ORIGINALES

Nursing diagnoses and interventions of the safety/protection domain for hemodialysis patients

Diagnósticos e intervenções de enfermagem do domínio segurança e proteção para pacientes em hemodiálise

Diagnósticos e intervenciones de enfermería del dominio seguridad y protección de los pacientes en hemodiálisis

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ABSTRACT:
The **objective** of this study was to identify the nursing diagnoses of the safety/protection domain in the NANDA-I Taxonomy II and propose nursing interventions and activities based on the Nursing interventions Classification (NIC) for chronic renal patients undergoing hemodialysis. Diagnoses present in at least 75% of the sample were analyzed, corresponding to 25 patients hospitalized in Fortaleza-Ceará-Brazil in 2014/2015. The study was approved by the Research Ethics Committees of the State University of Ceará and the General Hospital of Fortaleza under Opinion nº 392.488 and CAAE: 19640613.2.0000.5534. Five high-risk nursing diagnoses present in 100% of the simple were selected. Some of the interventions and activities proposed for the diagnosis of risk of infections were infection control and adequate cleaning of the environment after the its use for each patient. The identified diagnoses are all related to risks. This calls attention to the role of nurses in preventive actions with patients and professionals, as they are responsible for the success of the treatment. Also, the knowledge of these professionals and their interventions and activities provide a scientific basis for evidence-based discussions. Finally, the research is relevant for its contributions to nursing/health care actions to patients/users undergoing hemodialysis treatment.

Keywords: Nursing; Renal Dialysis; Nursing Process

RESUMO:
O **objetivo** deste estudo foi identificar os diagnósticos de enfermagem do domínio segurança e proteção da Taxonomia II da NANDA-I e propor intervenções e atividades de enfermagem baseadas na Nursing Interventions Classification (NIC) para pacientes renais crônicos em tratamento hemodialítico. Foram analisados no estudo os diagnósticos presentes em pelo menos 75% do grupo amostral, que foi composto por 25 pacientes internados em Fortaleza-Ceará-Brasil no ano de 2014/ 2015. O estudo foi

aprovado pelos Comitês de Ética em Pesquisa da Universidade Estadual do Ceará e do Hospital Geral de Fortaleza pelo Parecer Nº 392.488 CAAE: 19640613.2.0000.5534. Elegeram-se cinco diagnósticos de enfermagem de risco presentes em 100% da amostra. Algumas das intervenções e atividades propostas para o diagnóstico de risco de infecção foram controle de infecção e limpar adequadamente o ambiente após o uso de cada paciente. Os diagnósticos encontrados estão todos relacionados a riscos, o que evidencia o papel do enfermeiro em desempenhar ações preventivas com os pacientes e profissionais, pois estes são responsáveis pelo sucesso do tratamento. Além de que o conhecimento destes e de suas intervenções e atividades fornecem base científica para que a discussão seja baseada em evidências. Por fim, a pesquisa tornou-se relevante por trazer contribuições para a enfermagem/saúde nas ações do cuidado aos pacientes/usuários em tratamento de hemodiálise.

Palavras-chave: Enfermagem; Diálise Renal, Processo de Enfermagem

RESUMEN:

El **objetivo** de este estudio fue identificar los diagnósticos de enfermería del dominio seguridad y protección de la Taxonomía II de NANDA-I y proponer intervenciones y actividades de enfermería basadas en la Nursing Interventions Classification (NIC) para los pacientes con insuficiencia renal crónica en hemodiálisis. Se analizaron en el estudio los diagnósticos presentes en al menos el 75% del grupo de muestra, que se compone de 25 pacientes en *Fortaleza-Ceará*-Brasil en 2014/ 2015. El estudio fue aprobado por el Comité de Ética en Investigación de la Universidad del Estado de *Ceará* y del Hospital General de Fortaleza bajo parecer Nº 392488 CAAE: 19640613.2.0000.5534. Se eligieron cinco diagnósticos de enfermería de riesgo presentes en el 100% de la muestra. Algunas de las actividades e intervenciones propuestas para el diagnóstico de riesgo de infección fueron control de la infección y limpiar adecuadamente el ambiente después de su uso por cada paciente. Los diagnósticos encontrados están todos relacionados con los riesgos, lo que muestra el papel del enfermero en desempeñar acciones preventivas con los pacientes y los profesionales, ya que son los responsables del éxito del tratamiento. Además de que el conocimiento de estos y sus intervenciones y actividades proporcionan una base científica para que la discusión se base en pruebas. Por último, la investigación se hizo relevante por aportar contribuciones a la enfermería / salud en las acciones de atención a los pacientes / usuarios en tratamiento de hemodiálisis.

