevant sensitivity measures for inferring the Diagnosis.Thus, from the results obtained, one can infer that such elements were considered predictors of the Diagnosis under study. Prevalence results and accuracy measures can assist nurses in assessing the elements that make up the diagnosis of Excess Fluid Volume (00026), providing an accurate diagnostic proposition.

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INTRODUCTION

Chronic Kidney Disease (CKD) is defined as the progressive (over three months) and irreversible loss of renal function (Marinho, Penha, Silva, & Galvão, 2017; Spigolon *et al.,* 2018), leading to hydroelectrolytic, acid-base, endocrine, and metabolic imbalances, which result from an inefficient glomerular filtration (Zatz, 2018). CKD reaches stage five when the Glomerular Filtration Rate (GFR) is <15/ml/min/1.73 m^2, characterizing the most advanced stage of the disease (Spigolon *et al.,* 2018). The latest censuses have shown an increase in the number of patients affected by the disease, who are currently undergoing dialysis in Brazil (Sesso, Lopes, Thomé, Lugon, & Martins, 2017; Thomé, Sesso, Lopes, Lugon, & Martins, 2019; Neves, Sesso, Thomé, Lugon, &Nascimento, 2020). In a five-year period, there was a 19.16% increase in the number of patients undergoing dialysis, and currently 133,464 patients undergo renal replacement therapy, as reported by the Brazilian Chronic Dialysis Survey (Neves *et al.,* 2020). Some aspects are associated with this growth, including the urbanization process that brought less healthy life habits and less frequent health-seeking behaviors to modern society, as well as aging, which leads to an increase in Chronic Non-Communicable Diseases (CNCDs) for the population (Malta *et al.,* 2017; World Health Organization, 2018). Thus, Diabetes Mellitus (DM) and Systemic Arterial Hypertension (SAH) are the main causes of CKD, since they compromise renal function (Marinho *et al.,* 2017; Sesso *et al.,* 2017; Thomé *et al.,* 2019; Neves *et al.,* 2020). The inability to remove excess water and blood residues favors the accumulation of substances that should be excreted, causing the most varied signs and symptoms to the individual, namely: mental confusion, seizure, uremic frost, dry skin, thin and brittle nails, hypertension, pulmonary edema, pericarditis, pitting and periorbital edema, hyperkalemia, uremic breath, ulcerations and oral and gastrointestinal bleeding, anemia, thrombocytopenia, ecchymosis, renal osteodystrophy, bone fractures, metabolic acidosis, among others (Zatz, 2018; Tinôco *et al.,* 2017). Therefore, the set of therapeutic actions (dialysis, medication regimen, water and food control) aims to minimize or prevent CKD complications, as well as comorbidities. Among the purposes of treatment, the control of blood pressure, proteinuria, DM, hyperphosphatemia, weight, anemia, malnutrition, dyslipidemia, and secondary hyperparathyroidism

stands out, which are the most frequent complications, responsible for the large number of deaths in this population (Lins *et al.,* 2018). Conventional Hemodialysis (HD), the process of removing excess fluids and other toxic substances from the blood by diffusion, is the type of Renal Replacement Therapy (RRT) most used in Brazil (Spigolon *et al.,* 2018; Thomé *et al.,* 2019; Neves *et al.,* 2020). Although there are other therapeutic regimens, the patient usually undergoes treatment, on average, three times a week in sessions that last from two to four hours (Thomé *et al.,* 2019). Recognizing the problems faced by these patients, nurses stand out in the proposal of care aimed at the recovery of these individuals. They can significantly contribute to the profession's knowledge and, by the Nursing Process (NP), plan and implement the best therapeutic plan to minimize the adverse events of human responses and to recover health. The Nursing Diagnosis (ND), second phase of the NP, consists of the clinical judgment of the collected data, allowing an accurate identification of the diagnostic concepts that best represent the responses of the person, family, or human community to the health and disease processes (Herdman & Kamitsuru,2018).

