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Classification tree for the inference of the nursing diagnosis *Fluid Volume Excess (00026)**

Árvore de classificação para inferência do diagnóstico de enfermagem *Volume de Líquido Excessivo (00026)*

Árbol de clasificación para la inferencia del diagnóstico de enfermería *Volumen de Líquido Excesivo (00026)*

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ABSTRACT

Objective: To generate a Classification Tree for the correct inference of the Nursing Diagnosis Fluid Volume Excess (00026) in chronic renal patients on hemodialysis. **Method:** Methodological, cross-sectional study with patients undergoing renal treatment. The data were collected through interviews and physical evaluation, using an instrument with socio-demographic variables, related factors, associated conditions and defining characteristics of the studied diagnosis. The classification trees were generated by the Chi-Square Automation Interaction Detection method, which was based on the Chi-square test. **Results:** A total of 127 patients participated, of which 79.5% (101) presented the diagnosis studied. The trees included the elements "Excessive sodium intake" and "Input exceeds output", which were significant for the occurrence of the event, as the probability of occurrence of the diagnosis in the presence of these was 0.87 and 0.94, respectively. The prediction accuracy of the trees was 63% and 74%, respectively. **Conclusion:** The construction of the trees allowed to quantify the probability of the occurrence of Fluid Volume Excess (00026) in the studied population and the elements "Excessive sodium intake" and "Input exceeds output" were considered predictors of this diagnosis in the sample.

DESCRIPTORS

Decision Trees; Decision Making; Nursing Diagnosis; Renal Insufficiency, Chronic; Classification; Validation Study.

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INTRODUCTION

The diagnostic process involves a high degree of technical and scientific knowledge, as it is a complex procedure that uses human cognition to formulate, based on a set of data, hypotheses and possibilities about the occurrence or not of a phenomenon[1]. In nursing practice, this concept has been used since the 1970s, when the Nursing Diagnosis (ND) stage was introduced in the Nursing Process (NP)[2]. The ND phase, represented by the NANDA-International (NANDA-I), is the clinical judgment of the data collected from individuals, which allows an accurate identification of the diagnostic concepts that best represent the human response to a health and disease process of a person, family or community[1].

In this sense, the decision making process of the nurse requires precise clinical reasoning, so that the inference of the diagnosis can have a high degree of accuracy, which is essential for developing a safe and effective care plan[3]. However, there are several challenges in this process. The difficulties reported by nurses show that an excessive number of patients, excess of activities, lack of time, understaffing, lack of awareness among the team and lack of knowledge and experience with the use of the classification are factors that interfere in the diagnosis process. In addition, in some situations, several NDs have common elements, which hinders the selection of a diagnosis with the necessary accuracy[4].

Considering that patients with Chronic Kidney Disease (CKD) have several signs and symptoms and that many of these clinical indicators are associated with similar ND, errors in the inference of the diagnosis can compromise the care plan and lead to unsatisfactory results, impairing the nursing practice[5]. Therefore, it is important to have an accurate diagnostic process that reflects the real situation, giving the patient the possibility of receiving adequate treatment, both regarding time and quality, and preventing other complications and death[6].

Aiming to enhance the diagnostic process, ND validation studies attempt to refine the classifications and consolidate this knowledge based on results with specific populations[7]. This includes the use of strategies that help identifying clinical indicators that characterize the phenomenon presented by patients, making clinical reasoning and decision making more accurate[5].

The literature points out several methods for validating ND. One of these is an advanced method called Classification Trees (CT), which refers to the construction of graphic models based on computer algorithms, which allow a clearer and more precise view of the decision possibilities in situations with multiple courses of action[7]. CT are based on conditional probabilities and can assist in the identification and/or prediction of the presence or absence of a specific ND, based on a set of elements/indicators[5,7-8]. CT are the result of an ordered sequence of questions/inferences and depend on the answers to the previous questions. The process ends when an outcome is obtained, which, in this context, is the presence or absence of the ND under study[5].

The CT is constructed from the top down and its structure has elements called nodes, which guide the decision. The model starts with the root node (top), which is the starting point of a CT and represents an event related to the subject under study, located at the top of the tree. After the root node comes the decision nodes, which can be non-terminal or terminal nodes. The non-terminal node is divided into child nodes. That division is determined by a condition and means that there was no outcome. The terminal node, also called the leaf node, does not split into more nodes, and represents an outcome/event[5,9].

