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REVIEW

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Content Analysis of the Diagnostic Proposition Risk of Excessive Fluid Volume in Hemodialysis Patients

Análise de Conteúdo da Proposição Diagnóstica Risco de Volume de Líquidos Excessivo em Pacientes em Hemodiálise

Análisis de Contenido de la Proposición Diagnóstica Riesgo de Volumen de Líquidos Excesivo en Pacientes sometidos a Hemodiálisis

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ABSTRACT

Objective: To analyze the content of the diagnostic proposition risk of excessive fluid volume in patients undergoing hemodialysis. **Method:** Content validity study, with 48 judges who assessed the content of the diagnostic proposition risk of excessive fluid volume, using an electronic data collection instrument. The judges' answers were analyzed through the calculation of the Content Validity Index and the T test. **Results:** The risk of excessive fluid volume was considered adequate, containing 23 risk factors: increased sodium concentration in the dialysate; missing hemodialysis sessions; insufficient water; low self-efficacy for fluid restriction; deficient knowledge; altered body mass index; excessive intake of fluids, proteins and sodium; lower kt/v index; inadequate removal of fluids in hemodialysis; thirst; xerostomia; older people; comorbidities; renal function decline; decreased urinary volume; inflammatory status; hospitalization; low serum level of albumin and lymphocytes, and high level of phosphorus; and use of antihypertensive drugs. **Conclusion:** The content of the diagnostic proposition risk of excessive fluid volume was considered adequate by the judges.

DESCRIPTORS

Nursing; Validation Study; Renal Dialysis.

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INTRODUCTION

Hemodialysis is a procedure performed using a dialysis machine and a filtration system aimed at removing excess fluid gain and nitrogenous excreta, to allow the proper body functioning of patients with chronic end-stage renal disease[1].

Despite being a good alternative therapy, most patients on hemodialysis start accumulating fluids[2]. The effects of this volume overload are associated with an increased risk of morbidity and mortality[3]. Fluid overload is significantly associated with poor sleep quality, hypertrophy and/or heart failure, restrictive and obstructive respiratory abnormalities, such as hypertension and/or pulmonary edema, in patients on hemodialysis[2,4–5].

Based on this perspective, in nephrology, fluid overload appears as one of the most important and modifiable risk factors for mortality in dialysis patients[6]. However, despite the highlighted focus on fluid volume in recent years, volume control remains a major challenge for patients and health care professionals[7]. In this regard, the prevention of fluid overload and complications related to this problem is essential. Therefore, the identification of the main risk factors for this problem is an essential step to take.

In the taxonomy of NANDA International[8], it is possible to find diagnoses related to fluid overload, namely: excessive fluid volume and risk of unbalanced fluid volume. Excess fluid volume is defined as fluid retention; therefore, the problem is already present. In this case, the nurse would not be able to estimate the risk for the development of excess fluid in hemodialysis patients. In contrast, the risk of unbalanced fluid volume refers to the susceptibility to fluid increase or decrease within body compartments. This can lead to confusion, as it does not point to which side the imbalance is, or it induces the nurse to use a titration directed to different conditions when the patient only shows imbalance towards excess, as in the case of the chronic kidney disease patient on hemodialysis. In this case, terms that do not generate doubts about the problems or vulnerabilities found in patients shall be used in the nursing taxonomies.

Thus, to enhance the nursing professionals' knowledge on clinical practice, to support and to refine the terms described in the diagnostic classification of NANDA International, the diagnostic proposal of this study intends to validate a diagnosis that exposes the risk factors capable of increasing the susceptibility of patients on hemodialysis to excessive isotonic fluid retention.

Studies on content analysis of nursing diagnostic proposals emerge as indispensable resources for the improvement of nursing terminologies[9], aiming at supporting the nurses' work process and at facilitating the inference of nursing problems in clinical practice. Thus, this article aims to analyze the content of the diagnostic proposition risk of excessive fluid volume in patients undergoing hemodialysis.