NANDA-International (NANDA-I) brings the diagnostic concept of Excess Fluid Volume (00026), defined as "excessive intake and/or fluid retention" (Herdman & Kamitsuru, 2018, p.186), which is often attributed to the renal patient by the professionals who provide care (Debone, Pedruncci, Candido, Marques, & Kusumota, 2017; Grassi, Dell'Acqua, Jensen, Fontes, & Guimarães, 2017). In addition, nurses point out the relevance of the referred ND for clinical practice, showing that such a human response is valued by nurses working in HD (Lemes & Bachion, 2016). Therefore, the importance of an accurate diagnostic process that reflects the real situation found is emphasized, giving the patient the possibility of adequate treatment, both in time and quality, preventing other complications as well as death (Spigolon *et al.,* 2018). The validation studies of ND aim to consolidate this knowledge from their results in specific populations. They show the prevalence and accuracy of the indicators of the human response, which favors the inference of a certain event in the population, namely, the ND and, later, the proposal of interventions and nursing results that are effective. In addition, these studies improve and legitimize nursing classifications, providing theoretical support for professional practice (Lopes, Silva, & Araujo, 2019). Even with the growth in the number of studies of this nature using different classifications, there is still a lack of this approach in specific populations(Almeida, Seganfredo, Barreto, &Lucena, 2014). This fact is relevant in the proposal and execution of this study, considering that they favor the planning and implementation of effective nursing care directed to the real needs of chronic renal patients.Therefore, this study aimed to perform a clinical validation the ND of Excess Fluid Volume (00026) by presenting and analyzing the prevalence and accuracy measures of the Related Factors (RF), Associated Conditions (AC), and Defining Characteristics (DC) of the ND in chronic renal patients undergoing HD.

MATERIALS AND METHODS

This is a methodological, cross-sectional study of diagnostic accuracy guided by the instrument *Standards for Reporting Studies of Diagnostic Accuracy* (STARD) (Bossuyt *et al.,* 2015). It was carried out in a clinic that meets chronic renal patients undergoing dialysis treatment, located in a city in the Brazilian Midwest, a reference in the care for patients in the northern region of the state of Mato Grosso. Data collection took place from January to June 2018. The population considered for the calculation of the sample size was of 189 patients. In addition, a 5% sampling error and a 5% significance level were assumed (Lopes *et al.,* 2019). Thus, the sample size obtained was 127 patients, selected by convenience. The inclusion criteria were: age equal to or over 18 years; having a medical diagnosis of CKD; both sexes; presenting a level of alert awareness; ability to establish dialogue at the time of collection; and being on hemodialysis. Patients with cognitive impairment and unable to understand their participation in the research were excluded from the study. Participants were included in the study by invitation and explanation of the research objectives, signing the free and informed consent form; those who presented clinical instability at the time of collection were excluded. Data were collected by two nurses called diagnosticians, duly trained according to literature recommendations (Botelho, Correia, Manzoli, Costa, & Duran, 2019). Previous training of 16 hours was carried out for nurses with experience in the area, which consisted of workshops on the subjects that include the NP, the referred ND, and the data collection procedures. The training offered substrates to consolidate knowledge, guide the evaluations, and minimize the imperfect gold standard bias, considering that nursing does not have reference standards for the diagnostic process, since human responses cannot always be measured by specific devices (Lopes *et al.,* 2019). To minimize the impact by the absence of the gold standard and, thus, obtain an accurate diagnostic process, after training, nurses were subjected to an assessment of their ability to correctly infer ND by fictitious clinical histories (Botelho *et al.,* 2019). They were evaluated regarding the Hradesky parameters adapted for the classification of nurse evaluators in a clinical validation study for ND. The measures of effectiveness, false negative rate, false positive rate and trend were used, which, after evaluating the values obtained by each training participant, reached acceptable levels of score and were considered diagnosing factors (Botelho *et al.,* 2019; Hradesky, 1989).

The instrument used was constructed considering the contributing factors and signs and symptoms, as well as associated conditions for the occurrence of ND Excess Fluid Volume (00026), identified in the integrative review phase, with their conceptual and operational definitions. This instrument enabled the collection of data related to sociodemographic, psychosocial, clinical, biochemical, RF, AC, and DC variables by physical examination, anamnesis, and data collection available in the medical record. Initially, a pilot test was carried out with three patients so that the two diagnosticians could apply the instruments and solve any issues. The inference process took place by consensus, based on individual assessments. The data were stored in a database and descriptively analyzed using Excel® (2013). The statistical software *Statistical Analysis System* (SAS), version 9.4, was used to perform the statistical accuracy tests.

Regarding the characterization of patients, the data were analyzed using descriptive statistics and the elements of the ND were analyzed concerning the following accuracy measures: Sensitivity (Se), which represents the proportion of subjects with the ND for which the indicator is present; Specificity (Sp), which represents the proportion of subjects without ND for which the indicator is absent; Positive Predictive Value (PPV), which represents the percentage of people with the indicator when the ND is present; and Negative Predictive Value (NPV), which represents the percentage of people without the indicator when the ND is absent (Knottnerus & Buntinx,2009), considering values above 0.5 as relevant for discrimination power. At the time of the research proposal, as well as at the beginning of data collection, the RF and DC of the ND under study were considered as elements to be evaluated, according to NANDA-I version (2015-2017) (Herdman& Kamitsuru, 2014). During the study period, due to the publication of the new version of NANDA-I (2018-2020) (Herdman & Kamitsuru, 2018), it was decided to readjust the nomenclature of the elements that make up the ND. Thus, the element "Compromised Regulatory Mechanism," considered RF until then, started to be called AC. The study was approved under opinion number 1,996,822/2017 of the Research Ethics Committee of University of Campinas, considering the ethical recommendations provided for in resolution 466/12 of the National Health Council.