The ramifications of the CT represent decisions, according to each predictor of the event, all leading to a final classification[9]. This result is possible using algorithms based on heuristic problem-solving methods. Among the various computer algorithms referenced in the literature, the Chi-Square Automation Interaction Detection (CHAID), which is based on the Chi-square test, had a better adjustment when compared to other similar methods. This was demonstrated in a study that used CT to identify the Defining Characteristics (DC) with the best predictive power for the inference of Ineffective Airway Clearance (00031) in children with acute respiratory infection[5].

The use of the CT in the diagnostic process is one more instrument to improve the outcomes and enhance diagnosis inference. A study that used the CT to select the position of the venous access in children with kidney tumors showed that the use of the method can guide clinical decisions in an easy and reliable way and minimize the probability of a patient being exposed to unnecessary placement and removal of accesses[10]. Thus, it is understood that the results of studies that use CT, an advanced methodology, associated with other factors, can improve clinical practice and its organization, minimize errors and costs and enhance the quality of care and patient outcomes[5,8].

In this sense, in situations with numerous and frequent complications, as is the case of CKD, the assessment and inference of the phenomena presented by these patients must be accurate, so that the care provided is effective, considering the different consequences that this condition can bring to the kidney patient[11].

The inability to remove excess water and blood residues favors the accumulation of fluid, a phenomenon classified by NANDA-I as the ND Fluid Volume Excess (00026), defined as "surplus intake and/or retention of fluid"[1]. This diagnosis has been frequently attributed to kidney patients by professionals who provide care[12-14]. A study identified the most frequent ND in CKD patients undergoing hemodialysis and the concept investigated was present in 100% of the patients studied[12].

Studies that investigate the presence of this ND and its elements can help nurses to identify the concept with greater accuracy. In addition to the prevalence of this ND, understanding which clinical indicators have been validated in specific populations can help nurses understand the human response, its determinants, and defining characteristics. Therefore, it can support nursing care planning[12-15].

Similarly, a history of excessive sodium and fluid intake and defining characteristics such as alterations in blood pressure, in mental status and in respiratory pattern, azotemia, electrolyte imbalance, dyspnea, edema, decrease in hematocrit and in hemoglobin, oliguria, adventitious breath sounds, among others, are observed in clinical practice and can cause severe damage to the patient's life[1,13]. Thus, the recurrence of the condition in these patients can lead to numerous complications, which include acute pulmonary edema, fluid overload and, consequently, circulatory overload, which can reduce the efficiency of the heart pump, resulting in congestive heart failure and systemic arterial hypertension, as well as coronary disease and cerebrovascular conditions[11-12].

It is important that the nurse recognizes these complications in the patients under their care, so that the care plan can assist in their recovery. This condition requires specific care directed to the real needs of these patients. Aiming to enhance the diagnostic process conducted by the Nurse, the objective of the present study was to generate a CT for the correct inference of the ND Fluid Volume Excess (00026) in chronic kidney patients undergoing hemodialysis.

METHOD

Study type

Cross-sectional methodological study, considered the third stage of a validation study[7].

Setting

The study was carried out in a kidney treatment clinic, located in a city in the Center-West region of Brazil.

Sample definition

The sample was calculated using a finite population sampling, aiming to estimate the proportion of patients with CKD seen at a HD clinic with the ND Fluid Volume Excess (00026). In the sample calculation, a proportion equal to p=0.50 was considered. This value represents the maximum variability of the binomial distribution, which generates an estimate with the largest possible sample size.

For the sample calculation, a population of 189 patients who were being treated at the clinic during the data collection period was considered. The sampling error was 5% and the level of significance was set at 5%[7]. The total sample was composed of 127 patients.

Selection criteria

The patients were selected for convenience according to the criteria: being at least 18 years old; having a medical diagnosis of CKD; both genders; having an alert level of awareness; ability to establish dialogue at the time of collection; and being on hemodialysis. Patients with cognitive impairment and clinical instability at the time of data collection and those who were unable to understand their participation in the study were excluded.