METHOD

Design of Study

This is a methodological study of content analysis, using the collective wisdom model. In this method, the set of judges can range from nurses experienced in clinical practice to undergraduate students with theoretical knowledge on the subject. Despite the judges' varied level of proficiency, the high number of judges adopted most often prevents possible errors[10–11].

Population, Sample Definition and Selection Criteria

To calculate the sample size of judges participating in the content validation, the following formula was used:

$$n_0 = \left(\frac{Z_{1-\alpha/2} \cdot S}{e}\right)^2$$

$Z_{1-\alpha/2}$ represents the confidence level, with a value of 95% (1.96) being used; the S is equivalent to the standard deviation, in which the value of 0.17 was considered for the calculation, and the sampling error (e) was 5%. Given these values, the sample size was 45 judges. However, this sample size was corrected by 5% as it is generally considered that the Content Validity Index (CVI) distribution is asymmetric; thus, a loss of power when using the non-parametric test in its statistical analysis may take place[10]. In this regard, the final sample was calculated with the following correction: $n = n_0/0.95$. Thus, the final sample consisted of 48 judges.

For the selection of judges, the following inclusion criteria were adopted: being a nurse or nursing student with clinical/theoretical/research experience with renal patients undergoing hemodialysis and/or clinical/theoretical/research experience with nursing diagnoses. Individuals who did not respond to the survey instrument within 90 days were excluded.

To gather participants, a search was carried out on the platform Lattes on the website of the National Council for Scientific and Technological Development (CNPQ), through the Lattes curriculum, in subject mode, with the keywords: nursing *AND* nephrology *AND* nursing diagnoses.

Instrument and Data Collection

The data collection instrument was developed from a previous study that identified, through an integrative literature review, the definition of the excessive fluid volume risk label, its risk factors, and its conceptual and operational definitions[12].

The electronic data collection instrument was sent by email to the judges in the format of a link to access the Google Docs form, containing two parts: (1) the subjects characterization and (2) the data for the content analysis of the risk of excessive fluid volume diagnostic proposition with the items: label definition, adequacy of and domain for the insertion of the proposal in the NANDA International, and 31 risk factors. Each item contained the option of five scores to be checked. Zero score (0) meant that the item was not suitable; score 1, the item was very inadequate; score 2, the item was somehow adequate; score 3, the item was considerably adequate; and score 4, the item was adequate. This data collection was performed between July and October 2017.

Data Analysis and Treatment

For the judges' characterization analysis, descriptive statistics was used based on the distribution of absolute and relative frequencies, as well as the values of central tendency and dispersion, with evaluation of the normality of numerical variables through Shapiro-Wilk test.

The judges' answers were analyzed through the calculation of the Content Validity Index (CVI). The CVI was calculated

from a continuous scale ranging from zero to 4, and assessed the level of adequacy of each item. For the analysis of the CVI, a t test, whose null hypothesis was that its value should be ≥ 0.8, was applied. Thus, p values > 0.05 indicated the acceptance of the null hypothesis.

Ethical Aspects

This study was approved in October 2015 by the Research Ethics Committee with Opinion no. 1.257.908, in accordance with the ethical precepts established by Resolution 466/2012, which defines guidelines involving human beings. The Free Informed Consent Form was sent by email to be read and signed.

RESULTS

Regarding the judges characterization, it was identified that most of them were women, and worked in assistance and teaching. Regarding professional qualification, most were masters or PhDs in nursing, and studied nursing diagnoses. Regarding age, there was a median of 29 years and years of completion of undergraduate degree of 5 years.

The judges' answers about the insertion of the diagnostic proposition risk of excessive fluid volume as a diagnosis of NANDA International, specifically in domain 02 and in class 05, are shown in Table 1. About the analysis of the results in Tables 1 and 2, for the acceptance of the null hypothesis (acceptance of the item evaluated by the expert), the p-value of the t test should be > 0.05 and CVI ≥ 0.8.