FINDINGS

The 127 patients evaluated in the study had a mean age of 55.7 years and a standard deviation (SD) of 13.1, ranging between 18 and 79 years; 59.8% (n=76) were male; 37.8% (n=48) self-declared as brown, 27.6% (n=35) white, 25.2% (n=32) black, and 9.4% (n=12) yellow.

Table 1. Prevalence of components of the Nursing Diagnosis Excess Fluid Volume (00026) in patients with Chronic Kidney Disease undergoing hemodialysis (n=127). Campinas-SP, Brazil, 2019

Components	n	%	P*
Related Factors			
Excessive fluid intake	79	62.20	0.62
Excessive sodium intake	72	56.69	0.56
Associated Conditions			
Compromised Regulatory Mechanism	126	99.21	0.99
Defining Characteristics			
Azotemia	125	98.42	0.98
Decreased hematocrit	115	90.55	0.90
Decreased hemoglobin	115	90.55	0.90
Change in blood pressure	84	66.14	0.66
Electrolyte imbalance	84	66.14	0.66
Intake greater than elimination	76	59.84	0.59
Jugular vein distention	57	44.88	0.44
Weight gain in a short period of time	53	41.73	0.41
Edema	46	36.22	0.36
Paroxysmal nocturnal dyspnea	43	33.85	0.33
Oliguria	41	32.28	0.32
Adventitious breath sounds	27	21.25	0.21
Orthopnea	19	14.96	0.14
Change in breathing pattern	18	14.17	0.14
Pulmonary congestion	16	12.59	0.12
Change in mental state	14	11.02	0.11
Dyspnea	11	8.66	0.08
Anxiety	8	6.29	0.06
Restlessness	2	1.57	0.01
Hepatomegaly	2	1.57	0.01
Pleural effusion	1	0.78	-

*Prevalence

Table 2. Accuracy measures of the components of the Nursing Diagnosis Excess Fluid Volume (00026) in patients with Chronic Kidney Disease undergoing hemodialysis (n=127). Campinas-SP, Brazil, 2019

Components	Se	Sp	PPV	NPV
Related Factors				
Excessive fluid intake	0.7327	0.8077	0.9367	0.4375
Excessive sodium intake	0.6238	0.6538	0.8750	0.3091
Associated Conditions				
Compromised regulatory mechanism	0.9901	-	0.7937	-
Defining Characteristic				
Azotemia	0.9802	-	0.7920	-
Decreased hematocrit	0.9604	0.3077	0.8435	0.6667
Decreased hemoglobin	0.9604	0.3077	0.8435	0.6667
Electrolyte imbalance	0.7129	0.5385	0.8571	0.3256
Intake greater than elimination	0.7129	0.8462	0.9474	0.4314
Change in blood pressure	0.7030	0.5000	0.8452	0.3023
Jugular vein distention	0.4653	0.6154	0.8246	0.2286
Short-term weight gain	0.4653	0.7692	0.8868	0.2703
Paroxysmal nocturnal dyspnea	0.4257	1.0000	1.0000	0.3095
Edema	0.3960	0.7692	0.8696	0.2469
Oliguria	0.3465	0.7692	0.8535	0.2326
Adventitious breath sounds	0.2673	1.0000	1.0000	0.2600
Orthopnea	0.1881	1.0000	1.0000	0.2407
Change in breathing pattern	0.1683	0.9615	0.9444	0.2294
Pulmonary congestion	0.1584	1.0000	1.0000	0.2342
Change in mental state	0.1287	0.9615	0.9286	0.2212
Dyspnea	0.1089	1.0000	1.0000	0.2241
Anxiety	0.0792	1.0000	1.0000	0.2185
Restlessness	0.0198	1.0000	1.0000	0.2080
Hepatomegaly	0.0198	1.0000	1.0000	0.2080
Pleural effusion	0.0099	1.0000	1.0000	0.2063
Anasarca	-	1.0000	-	0.2047
Presence of the third heart sound (S3)	-	1.0000	-	0.2047
Positive hepatojugular reflux	-	1.0000	-	0.2047

Sensitivity (Se); Specificity (Sp); Positive Predictive Value (PPV); Negative Predictive Value (NPV).