Data collection

Data collection and diagnosis inference were conducted by two trained nurses[16]. This training lasted 16 hours and covered CKD, NP, ND and data collection procedures. Nurses were assessed on their ability to correctly select a ND through hypothetical clinical histories[16], and subsequently evaluated in relation to Hradesky's parameters[16], which were adapted to assess the classification of the evaluating nurses in a validation study on ND. Nurses who obtained acceptable scores in relation to the measures of effectiveness (0.90 or greater), false negative rate (0.05 or less), false positive rate (0.02 or less) and trend (0.80 to 1.20) were considered diagnosticians[16].

An initial pilot test with three patients was carried out, so that the two diagnosticians could apply the instruments and clear up any questions. Data was collected from January to June 2018, through physical examination, anamnesis, direct/clinical observation, evaluation of laboratory and imaging tests and clinical and socio-demographic data available in the medical record. The instrument used for data collection was elaborated considering the elements in the ND Fluid Volume Excess (00026) and its conceptual and operational definitions found in the integrative review phase. The inference process of the diagnosis was determined by absolute agreement between the diagnosticians.

Data analysis and treatment

The data referring to the characterization of the patients were analyzed by descriptive statistics using the *Software Excel®* (2013). The software Statistical Package for Social Sciences (SPSS) version 22.0 was used to create the CT, using the CHAID algorithm, which is based on the Chi-square test and aims to detect interactions between variables[8].

Thus, the independent variables (elements of the ND) that had greater interaction with the dependent variable (ND) were selected at each node of the CT to determine the diagnostic prediction. In this case, the ND is the outcome variable, classified as present or absent, and Related Factors (RF), Associated Conditions (AC) and DC are the predictor variables for the event. The cross-validation method was used to check the structure quality of the CT[7].

Ethical aspects

This study followed the precepts of Resolution no. 466, of December 12, 2012, of the National Health Council and was approved by the Unicamp Research Ethics Committee protocol 1.996.822/2017. All participants were aware of the research objectives and signed the Informed Consent Form.

RESULTS

The 127 patients had a mean age of 55.7 years, standard deviation (SD) of 13.09 and age varying between 18 and 79 years, 59.8% (n=76) were male and 55.12% (n=70) reported living with a partner. According to the medical records, in addition to CKD, 40.15% (n=51) of patients also had Diabetes Mellitus (DM) and Systemic Arterial Hypertension (SAH), 35.43% (n=45) had SAH, 18.89% (n=24) did not have any of these conditions, and 5.51% (n=7) had DM.

Patients had been on hemodialysis for a mean of 39.51 months and a median of 27 months. Sessions occurred three times a week and lasted three and a half hours for 52.75% (n=67) of patients, four hours for 37.79% (n=48) of patients, and three hours for 9.44% (n= 12) of patients. Of the total of patients, 35.43% (n=45) had no urine output, being categorized as anuric, and the rest were oliguric.

The ND Fluid Volume Excess (00026) was present in 79.5% (n = 101) of the patients. The trees generated with the CHAID method had three nodes, of which two were terminal nodes and one was a depth level, including the most significant RF for the occurrence of the ND under study, "Excessive sodium intake" (p-value <0.011) and the DC "Intake exceeds output" (p-value <0.001), as shown in Figures 1 and 2.

