Venous ulcer: risk factors and the Nursing Outcomes Classification

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Objective. To explore the relationship between the risk factors for the development of venous ulcers and the indicators of tissue integrity from the *Nursing Outcomes Classification*. **Methodology**. A cross-sectional study conducted in 2013 in a university hospital in Natal/RN (Brazil). Fifty individuals selected by consecutive sampling participated in an interview and physical examination. **Results**. The most important risk factors were: 44% presented with arterial hypertension, 26% allergy, 20% diabetes mellitus, 4% participated in some physical activity, 6% were smokers and 14% drank alcohol. There was a statistically significant association between diabetes mellitus and the *texture* of the lesion (p=0.015) and *tissue perfusion* (p=0.026); allergy and *texture* (p=0.034); physical activity and *hydration* (p = 0.034); smoking and *thickness* (p = 0.018); and alcoholism and *exudate* of the ulcer (p=0.045). **Conclusion**. The relationship between risk factors and the nursing outcome indicators generated information relevant to the development of guidelines for the monitoring and treatment of venous ulcer information.

Key words: venous ulcer; nursing; risk factors; nursing assessment

Úlcera venosa: Relación entre los factores de riesgo y la clasificación de los resultados de enfermería

Objetivo. Explorar la relación entre los factores de riesgo para el desarrollo de las úlceras venosas y los indicadores de integridad tisular de la clasificación de resultados de enfermería. **Metodología.** Estudio transversal realizado en 2013 en un hospital universitario de Natal / RN (Brasil). Participaron 50 individuos seleccionados por muestreo consecutivo; se les hizo entrevista y examen físico. **Resultados.** Los factores de riesgo más importantes fueron: 44% presentaba hipertensión arterial; 26%, alergia; 20%, Diabetes Mellitus; 4% realizaba alguna actividad física; 6%, fumadores y 14% bebía alcohol. Hubo asociación estadísticamente significativa entre la Diabetes Mellitus con la textura de la lesión (p=0.015) y la perfusión tisular (p=0.026), la alergia y la textura (p=0.034), la actividad física y la hidratación (p=0.034), el tabaquismo y el grosor (p=0.018); y el alcoholismo y el exudado de la úlcera

(p=0.045). **Conclusión.** La relación entre algunos factores de riesgo y los indicadores de resultado de enfermería genera información relevante para la elaboración de directrices para el seguimiento y tratamiento de las úlceras venosas.

Palabras clave: úlcera venosa; enfermagem; fatores de risco; avaliação em enfermagem.

Úlcera venosa: relação entre os fatores de risco e a classificação dos resultados de enfermagem

Objetivo. Explorar a relação entre os fatores de risco para o desenvolvimento das úlceras venosas e os indicadores de integridade tissular da classificação de resultados de enfermagem. **Metodologia**. Estudo transversal realizado em 2013 num hospital universitário de Natal / RN (Brasil. Participaram 50 indivíduos selecionados por amostragem consecutiva, foi feita entrevista e exame físico. **Resultados**. Os fatores de risco mais importantes foram: 44% apresentavam hipertensão arterial, 26% alergia, 20% Diabete Mellitus, 4% realizava alguma atividade física, 6% eram fumantes e 14% bebiam álcool. Teve associação estatisticamente significativa entre a Diabete Mellitus com a textura da lesão (p=0.015) e a perfusão tissular (p=0.026), a alergia e a textura (p=0.034), a atividade física e a hidratação (p=0.034), o tabagismo e a gordura (p=0.018); e o alcoolismo e o exsudado da úlcera (p=0.045). **Conclusão**. A relação entre alguns fatores de risco e os indicadores de resultado de enfermagem gera informação relevante para a elaboração de diretrizes para o seguimento e tratamento das úlceras venosas.

Palavras chave: úlcera venosa; enfermería; factores de riesgo; evaluación en enfermería.

Introduction

The large representation of venous ulcers (VU), in the current context, instigated this study in a more profound way, in the process of the risk factors that interfere with the healing process. This type of injury has become an alarming public health problem, not only due to its prevalence, but also for its economic and social costs related to treatment, disability and the dependency associated with it. The principal cause of the development of VU is chronic venous insufficiency (CVI), which may be the result of a congenital disorder or may be acquired. The disease in question can reach the superficial venous system, the deep venous system, or both, causing venous or varicose ulcers.[1]

If there is a failure of the system in one of its components, the result is long duration venous hypertension or venous obstruction, which causes distention and elongation of the capillary loops, causing swelling and, consequently, a venous ulcer.[2] Other associated diseases, beyond IVC, which may interfere with the wound healing process, are common among clients with chronic venous ulcers. Predominate among them, systemic arterial hypertension (SAH) and diabetes mellitus (DM), as well as some social habits such as smoking, alcoholism, and sedentary lifestyle.[3]