Regarding education, 57.5% (n=73) reported having incomplete elementary school, 13.4% (n=17) complete elementary school, 11% (n=14) had never studied and called themselves illiterate, 8.7% (n=11) complete high school, 4.7% (n=6), incomplete high school, 3.1% (n=4) complete higher education, and 1.6% (n=2), incomplete higher education. Declared they had a partner 55.12% (n=70) of participants and an average income of R$ 1,516.64, with a SD of R$ 1,400.70 and a median of R$ 998.00, ranging between R$ 0.00 and R$ 7,984.00. Regarding chronic diseases, in addition to CKD, according to the medical record, 40.2% (n=51) also had DM and SAH, 35.4% (n=45) only SAH, 18.9% (n=24) did not present any mentioned disease, and 5.5% (n=7) only DM. They had a mean of 39.51 months and a median of 27 months under dialysis. Concerning the daily duration of the HD session, 52.8% (n=67) underwent three and a half hours, 37.8% (n=48) four hours, and 9.4% (n=12) three hours of treatment. Of the 127 patients, 3.1% (n=4) had a history of previous unsuccessful transplants, 35.4% (n=45) had no urinary elimination, and the remaining were oliguric. The ND of Excess Fluid Volume (00026) was present in 79.5% (n=101) of the patients in the sample. Table 1 shows the prevalence of RF, AC, and DC of the ND under study, and Table 2 presents the diagnostic accuracy measures.

DISCUSSION

The sociodemographic profile found reflected findings from previous studies, such as one that aimed to identify complications in chronic renal patients undergoing hemodialysis and correlate them with sociodemographic and clinical factors. The average age of the patients evaluated in that study was 55 years old, showing that population aging can lead to an increase in the incidence of CNCDs (Tinôco *et al.,* 2017). The latest Brazilian Chronic Dialysis Survey showed that 42.6% of dialysis patients were in the age group between 45 and 64 years old (Neves *et al.,* 2020). The literature points out that a relevant risk factor for the occurrence of chronic diseases is the age group above 40 years. Regarding the study population, investigations show a decrease in the GFR of 0.08 ml/year from the age of 40, which denotes the vulnerability of these patients concerning the renal system, the electrolyte and metabolic imbalance and, consequently, the ability to maintain the body's homeostasis (Thomé *et al.,* 2019; Zatz, 2018). In addition, another study showed that the chance of developing CKD was 1.9% higher with each additional year of age (Pinho *et al.,* 2015). Studies have also shown similarity with the present research regarding brown ethnicity (Dos Santos, Silva, &Pierin, 2018), male predominance, married marital status, education and economic factor (Spigolon *et al.,* 2018; World Health Organization, 2018). The characteristics presented by the patients in this study, such as ethnicity, sex, education, and economic factor, can be considered contributing factors for the occurrence of CKD (Dos Santos *et al.,* 2018), since poverty increases the risk of developing diseases that may contribute to the occurrence of CKD , as well as low education level can make it difficult to understand measures for preventing CNCDs such as DM and SAH, the main causes of CKD. In addition, it can compromise the understanding of the limitations imposed by the disease and its complex treatment measures (World Health Organization, 2018).

The last Brazilian Chronic Dialysis Survey showed that 57% of dialysis patients in Brazil are male(Neves *et al.,* 2020). This may be due to the fact that men are more vulnerable to chronic diseases, especially SAH and DM, for several reasons, such as working hours, which minimize the time spent searching for health care, making them look less for health services (Dos Santos *et al.,* 2018). Regarding chronic diseases besides CKD, the coexistence of DM and SAH was also a finding in other studies, since these morbidities are known to remain the main underlying diseases of patients with CKD (Spigolon *et al.,* 2018; Thomé *et al.,* 2019; Neves *et al.,* 2020). Diabetic nephropathy constitutes an interstitial injury, which causes the impairment of the glomerular membrane, the weakening of mesangial cells and the extracellular matrix, by the inflammatory and fibrogenic response that evolves to the chronification of glomerular dysfunction and decreased GFR (Zatz, 2018). Data from the 2016 Brazilian census show that 30% of patients undergoing CKD