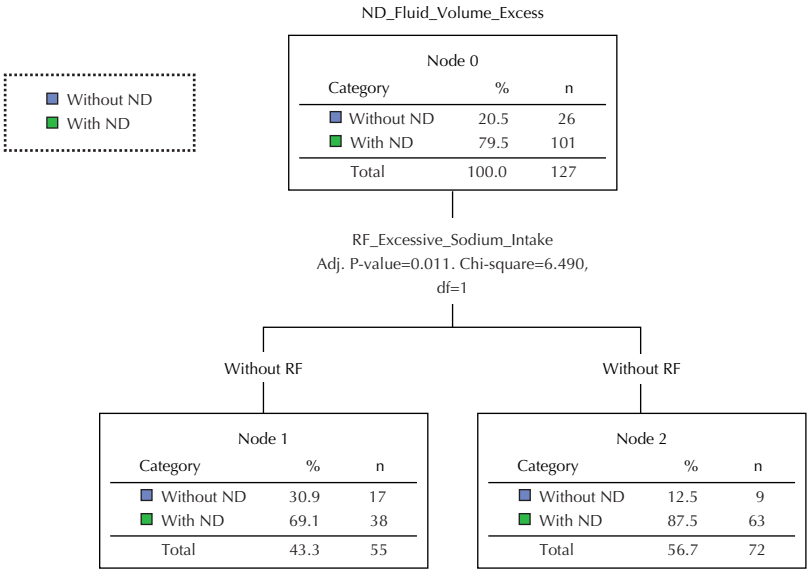

Figure 1 – Decision tree generated with the Related Factor Excessive sodium intake for the Nursing Diagnosis Fluid Volume Excess (00026) using the Chi-Square Automation Interaction Detection method and the Chi-square test.

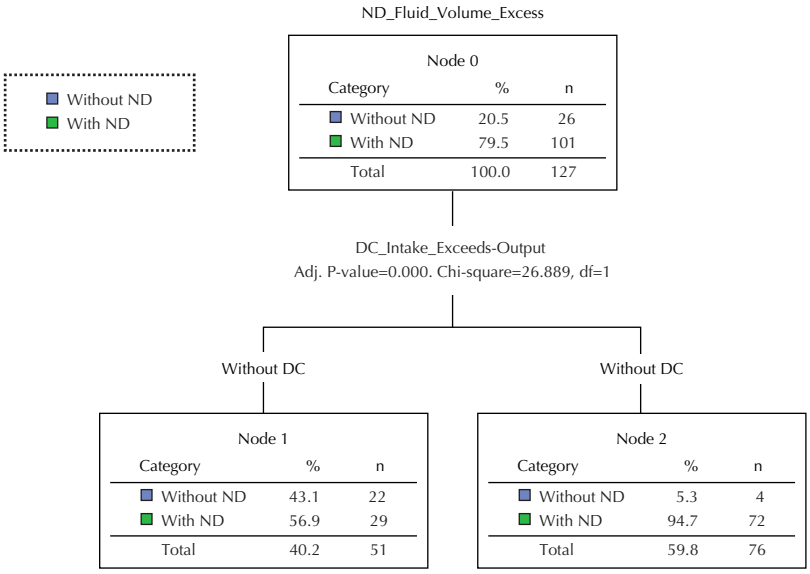

Figure 2 – Decision tree generated with the Defining Characteristic Intake exceeds output for the Nursing Diagnosis Fluid Volume Excess (00026) using the Chi-Square Automation Interaction Detection method and the Chi-square test.

The correct percentages of prediction of the CT, using cross-validation, were 63% and 74%, respectively, and are described in Tables 1 and 2.

Table 1 – Prediction of Classification Trees for the Nursing Diagnosis Fluid Volume Excess (00026) with the element Excessive sodium intake generated by the Chi-Square Automation Interaction Detection method – Sinop, MT, Brazil, 2018.

Classification		Predicted		
		Present	Absent	Correct Percentage
Observed	Present	63	38	62.4%
	Absent	9	17	65.4%
	Total	56.7%	43.3%	63%

Note: (n=127).

Table 2 – Prediction of Classification Trees for the Nursing Diagnosis Fluid Volume Excess (00026) with the element Intake exceeds output generated by the Chi-Square Automation Interaction Detection method – Sinop, MT, Brazil, 2018.

Classification		Predicted		
		Present	Absent	Correct Percentage
Observed	Present	72	29	71.3%
	Absent	4	22	84.6%
	Total	59.8%	40.2%	74%

Note: (n=127).

DISCUSSION

The socio-demographic data found are similar to the profile of hemodialysis patients in Brazil, with 42.6% of the patients between 45 and 64 years old[17]. Another study that sought to correlate the complications in chronic kidney patients undergoing hemodialysis with socio-demographic and clinical factors found a mean age of 55 years[11]. In this sense, the Brazilian Society of Nephrology warns that being above 40 years is a relevant risk factor for the occurrence of chronic diseases, since there is a decrease in GFR of 0.08 ml/year after 40 years old, making the person vulnerable to electrolyte and metabolic imbalances[18-19]. Other studies have also shown similar results in relation to the predominance of men[6,18,20-22].