The inclusion of the diagnostic proposition was considered adequate, confirming that its inclusion should be in domain 02 and class 05 of NANDA International taxonomy. Additionally, the definition created for the diagnostic label was also considered adequate by the judges; however, some suggestions were proposed.

Some words have been eliminated for a more concise definition. Items providing the idea of consequence and advance to the diagnostic proposition, such as "due to excessive hydration" and "with consequent chronic fluid overload" were removed. Additionally, it was also suggested that the expression "that occurs when interdialysis weight gain is above 3.5% of dry weight" should be removed, as it limits the diagnostic definition only to patients on hemodialysis.

The suggested risk factors for the diagnostic proposition risk of excessive fluid volume are shown in Table 2.

Table 1 – Content validity index for the content validity analysis of the label definition of the diagnostic proposition risk of excessive fluid volume and its insertion according to class and domain in NANDA-I (n = 48) – Natal, RN, Brazil, 2021.

Variables	CVI	95% CI		t test	gl	p-value*
Insertion of the proposition in domain 02 and class 05 of NANDA-I	0.961	0.929	0.993	10.169	47	1.000
Definition: Vulnerability to excessive isotonic fluid retention that occurs when interdialytic weight gain is above 3.5% of dry weight, due to excessive hydration, with consequent chronic overload of intravascular and extravascular fluid, capable of uncontrolled body volume and health impairment	0.853	0.781	0.925	1.493	47	0.929

CVI = Content Validity Index; CI = Confidence Interval; *t test.

Table 2 – Content Validity Index (CVI) of the risk factors of the diagnostic proposition risk of excessive fluid volume (n = 48) – Natal, RN, Brazil, 2021.

Risk factor	CVI	95% CI		t test	gl	p value*
Diet abuse	0.873	0.811	0.935	2.373	47	0.989
Young adults	0.749	0.672	0.826	−1.342	47	0.093
Increase in dialysate sodium concentration	0.951	0.914	0.988	8.152	47	1.000
Missing the hemodialysis session	0.996	0.986	1.000	41.782	47	1.000
Insufficient water intake frequency	0.908	0.863	0.953	4.804	47	1.000
Low self-efficacy for fluid intake	0.853	0.791	0.915	1.732	47	0.955
Comorbidities	0.904	0.856	0.951	4.403	47	1.000
Deficient knowledge	0.980	0.961	1.000	18.408	47	1.000
Decline in renal function	0.969	0.941	0.998	11.874	47	1.000
Decrease in body fat	0.775	0.695	0.855	−0.623	47	0.268
Decrease in ultrafiltration volume	0.969	0.941	0.998	11.874	47	1.000
Inflammatory status	0.915	0.852	0.977	3.687	47	1.000
Daily stress	0.708	0.617	0.799	−2.024	47	0.024
Diuresis failure	0.892	0.831	0.954	3.020	47	0.998
Vascular access failure	0.919	0.877	0.961	5.667	47	1.000
Intermittent conventional hemodialysis	0.786	0.699	0.874	−0.315	47	0.377
Hospitalization	0.845	0.769	0.921	1.195	47	0.881

continue...

...continuation

Risk factor	CVI	95% CI		t test	gl	p value*
Older people	0.828	0.741	0.915	0.651	47	0.741
Altered body mass index	0.813	0.726	0.900	0.298	47	0.616
Excessive fluid intake	0.873	0.950	1.000	13.357	47	1.000
Excessive sodium intake	0.987	0.971	1.000	23.494	47	1.000
Greater experience in dialysis treatment	0.665	0.568	0.761	−2.813	47	0.004
Lower Kt/V index	0.926	0.860	0.992	3.830	47	1.000
Low serum albumin level	0.958	0.931	0.986	11.594	47	1.000
High serum level of phosphorus	0.853	0.767	0.940	1.243	47	0.890
Decreased serum level of lymphocytes	0.803	0.714	0.892	0.069	47	0.527
African American or white race	0.613	0.500	0.726	−3.317	47	0.001
Inadequate fluid removal during hemodialysis	0.993	0.981	1.000	32.085	47	1.000
Thirst	0.932	0.891	0.972	6.586	47	1.000
Use of antihypertensive drugs	0.881	0.816	0.947	2.494	47	0.992
Xerostomia	0.933	0.895	0.971	7.098	47	1.000

CVI = Content Validity Index; CI = Confidence Interval; *t test.