Palabras clave: Enfermería; diálisis renal, proceso de enfermería

INTRODUCTION

Nursing has developed tools such as the Nursing Process (NP) with the objective to improve the quality of care and contribute to build a more consistent professional exercise along with the intense and improved growth of the profession.

The NP is a scientifically based and systematized work method that guides the care and documentation of professional practice. It is structured in the following steps: data collection, nursing diagnoses, results, interventions and evaluation [1].

Through this method of evaluating patients in clinical situations, nurses are able to establish nursing diagnoses and results that they want to achieve, define interventions and activities, and evaluate the expected results towards a new stage in the care process, whether maintaining the prescribed interventions or discontinuing them and starting others.

Nursing diagnoses presuppose that the judgment of the collected patients' health data identify the appropriate care needs for each case, and the nursing prescription represents a daily schedule of care with target dates for its execution [2].

When nursing care takes place in specialized units, there is a greater probability of recurrence of some nursing diagnoses and interventions, since patients in these units share, in most cases, the same cause of underlying disease and also hospitalization.

Thus, the identification of certain care needs, when shared by professionals, can guide the team in the collection of information, nursing diagnoses and interventions and ultimately facilitate and streamline the assistance to be provided. Common and standardized languages adopted in nursing diagnosis also favor patient safety, since the documentation of care according to the NP is possible through the use of certain terminologies[3].

In light of the foregoing, we ask: What are the nursing diagnoses of the safety/protection domain according to NANDA-I Taxonomy II for chronic renal patients undergoing hemodialysis? What are the nursing interventions and activities based on the Nursing Interventions Classification (NIC) in these patients?

The need to know the nursing diagnoses in chronic renal patients has been also pointed out in other studies[4-8]. This reality can be found and worked in units specialized in the treatment of renal patients who undergo hemodialysis, as they are intended to offer treatment to a disease that presents peculiar and recurrent signs and symptoms.

Renal Insufficiency (RI) is a metabolic syndrome caused by reversible or irreversible loss of renal function. Hemodialysis (HD) is a renal replacement therapy that consists in filtering and removing toxic substances and water from the body. This therapy is the most common treatment used with RI patients, either acute or chronic[9].

With the advancement of science and technology, HD has become more secure and efficient. However, intercurrences are still common; they are estimated to occur in 30% of sessions. They happen due to changes in patients' electrolyte balance and causing patient safety and protection to be affected. In view of this, the nursing team must be attentive and precise in its assistance to patients during the dialysis process[10].

This study will contribute to the promotion of quality care provided by the nursing team to renal patients, facilitating the appropriate conduct before intercurrences, with better targeted the interventions, acuracy and agility, thus minimizing possible treatment complications.

The objective of this study was to identify the nursing diagnoses of the safety/protection domain in the NANDA-I Taxonomy II and propose nursing interventions and activities based on the Nursing Interventions Classification (NIC) for chronic renal patients undergoing hemodialysis.

MATERIAL AND METHODS

This is a descriptive study carried out in a reference unit for renal patients, part of the Public Network of the Ceará State Health Secretariat, located in Fortaleza, Ceará, Brazil. Data collection was performed in the months of December 2014 and January 2015.