Current studies show that the patients with CKD also have DM and SAH, which are considered the main underlying diseases in patients with CKD[6,17-18]. The glomerular lesion caused by diabetic nephropathy impairs the Glomerular Filtration Rate as it weakens the mesangial cells and the extracellular matrix. This situation occurs due to the inflammatory and fibrogenic responses, which, over time, progress to chronicity[23].

SAH, on the other hand, causes an increase in intraluminal hydrostatic pressure, which leads to tissue damage in the glomerular vessels and, consequently, to renal dysfunction[23]. The latter is considered both a risk factor for the occurrence of CKD and a complication associated with the inability to excrete excess fluid. The latest hemodialysis survey showed that 34% of patients had SAH as the underlying disease[17]. Both pathologies contribute to the reduction in the GFR, which increases the metabolic and electrolyte imbalance and leads to azotemia and uremia[24].

The duration of treatment was similar to that found in a study on the accuracy of the DC of the ND Fluid Volume Excess (00026) in patients undergoing hemodialysis, in which the median duration of dialysis treatment was 28 months for most of the evaluated patients[14]. Regarding the prevalence of ND Fluid Volume Excess (00026), most of the patients evaluated in this study had a human response, similar to other studies with the same population[12-14], reinforcing the relationship between the renal patient and the accumulation of fluid.

Fluid Volume Excess is related to the pathophysiological mechanisms that regulate body fluids and lead to fluid imbalance in this chronic condition. This condition affects the vital functions, has numerous consequences for patients, compromises the quality of life and increases the risk of death[24]. In this sense, research on fluid overload highlights this risk[14], as the cardiovascular system is extremely affected by the increase in blood volume. Overloading the heart leads to high blood pressure, inefficient heart pump and cerebrovascular dysfunction[11-12,23].

In the context of this population, the elements "Excessive sodium intake" and "Intake exceeds output" are significative for the ND under study, considering the probability of the occurrence of the outcome event when these elements are present. Therefore, they were considered predictors of this ND. This result, obtained through an advanced methodology, can support the clinical judgment of the nurse when selecting this diagnosis. This finding also shows that, unlike the traditional method that uses relative frequencies and absolute numbers, used in studies with ND, the advanced method makes diagnosis inference more accurate in the context of the population studied, regardless of the number of elements (RF, AC and DC) validated or that predict the outcome[7].

Nurses can benefit from these results in their work, as they can improve their praxis. When the CT is pruned giving rise to the terminal node, it is possible to observe that the presence of the RF "Excessive sodium intake" and the DC "Intake exceeds output" determine the probability of occurrence of the ND Fluid Volume Excess (00026) in 87.5% and 94.7% respectively. Therefore, these indicators are important predictors of the phenomenon, given the characteristics of the studied population.

The percentages of correct prediction of the CT using cross validation showed similarities between what was observed in the sample and the classification of the tree in the validation process with the subsamples. Similar classifications refer to two different situations: the proportion of patients with the ND and for whom the elements "Excessive sodium intake" and "Intake exceeds output" are present and the proportion of patients without the ND for whom the elements are missing. This process determines the quality of the CT structure and predicts if it can be used in a generalized way[7].

NANDA-I considers that RF are variables that influence the occurrence of a given diagnosis and DC are clinical evidence that describe the data observed in patients who do

present a certain phenomenon. These elements are related since RF contribute directly to the occurrence of the DC[1]. In this context, and considering the results obtained in the CT, the literature points out that the excessive intake of sodium predisposes the patient to excess fluid intake. This is associated with the mechanism of regulation of these elements, and this behavioral pattern directly influences the human response[20].

The treatment proposed to these patients is complex and requires a change in their daily routine. In this context, many patients are unable to follow the recommended water and dietary restrictions[20-21,25]. The treatment requires a lot of effort from patients, and factors such as dietary preferences, economic status, level of education, behavior, social status, religious beliefs, and subjective issues can influence this process[26].