Among the 31 risk factors listed and assessed by the judges, six factors – young adults, decreased body fat, daily stress, conventional intermittent hemodialysis, greater experience in dialysis treatment, and African-American or white race – were considered inadequate and eliminated from the list. In addition, some factors were modified as suggested by the judges. Three factors – decreased ultrafiltration volume, vascular access failure, and inadequate fluid removal during hemodialysis – were merged into a single factor, inadequate fluid removal during hemodialysis.

Additionally, four were changed in terms of their nomenclature: fluid assessment with insufficient frequency was renamed to fluid assessment as insufficient, low self-efficacy for fluid intake was changed to low self-efficacy for fluid restriction, dietary abuse for excessive protein intake and failure to diuresis to decreased urinary volume, totaling a final sample of 23 risk factors considered adequate for the proposition under study.

Thus, given the content validity assessment performed by judges and their considerations, the diagnostic proposition risk of excessive fluid volume is presented in Chart 1.

The diagnostic proposition expressed in Chart 1 presents 23 risk factors considered adequate by the judges, among which one was classified as populations at risk and nine as associated conditions. The adequacy of these risk factors after content validation with the judges was necessary due to the update of NANDA International, which took place in the 2018–2020 edition.

Therefore, the reorganization of the risk factors older people, comorbidities, decline in renal function, decreased urinary volume, inflammatory status, hospitalization, low serum levels of albumin and lymphocytes, high serum level of phosphorus, and use of antihypertensive drugs was carried out considering that, despite helping in the diagnostic inference process, there is no possibility of nurses directly intervening in their mitigation. Thus, the non-modifiable risk factor "older people" was classified as a population at risk, as it is a group of people who share similar characteristics that make them susceptible to the development of excessive fluid volume. Similarly, the associated conditions listed in the chart above are contemplated as medical diagnoses, medications or clinical conditions that are not directly modified by the nurse.

Chart 1 – Proposition of the diagnostic structure of the risk of excessive fluid volume – Natal, RN, Brazil, 2021.

Risk of excessive fluid volume	
Domain 2. Nutrition **Class 5.** Hydration	
Definition: Vulnerability to excessive retention of isotonic fluids in intravascular and extravascular spaces, capable of uncontrolled body volume and health impairment.	
Risk factors	
• Increase in dialysate sodium concentration • Missing the hemodialysis session • Fluid assessment as insufficient • Low self-efficacy for fluid restriction • Deficient knowledge • Altered body mass index • Excessive fluid intake	• Excessive protein intake • Excessive sodium intake • Lower Kt/V index • Inadequate fluid removal during hemodialysis • Thirst • Xerostomia
Populations at risk	
• Older people	
Associated conditions	
• Comorbidities • Decline in renal function • Decrease in urinary volume • Inflammatory status • Hospitalization • Low serum albumin level • High serum level of phosphorus • Decreased serum level of lymphocytes • Use of antihypertensive drugs	

Source: The author.

DISCUSSION

This study estimated the content validity of the diagnostic proposition risk of excessive fluid volume and identified

23 factors that may increase the chances of occurrence of excessive fluid volume in hemodialysis patients. Therefore, it is critically important that nurses understand the relationship between these factors and the risk of excessive fluid volume.

The risk factor increased sodium concentration in the dialysate consists of an increase greater than 140 mEq/L in the sodium composition of the solution inserted in the hemodialysis machine during treatment[13]. Thus, if the dialysate sodium is regulated above this standard, a smaller amount of fluid tends to be filtered from the patient into the capillary of the hemodialysis machine, with consequent decrease in the removal of bodily fluids from the patient, a fact that can result in excessive fluid volume[14].