treatment have DM as the underlying disease. This rate is higher among patients beginning treatment, reaching 41%, numbers that are above some European countries and close to the numbers present in the North American population (44%) (Sesso *et al.,* 2017). In 2018, this rate reached 31%, showing an increase of 4 percentage points compared to previous years (2009-2018)(Neves *et al.,* 2020), which can be justified not only by the genetic factors for the occurrence of some diseases, but also by the unruly habits of modern society, which include the adoption of less healthy behaviors, such as inadequate diets and physical inactivity (Spigolon *et al.,* 2018). SAH, on the other hand, causes an increase in intraluminal hydrostatic pressure, which leads to tissue damage to glomerular vessels and, consequently, renal dysfunction sets in (Zatz, 2018). The latter is considered both a risk factor for the occurrence of CKD and a complication arising from the body's inability to excrete excess body fluids. The latest dialysis survey showed that 34% of patients have SAH as the underlying disease (Neves *et al.,* 2020). Regarding the prevalence of ND under study, 79.5% (n=101) of the evaluated patients had Excess Fluid Volume (00026) and some studies with the renal population showed similar findings (Debone *et al.,* 2017; Fernandes *et al.,* 2015; Grassi *et al.,* 2017; Dos Santos, Campelo, Dos Santos, & Da Silva, 2017), which corroborates what the literature points about renal patients and the accumulation of fluids. The various pathophysiological mechanisms already mentioned contribute to the imbalance of fluids, favoring their accumulation in the body, as well as the impairment of several vital functions, which cause important functional impairments and place these patients before the imminent risk of death. One must consider that the validation studies of ND have grown in Brazil in recent years, but privileging the analysis of DC. The scarcity of studies that present validation results with RF or AC motivated the proposal of this study. The evaluation of these indicators, considered as contributing elements for the occurrence of the human response, guided this investigation, which makes this study relevant to clinical practice.

Although RF and AC, considered as contributing to the occurrence of ND, that is, they are antecedents to the phenomenon, there is a direct correlation between RF, AC and DC, since they make up the phenomenon in its completeness. In addition, RF are the basis for nursing interventions and the more accurate they are, the better they will subsidize the choice of these interventions (Herdman & Kamitsuru, 2018). It is understood that studies on the accuracy of ND are essential for correct inference of the phenomenon. Thus, the recognition of diagnostic indicators (RF, AC and DC) with better predictive capacity for a given diagnostic concept allows nurses to be more precise in choosing and directing the interventions to be implemented, favoring the achievement of the expected results (Lopes *et al.,* 2019). The high prevalence of AC "Compromised regulatory mechanism" in the studied sample confirmed the results of a prevalence study with the referred ND and its elements, which identified this condition in 100% of the sample (Grassi *et al.,* 2017). The compromise of the body fluid regulation mechanism, which is maintained by an interaction between the entry and exit of liquids, the urine produced by the kidneys, the loss through the skin and lungs, as a result of the hydrostatic pressure inside the cell compartment and osmolarity within each compartment, has numerous consequences for the life of the patient with CKD. As the GFR decreases, the metabolic and hydroelectrolytic imbalance increases, leading to azotemia and uremia (Zatz, 2018). The literature points out that the creatinine measurement is a gold standard diagnostic test that presents excellent accuracy in the screening and control of CKD(Silva, Gómez, Lugon, &Graciano, 2016). Thus, an important data to be highlighted is the occurrence of the DC "Azotemia" in this study, which corroborates the result of another research conducted with patients on hemodialysis, in which this indicator was present in 100% of the sample (Fernandes *et al.,* 2015).

This indicator refers to a biochemical abnormality that is characterized by an increase in plasma urea and creatinine levels, and is closely linked to a decreased GFR(Kumar, Abbas, & Aster, 2015). This fact corroborates the impairment of the regulatory mechanism, previously reported, which can bring serious damage to the patient's life, since compromised regulatory mechanisms can generate the accumulation of fluids and toxic substances for the individual, causing problems in the different systems (Zatz, 2018). Biochemical abnormalities extend as laboratory data show the deficiency of other elements relevant to vital functions. Erythrocytes, responsible for carrying oxygen to the tissues, through the globin chains (alpha and beta), decrease as the renal function is compromised. The decrease in erythropoietin occurs due to the inability of the adrenal gland, therefore, erythropoiesis is compromised, causing limitations in cell production, either in quality or in quantity, increasing the number of reticulocytes and decreasing tissue perfusion, which characterizes anemia in the kidney disease. These changes can be evidenced in clinical practice by the DC "Decreased hematocrit" and "Decreased hemoglobin," which showed high prevalence and sensitivity in the sample of this study. Another study that sought to evaluate the accuracy measures of the referred ND in hemodialysis patients presented similar results regarding the "decreased hematocrit," DC present in 96% of the studied patients (Fernandes *et al.,* 2015). Anemia in CKD is, in general, asymptomatic and slowly established, which allows the patient to adapt "physiologically" to decreasing levels of red cells. In other words, signs and symptoms that would be present in the general population, bringing relevant discomforts, are difficult to detect for the renal patient, in view of the slow progression of the development of anemia (Ribeiro-Alves & Gordan, 2014). Regarding the DC "Electrolyte imbalance," present in most of the studied sample, it shows that the impairment of the regulatory mechanisms is installed and compromises body homeostasis. Thus, the degradation products that should be excreted in the urine accumulate, causing hypernatremia, hyperkalemia, and disturbance in the regulation of calcium and phosphorus, responsible for constant cramps and bone breakage, even if they originate from low impact trauma. In addition, electrolyte imbalance can cause hyperchloremia, hypermagnesemia, responsible for the loss of muscle reflexes, and values above 7.2 mg/dLcan lead to abnormalities in cardiac conduction, respiratory paralysis, and, consequently, loss of consciousness (CKD Work Group, 2013; Fischbach & Fischbach, 2016). Regarding the sensitive DC for the prediction of the ND under study, namely, "Decreased hematocrit," "Decreased hemoglobin," and "Alteration in blood pressure," it is worth mentioning that they are present regardless of the Excess Fluid Volume (00026), being intrinsic to CKD itself (Fernandes *et al.,* 2015). On the other hand, the DC "Intake greater than elimination," "Electrolyte imbalance," and "Alteration in blood pressure" are related to the result of prevalence and sensitivity of RF "Intake greater than elimination," and this denotes regional characteristics. Because it is a region with a dry climate, water management is compromised, favoring the accumulation of body fluid, which, due to the inability of regulatory mechanisms, leads to increased blood pressure.