Such diseases are considered as risk factors for CVI, and consequently for VU, with a view that can be conceptualized as the components that lead to illness or that contribute to the risk of illness and maintenance of health problems. It is noteworthy that the common and modifiable risk factors, such as obesity, sedentary lifestyle, smoking and alcoholism, underlie the principle chronic diseases.[4] Therefore, it is important to control these risk factors in order to promote effective healing of the injury, by means of diet, control of arterial pressure and blood glucose, performing physical activities, avoiding alcohol and tobacco, and controlling external factors that cause aggression to the injured tissue, as well as other physiological factors.[1]

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The characterization of the state of health of the lower limbs of patients with VU, and its relationship with risk factors for the development of VU, are nursing care priorities for these clients, as it should induce the nurse to plan nursing care consistent with reality, and targeted to the needs of the client in question. In order to characterize the health status of these patients, a proper professional framework was used, the Nursing Outcomes Classification (NOC). In this study, the nursing outcome chosen was *tissue integrity: skin and mucous membranes* (Code #1101), which is defined as: "the structural intactness and normal physiological function of skin and mucous membranes". Such an outcome is framed in this context because it is a device to assess the actual condition of the patient with venous ulcers.[5]

The indicators of the outcome in question considered for the client with VU, based on a study by Santos,[6] were: *skin temperature, sensation, elasticity, hydration, texture, thickness, tissue perfusion, hair growth on skin, abnormal pigmentation, skin lesions, scar tissue,* skin flaking, *erythema, necrosis, induration, pruritus, pain* and *exudate*. Thus, this study aimed to establish the relationship between the risk factors for the development of venous ulcers and outcome indicators for *tissue integrity: skin and mucous membranes* of the Nursing Outcomes Classification.

Methodology

This was a cross-sectional, descriptive study conducted at the outpatient surgical clinic of a university hospital located in Northeastern Brazil. The sample consisted of 50 individuals, recruited through consecutive sampling, calculated from the application of the formula[7] $n = (z*s/e)^2$, where z is the level of confidence, s is the standard deviation of the mean of the NOC scale, the absolute sampling error in relationship to the mean of the NOC scale. For the sample in question, z = 95% (1.96), a normality of the mean of the NOC scale of 3 and an error of 0.83.

The inclusion criteria were: having a VU, attested by the characterization and by the value of the ankle/brachial index (ABI) greater than 0.8, which represents venous compromise; to be a patient in the referenced outpatient surgical clinic of the University Hospital of Natal-RN; aged greater than 18 years. The exclusion criteria were: patients with a VU and with psychiatric or psychological disorders characterized by abnormal conditions, suffering or impairment of a psychological, mental or cognitive nature; presenting with an oncological, arterial or mixed etiology wound, because these wounds have different characteristics than typical venous ulcers.

Data collection occurred through a form of interview and physical examination, constructed on the basis of a script developed within a doctoral thesis in Northeastern Brazil.[6] An instrument of operational definitions for the outcome indicator, *tissue integrity: skin and mucous membranes*, was also applied to patients with VU, constructed based on the NOC scale and validated by the same author.[6]

The scale proposed by NOC, more specifically with respect to the variables of the outcome indicators for *tissue integrity: skin and mucous membranes*, is presented using a coded five-point Likert scale regarding compromise: 1 – Severely; 2 - Substantially; 3 - Moderately; 4 - Mildly; 5 – Not compromised. For the measurement of the outcome indicators of *tissue integrity: skin and mucous membranes*, propaedeutic methods of inspection and palpation were used, however two of the indicators were measured by specific instruments: temperature by means of a Minipa® brand MT-305 infrared thermometer, calibrated with emissivity of 0.98, specific to human skin measured by an infrared wave coming through at a distance of 10 cm from the lesion; and tactile sensitivity of the perilesional area and dorsum of the foot, through the Semmes-Weinstein monofilaments or the Sorry® brand, securing the cord of the apparatus so that the filament is perpendicular to the skin surface of the patient and the pressure taken must achieve a sufficient force to bend the filament.

The personal risk factors for the development of venous ulcers were coded as absent and present, covering the underlying diseases (cardiac disorders, DM, dyslipidemia, SAH, allergies, others); surgical history (previous surgeries, revascularization, grafting, surgical debridement of the lesion, others) and obstetric (number of pregnancies, number of deliveries). As for family risk factors, the variables considered were: cardiac disorders, DM, dyslipidemia, SAH, VU, and others.

The lifestyle habits considered to influence the development of VU were: physical activity, smoking and alcoholism. Alcoholics were characterized as those patients who reported drinking alcohol in systematic quantity and frequency, in other words, they exhibited excessive and continued use. Those who never drank or did not drink any alcohol except on rare social occasions were considered non-alcoholics. Smokers were considered to be those participants who reported tobacco use at the time of the research. The collection period occurred between the months of February and June of 2012. Data were tabulated and stored in spreadsheets of the Excel software, and later statistically analyzed using the Statistical Package for Social Sciences (SPSS) version 16.0, using descriptive statistics and nonparametric tests. From these analyses, categorical variables were presented using absolute and relative frequencies; for the quantitative variables, measures of central tendency and dispersion were generated.