A systematic review with meta-analysis states that it is plausible that the dialysate low sodium content may decrease the total body sodium content, thus reducing fluid overload and hypertension, and may also reduce morbidity and mortality from cardiovascular diseases. In contrast, it also points out that it could increase the incidence of hypotension and cramps during dialysis[15].

The factor fluid assessment as insufficient also increases the risk of insufficient fluid removal in hemodialysis, with consequent fluid overload in these patients[16]. Thus, the patient's volume status shall be evaluated every two weeks by health professionals[13].

Another risk factor that needs to be assessed by health care professionals is the Kt/V index. When it is low, there is a decrease in the efficiency of hemodialysis received by the patient[13]. Consequently, the removal of excreta and fluids will also decrease, which will increase the vulnerability to develop fluid overload.

Although some risk factors depend almost exclusively on health professionals, others are related to attitudes from the patients themselves, such as deficient knowledge. This factor consists of the cognitive absence/deficiency towards some specific aspect of knowledge[8].

Regarding this aspect, the literature states that the highest intake of sodium and fluids was observed among patients with a lower level of education (up to eight years of formal education), compared to participants with higher education[17]. In this regard, a study states that education can influence this clientele's learning. Due to the complexity involved in the treatment, patients with low education may have difficulty assimilating the important items for health maintenance[18].

Regarding the risk factor of missing hemodialysis sessions, studies report that fluid overload and hospitalization rate in these patients are remarkably higher after a long interdialysis interval[19]. In this respect, it is recommended that nursing reinforce, in educational activities, the importance of adherence to dialysis treatment and fluid and/or diet restriction.

A study found that 49.8% of patients undergoing hemodialysis reported a level of difficulty from moderate to extreme for fluid restriction and 55.1% responded that they could not follow the recommendation for fluid restriction. Thus, low self-efficacy for fluid restriction is observed in these patients[17]. Similarly, a study that examined health beliefs about salt intake among 307 hemodialysis patients found that most had a low level of health beliefs about salt intake[20].

In this context, an analysis of the concept of excessive fluid volume confirms that excessive fluid and sodium intake are factors related to fluid overload in hemodialysis patients[21]. The increased salt intake in these patients causes the inevitable increase in thirst. Thirst, added to xerostomia, are the main causes of low adherence to fluid restriction, with consequent increase in interdialytic weight gain[22–23]. The presence of diabetes in hemodialysis patients can also intensify xerostomia and thirst[24].

Studies recommend the use of chewing gum to relieve xerostomia and thirst in these patients[25]. In addition, evidence indicates that the use of educational and motivational videos helps to control fluid intake, with a decrease in the interdialytic weight gain[26].

Additionally, diet is a critical component for the hemodialysis patient. Research shows that this clientele has difficulties in adhering to dietary restrictions[27]. On the other hand, maintaining a healthy body mass index is a challenge to be achieved, since a low body mass index is an independent predictor of death in these patients[28].

A study confirms that the presence of malnutrition is associated with higher levels of fluid overload[29]. And the occurrence of fluid overload and malnutrition represents a significant increase in the risk of death, indicating a worse prognosis for these patients[30]. Therefore, maintaining an adequate diet and/or fluid intake is a protective measure in patients undergoing hemodialysis. Thus, nurses shall reinforce, at every opportunity, the importance of adhering to these measures.

In view of the above, it should be noted that this study contributed to confirm the validity between risk factors and excessive fluid volume. In this regard, it provides evidence on the risk factors responsible for the development of excessive fluid volume in patients undergoing hemodialysis, an analysis that is lacking in current studies. Consequently, nurses shall pay attention to these factors and plan interventions capable of minimizing the chances of occurrence of this problem.

As limitations, we highlight that the analysis of the diagnostic proposition was directed to patients undergoing hemodialysis; thus, the generalization of these results should be used with caution. Moreover, the fact that the authors subdivided ten of the 23 risk factors analyzed by the judges into the category of populations at risk and associated conditions is suggested as a limitation. The construction of this diagnostic proposition and its subsequent validation by judges were carried out prior to the release of the 2021–2023 edition of NANDA International. Therefore, to adapt it to the model required by the taxonomy, the authors needed to make this change.