In this sense, researches that deal with water overload call attention to the imminent risk of death of these patients (Fernandes *et al.,* 2015). The cardiovascular system is extremely affected by the increase in blood volume, which results in an overload on the heart, increased blood pressure, and, later, inefficiency of the cardiac pump, which can lead to heart failure and cerebrovascular dysfunctions[8-9,12]. The latest Brazilian Chronic Dialysis Survey drew attention to the high number of deaths in this population. The gross mortality rate was 19.5% in 2018(Neves *et al.,* 2020). Thus, it is important to emphasize the need for guidance by nurses and other professionals who work with these patients. Providing the patient with educational activities that deal with effective self-care measures in water control show significant results, as shown by a study developed in Lisbon with 254 patients undergoing dialysis (Cristóvão, 2015). Adherence to water control is directly linked to decreased interdialytic weight gain and, consequently, better laboratory results and control of blood pressure levels (Cristóvão, 2015). Still in this sense, the results regarding the prevalence and accuracy of the element "Excessive sodium intake" may show that behavioral patterns directly affect the occurrence of several complications. A study with renal patients showed that excessive sodium consumption predisposes excessive fluid intake by the very regulation mechanism of these elements (Cristóvão, 2015). Concerning dietary restriction, measures such as avoiding the use of

instant or ready-made foods (fast food) and avoiding the use of table salt were more frequent in the lifestyle and showed significant association for reducing interdialytic weight gain. In addition, the presence of family members in support of dietary restrictions, especially regarding food preparation, proved to be relevant concerning the effectiveness of self-care measures, showing awareness of the limitations imposed by CKD (Cristóvão, 2015). It should be noted that the absence of the elements in people without ND determines the specificity measure, and that such elements such as "Paroxysmal nocturnal dyspnea," "Adventitious respiratory sounds," "Orthopnea," "Pulmonary congestion," "Dyspnea," "Anxiety," "Restlessness," "Hepatomegaly," and "Pleural effusion" do not establish an exclusive relationship with the presented phenomenon, and can be evidenced as signs and symptoms of other ND. In addition, one must consider that the studied population consisted of patients undergoing hemodialysis, with an average treatment of 27 months, which justifies a certain control of the complications resulting from CKD and the absence of some signs and symptoms. As a limitation of the study, we highlight, among the elements evaluated, the impossibility of evaluating the element "Alteration in the specific gravity of the urine" due to the unavailability of results of urinalysis in the medical records of patients, since most of them do not present urinary elimination or were categorized as oliguric. Likewise, the indicators "Alteration in Pulmonary Pressure" (APP) and "increased Central Venous Pressure (CVP)" were not evaluated, since their measurement would only be possible from the presence of catheters used when the patient is hospitalized, mostly in a hospital environment.

CONCLUSIONS

The RF "Excessive fluid intake" and "Excessive sodium intake," AC "Compromised regulatory mechanisms," and DC "Azotemia," "Decreased hematocrit," "Decreased hemoglobin," "Intake greater than elimination," "Electrolytic imbalance," and "Alteration in blood pressure" presented relevant sensitivity measures for inferring the ND. It is known that sensitivity is the correct identification of the presence of a certain element in patients with the ND. Thus, from the results obtained, one can infer that such elements were considered predictors of the ND under study. This data instrumentalizes nurses about the possible manifestation of the ND Excess Fluid Volume (00026) in patients with CKD undergoing hemodialysis, and, above all, denotes a pattern of behavior regarding self-care measures. Thus, it is important to adopt strategies for proposing nursing interventions that address the population's awareness of the need for self-care, as well as awareness of the limitations imposed by the disease. This study can make the diagnostic inference of ND Excess Fluid Volume (00026) in chronic renal patients undergoing dialysis treatment more accurate. Results obtained through accuracy studies can contribute to nurses' decision-making and help their decisions in clinical practice. Nursing does not have instruments considered as a reference for inferring certain human responses. Thus, the results obtained can assist nurses in these inferences, by the precise identification of related factors (RF), associated conditions (AC), and defining characteristics (DC), of the increase in the volume of liquids, besides helping them to, subsequently, propose effective interventions to control complications from CKD and obtain the desired results.