A study that evaluated treatment adherence among renal patients showed that 56.4% were not able to avoid certain non-recommended foods, and when asked about difficulties to follow water restriction, 55.1% reported they were not successful in this task[20]. This fact is associated with the high and increasing mortality rates in this population[20], which in 2017 was 19.9%, with an absolute number of deaths of 25,187 patients[17].

The same indicators were present in the results of studies on the prevalence of the elements in the ND Fluid Volume Excess (00026) in patients undergoing hemodialysis[13,27]. The RF "Excessive sodium intake" showed a prevalence of 100% in the studied population[27] and the DC "Intake exceeds output" showed a prevalence above 50% in both studies[13,27]. Both were considered relevant indicators for this diagnosis, which corroborates the current findings.

The *International Society of Nephrology* recommends that sodium intake does not exceed 2g/day, which corresponds to between 5g and 6g of sodium chloride[28]. Values above the recommended characterize an excessive intake and this behavior is directly associated with risk markers of cardiac events, such as high blood pressure, and progression of CKD, due to the increase in Interdialytic Weight Gain (IDWG). In contrast, the decrease in sodium intake has positive effects, improving these indicators[25].

As for fluid management, it is recommended to ingest up to 500ml of fluid above diuresis[29]. Anuric and oliguric patients have difficulty managing this recommendation[20]. This influenced the results of this study regarding fluid management, as 100% of the sample was anuric/oliguric.

A study showed that adherence to fluid and dietary control is directly associated with a decrease in IDWG and, consequently, with better laboratory results and blood pressure control[20]. The nurse has a fundamental role in this process. Assessing how these patients understand their chronic condition and how they deal with the treatment is important for the development of strategic measures to encourage self-care. In the study population, the nurse's guidance should address effective self-care measures in fluid and dietary control. This activity showed significant results in a study developed in Lisbon with patients undergoing hemodialysis[20].

Results showed that, in most cases, individuals adhere more frequently to dietary restrictions (salt reduction), and less frequently to fluid control[20]. As the sample of the present study is located in a region close to the biomes of the Cerrado and the Amazon Forest, the climatic characteristics are a disadvantage to fluid management due to the high temperatures and dry weather most of the year.

The study carried out in Portugal also assessed the frequency and effectiveness of fluid and dietary restrictions in chronic kidney disease patients on HD and showed that the complications resulting from CKD were less frequent among the patients who adhered to the care measures (no instant or ready-made foods, no salt in the table, no spicy meals and no meals with excessive water, not exceeding the daily fluid recommendation, no alcohol). Adherence to care measures was also statistically associated with the decrease in the IDWH. In contrast, patients with behaviors such as drinking cold fluids and controlling fluid restriction according to symptoms had higher IDWH[20].

Furthermore, the support of family members in dietary restrictions, especially with regard to food preparation, proved to be relevant to the effectiveness of self-care measures, showing awareness of the limitations imposed by CKD[20]. All of these guidelines should be considered when developing educational activities for patients with the same chronic condition. The complications associated with excess fluid intake can be minimized with proper guidance provided by the nursing team on the importance of adhering to fluid and dietary restrictions.

The importance of this nursing care was demonstrated in a study with this population. The results showed that measures such as avoiding sun exposure, spicy foods, foods with excessive water and very sweet foods were frequent and efficient in the fluid control of patients in the study sample. These positive results in relation to self-care measures and low IDWG were attributed to the knowledge of patients about these measures, considering that only 3.9% of the sample did not manage fluid restrictions[20]. This fact corroborates the understanding that continuous guidance by the health care team is effective for changing behaviors related to the treatment prescribed for this population.

As a limiting factor, it is worth noting that, among the elements in the ND studied, it was not possible to evaluate the indicator "Alteration in urine specific gravity" due to the unavailability of urinalysis results in the patients' records, as most patients were oliguric or had no urine output. Likewise, the elements "Alteration in Pulmonary Artery Pressure (PAP)" and "Increase in Central Venous Pressure (CVP)" were not evaluated, as their measurement would only be possible using invasive catheters in a hospital environment.

Another relevant fact is the scarcity of studies that used CT for diagnosis inference in nursing, especially with the studied diagnosis, which made it impossible to compare the results of this research. On the other hand, this fact makes this study relevant for professional practice and indicates a proposition to conduct other studies with the same clinical validation method.