The Hemodialysis Service of this Hospital has 19 hemodialysis machines and 20 electric armchairs. In total, there are 12 machines running on a 24-hour basis. The dialysis service also serves Intensive Care Unit (ICU) patients, Renal Transplant patients, and patients under observation in the emergency room of the hospital.

The research included Chronic Renal Failure patients undergoing Hemodialysis Therapy. The population was composed of all chronic patients who underwent dialysis treatment in the dialysis unit studied during the study period. Thus, the population was composed of patients who had hemodynamic conditions to move to the hospital dialysis unit, located on the ground floor of the hospital.

Inclusion criteria in the study were: age of 18 years or more, and presence of hemodynamic stability to undergo dialysis in the hospital dialysis unit during the data collection period. Patients older than 60 were excluded because in this age group, sequelae due to underlying diseases such as Hypertension and Diabetes Mellitus, are more frequent, and in cases of patients with severe clinical status. After applying the inclusion and exclusion criteria, the study sample consisted of 25 patients.

Data were collected through structured interviews and observation script aimed at evaluating the environment of the sector where the treatment takes place. The interview script consisted of identification data, information on physical examination, specifically on renal disease conditions, clinical and epidemiological characteristics of patients, and information on laboratory test results such as urea, creatinine and capillary glycemia compiled from the patients' medical records. The questions were based on the NANDA-I Classification, related to the Domain 11 - Safety/protection.

The physical examination was performed during the performed hemodialysis session, and thus, it had to be simplified and carried out with caution. Some propaedeutic methods such as palpation, percussion and auscultation were not possible, as these are chronic patients who were hospitalized for some renal disease complication or some other reason and were, therefore, using central catheters, what restricts movement. Moreover, some were hospitalized for having undergone surgical procedures.

After collection, data were organized and clinical judgment was made[11]. Based on risk and related factors, the nursing diagnoses pertinent to the 25 patients were elaborated. Diagnoses present in at least 75% of the sample were analyzed. Nursing interventions were then suggested.

Results were interpreted according to the literature on care and updated nursing classifications, as well as documents of scientific societies, and presented in tables and boxes. Patient information was treated confidentially, and those exposed in the study are identified with the letter "P" of patient followed by an Arabic numeral representing the order in the sequence of interviews.

The project was approved by the Research Ethics Committees of the State University of Ceará and the General Hospital of Fortaleza under Opinion nº 392,488 and CAAE: 19640613.2.0000.5534.

Guidelines and ethical principles on research with human beings were observed, in accordance with the Resolution 466/2012 of the National Health Council (NHC), which prioritizes the following bioethical principles: freedom to participate or not in a study and to withdraw at any moment during data collection, assurance of confidentiality of the participants' identity and clarification about the research at any stage of its development[12].

RESULTS

The results showed that 21 (84%) patients were in the age group from 41 to 59 years. As to education, 17 (68%) had studied from 10 to 15 years, indicating that this population of chronic patients is well educated.

In relation to sex, women prevailed, 15 (60%). Regarding marital status, 15 (60%) have partner. The income of 22 (88%) patients interviewed was between one and two minimum wages, showing that they are people who probably live only with the retirement pension provided by the government.

Fourteen (56%) patients were hypertensive, the heart rate of 20 (80%) and patients and the respiratory rate of 23 (92%) patients were within normal limits. The capillary glycemia of 24 (94%) participants was between 111 and 260 mg/dL.

Twenty-four (96%) patients presented high levels of urea, ranging from 0.8 to 10.3 mg/dL. The creatinine of all patients was altered, with higher levels tan normal; 15 (60%) patients had creatinine levels between 2, 1 and 5.0 mg/dL. As for skin moisture, the skin of 14 (56%) patients was dry, and 24 (96%) had no lesionS.

Regarding the type of venous access of patients, 12 (48%) were using a double lumen catheter (DLC) and 13 (52%) were using an arteriovenous fistula (AVF).

Table 1 shows the nursing diagnoses of the Safety/protection domain in the NANDA-I (2015-2017)[2] identified in the sample.