Knowledge Translation: This study assists in the diagnostic inference of ND Excess Fluid Volume (00026) in the studied population, making this process accurate. In addition, it can assist nurses in identifying key elements in the occurrence of this human response and guide the care plan to be implemented.

REFERENCES

Almeida, M., Seganfredo, D., Barreto, L., & Lucena, A. (2014). Validation of indicators of the nursing outcomes classification for hospitalized adults at risk of infection. *Texto & Contexto - Enfermagem*, *23*(2), 309-317. https://doi.org/10.1590/0104-07072014003330012

Bossuyt, P., Reitsma, J., Bruns, D., Gatsonis, C., Glasziou, P., &Irwig, L. et al. (2015). STARD 2015: an updated list of essential items for reporting diagnostic accuracy studies. *BMJ*, h5527. https://doi.org/10.1136/bmj.h5527

Botelho, M. T. S.L., Correia, M. D. L.,Manzoli, J. P. B., Costa, P. C. P., & Duran, E.C. M. (2019). Capacitação de enfermeiros para coleta de dados em estudos de validação clínica de diagnóstico de enfermagem. In T. H. Herdman, A. A. Napoleπo, C. T. Lopes, & V. M. Silva (Eds.), *PRONANDA Programa de Atualização em Diagnósticos de Enfermagem: Ciclo 7* (pp. 135–174). Porto Alegre, Brazil: ArtmedPanamericana.

CKD Work Group. (2013). Clinical Practice Guideline for the Evaluation and Management of Chronic Kidney Disease (pp. 1-150). Retrieved from: https://kdigo.org/wp-content/uploads/2017/02/KDIGO_2012_CKD_GL.pdf

Cristóvão, A. (2015). Fluid and dietary restriction's efficacy on chronic kidney disease patients in hemodialysis. *Revista Brasileira De Enfermagem*, *68*(6), 1154-1162. https://doi.org/10.1590/0034-7167.2015680622i

Debone, M., Pedruncci, E., Candido, M., Marques, S., &Kusumota, L. (2017). Nursing diagnosis in older adults with chronic kidney disease on hemodialysis. *Revista Brasileira De Enfermagem*, *70*(4), 800-805. https://doi.org/10.1590/0034-7167-2017-0117

Dos Santos, A., Campelo, S., Dos Santos, W., & Da Silva, R. (2017). Nursing diagnoses in patientswithnephropathies. *Revista De Enfermagem Da UFPI*, *6*(4), 65. https://doi.org/10.26694/2238-7234.6465-69

Dos Santos., K., Lucas, T., Glória, J., Pereira Júnior, A., Ribeiro, G., & Oliveira Lara, M. (2018). Epidemiological profile of chronic renal patients in treatment. *Revista deEnfermagem UFPE On Line*, *12*(9), 2293. https://doi.org/10.5205/1981-8963-v12i9a234508p2293-2300-2018

Fernandes, M., Bispo, M., Leite, É., Lopes, M., Silva, V., & Lira, A. (2015). Diagnostic accuracy of the defining characteristics of the excessive fluid volume diagnosis in hemodialysis patients. *Revista Latino-Americana De Enfermagem*, *23*(6), 1057-1064. https://doi.org/10.1590/0104-1169.0380.2649

Fischbach, F., &Fischbach, M. (2016). *Exames laboratoriais e diagnósticos em enfermagem*. Grupo Gen - Guanabara Koogan.

Grassi, M., Dell'Acqua, M., Jensen, R., Fontes, C., & Guimarães, H. (2017). Diagnosis, results, and nursing interventions for patients with acute renal injury. *Acta Paulista De Enfermagem*, *30*(5), 538-545. https://doi.org/10.1590/1982-0194201700078

Herdman, T. H., &Kamitsuru, S. (Eds.). (2014). *NANDA international nursing diagnoses: Definitions and classification, 2015-2017*. Oxford, UK: Wiley- Blackwell.

Herdman, T. H., &Kamitsuru, S. (Eds.). (2018). *NANDA international nursing diagnoses: Definitions and classification, 2018-2020*. New York, NY: Thieme Publishing.

Hradesky, J. L. (1989). *Productivity & quality improvement: A pratical guide to implementing statistical process control*. New York, NY: McGraw-Hill.