CONCLUSION

The definition proposed for the diagnostic label of the risk of excessive fluid volume was considered adequate, and adjustments were suggested by the judges. Of the 31 risk factors indicated by this study, 13 factors were considered adequate by the judges: increased sodium concentration in the dialysate; missing the hemodialysis session; fluid assessment as insufficient; low self-efficacy for fluid restriction; deficient knowledge; altered body mass index; excessive intake of fluids, proteins and sodium; lower kt/v index; inadequate removal of fluids in

hemodialysis; thirst; and xerostomia. One factor (older people) was considered as a population at risk, and nine as associated conditions: comorbidities, decline in renal function, decreased urinary volume, inflammatory status, hospitalization, low serum levels of albumin and lymphocytes, high serum level of phosphorus, and use of antihypertensive drugs.

The clinical validation of the 23 risk factors identified in this study with the hemodialysis clientele is suggested.

RESUMO

Objetivo: Analisar o conteúdo da proposição diagnóstica risco de volume de líquidos excessivo em pacientes submetidos à hemodiálise. **Método:** Estudo de validação de conteúdo, com 48 juízes que avaliaram o conteúdo da proposição diagnóstica risco de volume de líquidos excessivo, a partir de um instrumento eletrônico de coleta de dados. As respostas dos juízes foram analisadas pelo cálculo do Índice de Validade de Conteúdo e o teste T. **Resultados:** O risco de volume de líquidos excessivo foi considerado adequado, contendo 23 fatores de risco: aumento na concentração de sódio do dialisado; ausência na sessão de hemodiálise; avaliação hídrica insuficiente; baixa autoeficácia para restrição de líquidos; conhecimento deficiente; índice de massa corporal alterada; ingesta excessiva de líquidos, de proteínas e sódio; menor índice do kt/v; remoção inadequada de líquidos na hemodiálise; sede; xerostomia; idosos; comorbidades; declínio da função renal; diminuição do volume urinário; estado inflamatório; hospitalização; níveis séricos de albumina e linfócitos baixos, e de fósforo elevado; e uso de anti-hipertensivos. **Conclusão:** O conteúdo da proposição diagnóstica risco de volume de líquidos excessivo foi considerado adequado pelos juízes.

DESCRITORES

Enfermagem; Estudos de Validação; Diálise Renal.

RESUMEN

Objetivo: Analizar el contenido de la proposición diagnóstica riesgo de volumen de líquidos excesivo en pacientes sometidos a hemodiálisis. **Método:** Estudio de validación de contenido, con 48 jueces que evaluaron el contenido de la proposición diagnóstica riesgo de volumen de líquidos excesivo, por medio de un instrumento electrónico de recolección de datos. Las respuestas de los jueces fueron analizadas por el cálculo del Índice de Validez de Contenido y la prueba T. **Resultados:** El riesgo de volumen de líquidos excesivo fue considerado adecuado, se identificó 23 factores de riesgo: aumento en la concentración de sodio del dializado; ausencia en la sesión de hemodiálisis; evaluación hídrica insuficiente; baja autoeficacia para restricción de líquidos; conocimiento insuficiente; índice de masa corporal alterada; ingestión excesiva de líquidos, de proteínas y sodio; menor índice del kt/V; remoción inadecuada de líquidos en la hemodiálisis; sed; xerostomía; ancianos; comorbilidades; disminución de la función renal; disminución del volumen urinario; estado inflamatorio; hospitalización; nivel sérico de albumina y linfocitos bajos, y de fósforo elevado; y uso de antihipertensivos. **Conclusión:** El contenido de la proposición diagnostica riesgo de volumen de líquidos excesivo fue considerado adecuado por los jueces.

DESCRIPTORES

Enfermería; Estudios de Validación; Diálisis Renal.

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