Table 1: Nursing diagnoses of the Safety/protection domain in the NANDA-I identified in the sample group. Fortaleza, Ceará, Brazil, 2015.

Class	Nursing Diagnosis	Risk Factor	Patients	
			n	%
1	Risk for infection	Invasive procedures and chronic diseases	25	100%
2	Risk for bleeding	Treatment regimen	25	100%
3	Risk for contamination	Exposure to chemical substances of the treatment	25	100%
5	Rsik for alergic response	Exposure to allergens	25	100%
6	Risk for hypothermia	Low ambient temperature	25	100%

Source: Direct search

Interventions and nursing activities (NIC)[13] were drawn for each diagnosis described in Table 1.

Table 2: Nursing interventions for each diagnosis found. Fortaleza, Ceará, Brazil, 2015.

Diagnosis	Interventions
Risk for infection	Infection control
Risk for bleeding	Bleeding precautions
Risk for contamination	Hemodialysis Therapy
Rsik for alergic response	Anaphylaxis control
Risk for hypothermia	Temperature regulation

Source: Direct search

Invasive procedures represent a risk factor to the diagnosis risk for infection. These procedures are inherent to the treatment of hemodialysis and the chronic disease, which can be either chronic kidney disease (CKD) or the underlying condition that caused the renal failure. This fact explains why the whole sample presented this risk diagnosis. Thus, the intervention "infection control"[13:468] was selected, and in order to implement it, the following activities were chosen: "[...] adequately clean up the environment after use of other patients; Wash hands before and after every nursing action; and provide antibiotic therapy if necessary[...]."[13: 468]

For the diagnosis risk for bleeding, the risk factor was the treatment regimen, which requires the use of anticoagulants during hemodialysis. Another aggravating factor is the uremia of CKD patients. The whole sample had this nursing diagnosis. "Bleeding precautions" was the intervention[13: 656] chosen, through the following activities, "[...] monitor the occurrence of signs and symptoms of persistent bleeding (e.g., checking all secretions for live or occult blood); monitor clotting tests, including prothrombin time (PT), partial thromboplastin times (PTT), fibrinogen, fibrin degradation/fragmented division products and platelet counts, as appropriate; guide the patient and/or family members about bleeding signs and appropriate actions (e.g., notify the nurse if bleeding occurs) [...]."[13:656]

As for the diagnosis of risk for contamination, the risk factor was exposure to chemical substances of the treatment, related to the possible exposure to chemical substances that are used throughout the treatment, such as paraacetic acid, puristeril acid, heparin, among others. The intervention indicated was "hemodialysis therapy"[13:429] and the activities selected were "[...] check the equipment and the solutions according to protocol, use sterile technique to initiate hemodialysis and for needle insertion and connection of catheter, administer heparin according to protocol[...]."[13:429]

In the diagnosis risk for allergy response, the identified risk factor was exposure to allergens. These can be the chemical substances used in the treatment of hemodialysis, such as paraacetic acid and puristeril acid, already mentioned, as well as substances common to the treatment, as synthetic hormone erythropoietin, hepatitis B vaccines, antibiotics, anticoagulants, and others. This diagnosis is present in all patients undergoing hemodialysis. The best appropriate intervention is "anaphylaxis control"[13:148], with the activities "[...] identify and remove the allergen source, if possible, monitor vital signs; monitor self-reports of imminent death[...]."[13:148]

The diagnosis risk for hypothermia has as risk factor the low ambient temperature, due to the need to keep the temperature low in hemodialysis rooms for better conservation of machines. Again, this diagnosis is present in the whole sample. In order to solve this risk, the intervention "temperature regulation"[13:713] was selected, through the activities "[...] report signs and symptoms of hypothermia, and monitor them from the patient's reports; teach the patient, especially the elderly, to monitor skin color and temperature; use warm blankets in the dialysis room to adjust an altered body temperature, if appropriate [...]"[13:713]

DISCUSSION

The population of this study was in the same age range as the Brazilian annual dialysis census[9]. Regarding schooling, the results of the present study differ from literature; most of the patients had 10 to 15 years of schooling, that is, they had

finished high school. The literature shows that patients undergoing hemodialysis have mostly incomplete elementary education, what interferes with their understanding of the disease and adherence to treatment[14].