Knottnerus, J. A., &Buntinx, F. (2009). *The evidence base of clinical diagnosis: Theory and methods of diagnostic research* (2nd ed.). Hoboken, NJ: Blackwell Publishing.

Kumar, V., Abbas, A., & Aster, J. (2016). *Robbins &Cotran Patologia - Bases Patológicas das Doenças*. Elsevier Health Sciences.

Lemes, M., &Bachion, M. (2016). Hemodialysis nurses rate nursing diagnoses relevant to clinical practice. *Acta Paulista De Enfermagem*, *29*(2), 185-190. https://doi.org/10.1590/1982-0194201600026

Lins, S., Leite, J., Godoy, S., Tavares, J., Rocha, R., & Silva, F. (2018). Treatment adherence of chronic kidney disease patients on hemodialysis. *ActaPaulista De Enfermagem*, *31*(1), 54-60. https://doi.org/10.1590/1982-0194201800009

Lopes, M. V. O., Silva, V. M., &Araujo, T. L. (2019). Métodos de pesquisa para validação clínica de conceitos diagnósticos. In T. H. Herdman& E. C. Carvalho (Eds.), *PRONANDA – Programa*

de atualização em Diagnóstico de Enfermagem – Conceitos Básicos (2nd ed., pp. 87–132). Porto Alegre, Brazil: Artmed Panamericana.

Malta, D., Bernal, R., Lima, M., Araújo, S., Silva, M., Freitas, M., & Barros, M. (2017). Noncommunicable diseases and the use of health services: analysis of the National Health Survey in Brazil. *Revista De Saúde Pública*, *51*(suppl 1). https://doi.org/10.1590/s1518-8787.2017051000090

Marinho, A., Penha, A., Silva, M., & Galvão, T. (2017). Prevalence of chronic renal disease among Brazilian adults: a systematic review. *Cadernos Saúde Coletiva*, *25*(3), 379-388. https://doi.org/10.1590/1414-462x201700030134

Neves, P., Sesso, R., Thomé, F., Lugon, J., & Nascimento, M. (2020). Brazilian Dialysis Census: analysis of data from the 2009-2018 decade. *Brazilian Journal Of Nephrology*, 42(2), 191-200.https://doi.org/2175-8239-JBN-2019-0234

Pinho, N., Silva, G., &Pierin, A. (2015). Prevalence and factors associated with chronic kidney disease among hospitalized patients in a university hospital in the city of São Paulo, SP, Brazil. *Jornal Brasileiro De Nefrologia*, *37*(1). https://doi.org/10.5935/0101-2800.20150013

Ribeiro-Alves, M., &Gordan, P. (2014). Diagnosis of anemia in patients with chronic kidney disease. *Jornal Brasileiro De Nefrologia*, *36*(1). https://doi.org/10.5935/0101-2800.2014s003

Sesso, R., Lopes, A., Thomé, F., Lugon, J., & Martins, C. (2017). BrazilianChronicDialysisSurvey 2016. *Jornal Brasileiro De Nefrologia*, *39*(3). https://doi.org/10.5935/0101-2800.20170049

Silva, A., Gómez, J., Lugon, J., & Graciano, M. (2016). Creatinine measurement on dry blood spot sample for chronic kidney disease screening. *Jornal Brasileiro De Nefrologia*, *38*(1). https://doi.org/10.5935/0101-2800.20160004

Spigolon, D., Teston, E., Souza, F., Santos, B., Souza, R., & Moreira Neto, A. (2018). Nursing diagnoses of patients with kidney disease undergoing hemodialysis: a cross-sectional study. *Revista Brasileira De Enfermagem*, *71*(4), 2014-2020. https://doi.org/10.1590/0034-7167-2017-0225

Thomé, F., Sesso, R., Lopes, A., Lugon, J., & Martins, C. (2019). Brazilian chronic dialysis survey 2017. *Brazilian Journal Of Nephrology*, *41*(2), 208-214. https://doi.org/10.1590/2175-8239-jbn-2018-0178

Tinôco, J., De Paiva, M., Lúcio, K., Pinheiro, R., De Macedo, B., & Lira, A. (2017). Complications in patients with chronic renal failure Undergoing hemodialysis. *CogitareEnfermagem*, *22*(4). https://doi.org/10.5380/ce.v22i4.52907

World Health Organization. (2018). Noncommunicable diseases country profiles 2018. World Health Organization. Retrieved from: https://www.who.int/nmh/publications/ncd-profiles-2018/en/

Zatz, R. (2018). Patogênese e Fisiopatologia da Doença Renal Crônica. In M. Riella, *Princípios da Nefrologia e Distúrbios Hidroeletrolítico* (6th ed.). Guanabara Koogan.

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