CONCLUSION

The tree generated by the CHAID method showed that the RF "Excessive sodium intake" was strongly related to the

occurrence of the ND Fluid Volume Excess (00026), since the probability of occurrence of the ND in the presence of this element was 87.5%. The DC "Intake exceeds output" had a high predictive power for the ND under study, since it showed 94.7% of correct prediction of the ND.

This result points out that, in the studied sample, the behavior pattern can influence fluid accumulation and highlights the need for strategic health education proposals that address the population's awareness on the need for self-care and on the limitations imposed by the disease.

These activities may help controlling complications of CKD associated with inappropriate adherence to treatment, as the situation experienced by patients with CKD requires a high degree of care and self-care. Thus, studies addressing educational strategies for this population should be carried out.

The use of algorithms and graphic models can contribute to decision making in nursing and help nurses in their clinical decisions. The results obtained can assist nurses in these decisions, by the precise identification of determinants (RF) and defining characteristic (DC) elements of the increase in fluid volume. In addition, these results can help nurses to propose effective interventions to achieve the outcomes desired.

RESUMO

Objetivo: Gerar Árvore de Classificação para correta inferência do Diagnóstico de Enfermagem Volume de Líquido Excessivo (00026) em pacientes renais crônicos hemodialíticos. **Método:** Estudo metodológico, transversal, com pacientes em tratamento renal. Os dados foram coletados por meio de entrevista e avaliação física, utilizando instrumento com variáveis sociodemográficas, fatores relacionados, condição associada e características definidoras do Diagnóstico estudado. As árvores de classificação foram geradas pelo método *Chi-Square Automation Interaction Detection*, que se baseou no teste do Qui-quadrado. **Resultados:** Participaram 127 pacientes. Apresentaram o referido diagnóstico 79,5% (101), e as árvores incluíram os elementos "Ingesta excessiva de sódio" e "Ingestão maior que a eliminação" significativos para ocorrência do evento. Os pacientes com esses indicadores tiveram probabilidade de apresentar o diagnóstico de 0.87 e 0.94, e a capacidade de predição das árvores foi de 63% e 74%, respectivamente. **Conclusão:** A construção das árvores permitiu quantificar a probabilidade de ocorrência de Volume de Líquido Excessivo (00026) na população estudada. Os elementos "Ingesta excessiva de sódio" e "Ingestão maior que a eliminação" foram considerados preditores do referido diagnóstico na amostra.

DESCRITORES

Árvores de Decisões; Tomada de Decisões; Diagnóstico de Enfermagem; Insuficiência Renal Crônica; Classificação; Estudo de Validação.

RESUMEN

Objetivo: Generar un Árbol de Clasificación para la inferencia correcta del Diagnóstico de Enfermería Volumen de Líquido Excesivo (00026) en pacientes renales crónicos que hacen hemodiálisis. **Método:** Se trata de un estudio metodológico transversal con pacientes en tratamiento renal. Los datos se recogieron mediante entrevistas y evaluación física, utilizando un instrumento con variables sociodemográficas, factores relacionados, condición asociada y características definidoras del diagnóstico estudiado. Los árboles de clasificación se generaron por el método Detección de Interacción Automática del Chi-cuadrado, basado en la prueba del Chi-cuadrado. **Resultados:** Participaron 127 pacientes, de los cuales el 79,5% (101) presentaba el diagnóstico mencionado; los árboles incluían los elementos "Ingestión excesiva de sodio" e "Ingestión superior a la eliminación", ambos significativos para el acaecimiento del evento. Los pacientes con estos indicadores tenían probabilidades de presentar el diagnóstico de 0,87 y 0,94, y la capacidad de predicción de los árboles era del 63% y 74%, respectivamente. **Conclusión:** La construcción de los árboles ha permitido cuantificar la probabilidad del acaecimiento del Volumen de Líquido Excesivo (00026) en la población estudiada. Los elementos "Ingestión excesiva de sodio" e "Ingestión superior a la eliminación" están considerados como premonitores del referido diagnóstico en la muestra.

DESCRIPTORES

Árboles de Decision; Toma de Decisiones; Diagnóstico de Enfermería; Insuficiencia Renal Cónica; Clasificación; Estudio de Validación.

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