Women were more numerous than men, different from that found in the annual census and in another study[8,9]. This study indicates that women under hemodialysis have lower scores of quality of life and higher risk of death when compared to men. This is associated with the maintenance of the function of providing care to the home and children, a reality that may be responsible for increasing their physical and mental stress[15].

Regarding marital status, more than half of the patients reported having partners, as in another study[14]. The presence of family is recognized as fundamental to renal patients undergoing hemodialysis, to help in the acceptance of the disease, adherence to treatment and coping with all the changes brought about by the diseas.

Most participants were retired their family income ranged from one to two minimum wages (R$ 880.00)[16]. The high number of retirees can be justified by the benefit obtained from the National Institute of Social Security (INSS) after the diagnosis of chronic kidney disease[14,17].

The patients' physical examination revealed that more than half of them had systolic and diastolic blood pressure above normal limits. According to the classification stipulated by the literature, borderline systolic and diastolic blood pressure are characterized by systolic levels between 130-139 mmHg and diastolic between 85-89 mmHg. Hypertension happens when the systolic pressure is greater than or equal to 140 mmHg and/or the diastolic pressure is greater than or equal to 90 mmHg. In chronic kidney patients who have been treated for hypertension, BP should be less than or equal to 130/80 mmHg[18,19].

According to the annual dialysis census[9], hypertension affects 35% of CKD patients under dialysis, being the main cause of CKD in Brazil, followed by diabetes mellitus (30%) and chronic glomerulonephritis(12%)[9].

The majority of the patients in the study were within normality regarding respiratory and cardiac frequencies. The literature considers normal the respiratory rate between 12 and 20 mrpm, and the heart rate between 60 and 100 bpm[20].

Urea and creatinine were both high in most of the sample. Urea is still used nowadays as a marker of renal function, although there is evidence that this is not an ideal marker. Most clinical analysis laboratories consider normal the value of 20-40mg/dL[21]. Creatinine is also an optional marker for assessing renal function, ranging from 0.6 to 1.3 mg/dL, reported by most clinical laboratories[21].

Another aspect analyzed was dry skin, typical of uremia, which is usually associated with changes in the skin structures underlying the epidermis. There is also a decrease in perspiration, atrophy of sebaceous glands and of the secretory portion of sweat glands, which reduces the level of lipids on the surface of the skin and causes dryness[22].

The type of vascular access, which may be temporary or permanent, was also analyzed. The present research had equal prevalence of patients with AVF and DLC.

AVF is considered a permanent and ideal access because it allows adequate flow, lasts longer and presents a low rate of complications[23].

Vascular access through catheters is the main cause of infectious events in HD patients, and the cause of 34% of deaths in the first year of HD[24].

The nursing diagnoses found included risk for infection, which was also evident in other studies[8,25]. This diagnosis is defined as "[...] vulnerability to invasion and multiplication of pathogenic organisms, which can compromise health."[2: 369] Its presence in patients undergoing hemodialysis is explained by the constant performance of invasive procedures such as venipunctures (arteriovenous fistula or central catheter), as well as by anemia, leukopenia and other associated chronic diseases, such as hypertension and diabetes[7,26,27].

For this diagnosis, professionals should use correct puncture techniques, maintaining aseptic technique, taking care witht the hemodialysis machine and assessing the filtration rate in order to prevent infections[28].

Multiple punctures increase the risk of infection. Nurses must be attentive to the characteristics of the ideal access, which must have adequate blood flow for dialysis, guaranteeing long permanence and, consequently, less complications.

The diagnostic risk of hypothermia, which is defined as "[...] vulnerability to thermoregulation failure that may result in central body temperature below normal diurnal variation, and that may compromise health,"[2:418] has been also found in other studies[29,30].

Hypothermia is related to the loss of blood heat due to extracorporeal circulation, since the blood line and/or dialysate solution are exposed to the room temperature, which is low, generating hypothermia in the patients. To alleviate the low temperature, dialysis solutions can be preheated. Likewise, machines must have precise temperature adjustment mechanisms[31].

The risk for bleeding, which is defined as "[...] vulnerability to a reduction in blood volume that may compromise health,"[2:392] is related to the administration of the anticoagulant heparin, a necessary element to avoid clotting of the extracorporeal system, preventing the removal of fluids[32].

Heparin is the most widely used anticoagulant in Brazil, and its use is associated with a long half-life of up to 5 hours. As the hemodialysis session lasts on average 4 hours, the patient is released from the clinic still under effect of the heparin, and thus exposed to the risk of bleeding and thrombocytopenia[33]. Another factor that contributes to the risk of bleeding in HD patients is uremia, which causes coagulation disorder. Furthermore, chronic renal patients rather frequently make heavy use of nonsteroidal anti-inflammatory drugs (NSAIDs), increasing the risk of bleeding, because of their synergistic effects on the inhibition of platelet aggregation[33].

The nursing diagnosis risk of contamination, defined as "[...] vulnerability to exposure to environmental contaminants that may compromise health,"[2:409] is associated with the risk of allergic response, which was also identified in the study. Both are related to the exposure of patients to chemical substances during hemodialysis, such as the use of heparin and hormones such as erythropoietin, active vitamin D, acids used for

disinfection of the hemodialysis system and the machine, among others. These substances may increase the risk of both, contamination by sharing heparin bottles between patients, for example, as well as the greater ease of allergic response.

The last diagnosis found was the risk of allergic response that is closely related to the previous diagnosis, since chronic renal patients make use of many medications during hemodialysis and also several chemical compounds necessary to guarantee the safety and quality of the treatment.

This diagnosis is defined as "[...] vulnerability to exposure to treatment contaminants that may compromise health."[2:412] Chronic kidney disease requires the use of several drugs[34] and this facilitates the occurrence of allergic responses. In addition, a study confirms the occurrence of polypharmacy in chronic renal patients[35].

CONCLUSION

At the conclusion of this study, it is noticed that hemodialysis treatment is still permeated by details, peculiarities and complications. Nurses are responsible for part of the control of all these aspects. They perform the supervision of the nursing technician actions to the conditions of the machines, inputs, management of multiple drugs used in the treatment, management of the environment, patient comfort, and infection control.

Thus, the responsibility present in the actions of the Nephrologist nurse was clear in the study, and justifies the fact that the current legislation requires the specialist nurses, or higher levels or training, in Nephrology services. However, despite all training, tools are needed to facilitate and assure a quality and safe provision of care for patients.

Since diagnoses are all related to risks, preventive and educational actions with patients and other professionals who provide assistance to them are an evident and important component of the nurses' role. They are responsible for the success of the treatment; the control of bleeding risk, which is mainly related to the use of heparin, depend on the nursing team because nurses are responsible for administration of drugs, as well as for the risk of contamination and infection, as it is the nursing team that transits from patient to patient.

Risk of hypothermia and allergic responses was also present. These problems are readly noticed in the inspection and reporting of patients, which shows the importance of the nursing team to observe and listen to patients.

Nursing diagnoses are of great importance, since many of them originate in the onset of chronic kidney disease and are maintained throughout HD treatment. In this perspective, a better quality of life for these patients/users can be provided by safe, effective and quality nursing interventions, implemented from the identified diagnoses, contributing to care planning.

Thus, the publication of nursing diagnoses and interventions found on this specific patient population is relevant, as they foster the growth of nephrological nursing, which is still a new and little known area, bringing growth and scientific basis for evidence-based discussions.

Finally, the research is relevant for its contributions to nursing/health care actions to patients/users under hemodialysis treatment.

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