In order to evaluate the distribution of quantitative data regarding their normality, the Shapiro-Wilk test of normality was performed, which compares the scores of a sample to a normal distribution model.[7] In order to verify the correlation between the variables, the Spearman's rank correlation coefficient was used, and to analyze the statistical associations, the Mann-Whitney test was used for two groups, and the Kruskal-Wallis test when the comparison involved three or more groups.[7,8] For the statistical significance of the specified tests we adopted a level of 5% (p <0.05), This research met Resolution No. 466/12 of the Ministry of Health with the approval of the project by the University Hospital Committee on Ethics in Research (protocol number 608/11) and Certificate of Presentation for Ethical Appreciation No.0038.0.294.000-11.[9] Patients manifested their acceptance to participate by signing the Terms of Free and Informed Consent.

Results

The patients who participated in the study had VU in the lower legs with a mean of 13.15 ± 11.09 years of duration of the ulcer, presented a mean age of 59.72 ± 12.57 years; the majority were female (66%), with a mean of 4.98 ± 3.32 years of study, and the majority were retired (48%).

The results of the study, according to the characteristics of patients with UV according to risk factors, showed that of the total participants, 33 were women (66%) and only one of them had not been pregnant prior to data collection. They presented, therefore, a median of five pregnancies and four deliveries. Regarding previous surgeries, 70% of the patients had undergone some type of surgery, of which 22% reported already having revascularization surgery, 6%, a grafting surgery, and 6% surgical debridement of the ulcer. Regarding family history of VU, this was present in 46% of participants in the sample.

Regarding the most prevalent underlying illnesses, SAH was identified (44.0%), followed by allergies (26.0%). Diabetes mellitus and dyslipidemias were each present in 20.0% of the sample, and with less emphasis were cardiac disorders and other diseases (12.0%). We found a mean body mass index (BMI) value of 30.29 kg/m^2.

There was an association between DM and the indicators: *texture* (p=0.015) and *tissue perfusion* (p=0.026); dyslipidemia and the indicator of *erythema* (p=0.020); and allergy and *texture* (p=0.034). The BMI and SAH did not present an association with any of the indicators of the outcome, *tissue integrity: skin and mucous membranes*.

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With respect to social habits, it was identified that 4% of the sample performed some form of physical activity, a fact that evidenced sedentary lifestyle in 96% of the individuals investigated, 6% had a smoking habit and 14% consumed alcoholic beverages.

The data showed a statistically significant association between physical activity and *hydration* (p=0.034); smoking and *thickness* (p=0.018); and alcoholism and *exudate* (p=0.045).

Discussion

Arterial hypertension and DM interfere in the healing process of the ulcer, by generating vascular complications that lead to poor circulation, producing deficient wound healing, a fact that justified its statistically significant association with the indicators of *tissue perfusion*.[10,11] The association of these two conditions leads to the progression of the development of renal insufficiency, lower limb amputation, blindness and cardiovascular disease, given that hypertension increases the risk for macro- and micro-vascular lesions, exacerbating cardiac events and the appearance of lesions in the lower limbs.[11]

Diabetes presents a high prevalence of morbidity and mortality. Among the complications of DM related to lower limb lesions is peripheral neuropathy, which leads to biomechanical changes and loss of sweating that protect skin against dryness, in addition to the loss of protective sensation of the feet[11] and having, therefore, a relationship to the *texture* indicator of the nursing outcome studied, which can be verified by the statistical significance between the two variables. It is also evident that the loss of sensation of diabetic patients influences the emergence and evolution of lesions such as fissures, ulcers, infections.[2]

The prevalence of SAH in the sample corroborated with the data of research conducted in an ambulatory setting in Rio de Janeiro, in which 55% of the patients were identified with this condition, and 22% were also associated with DM.[3] It is noteworthy that 22% of the study sample in question did not refer to other chronic disease associated with the CVI, which presents the probability of tissue repair occurring in less time.[10]

With respect to allergy, such a factor may be caused by the use of local antibiotics, which can develop bacterial resistance, and also induce hypersensitivity reactions that retard the healing process.[10] Therefore, it is necessary to investigate how the patients' allergic events developed for the use of some type of product for their ulcer or perilesional skin, in order to avoid a possible allergic process. Allergy can also have a relationship with eczema, since it is a consequence of a possible autoimmune reaction against infectious bacteria and presents as erythematous dermatitis that tends to occur in people with allergies. The skin eruption is usually erythematous, causes itching and produces flaking skin, which shows changes in the texture of the surrounding skin, justifying the presented statistical significance between allergy and the indicator, *texture*.[12]

Social habits also interfere in the healing process of the lesions. Smoking in this process reduces functional hemoglobin, predisposing the patient to deprivation of oxygen in the tissues. Nicotine, a component found in cigarettes, induces the prothrombotic state through platelet activation and produces vasoconstriction, which increases the risk for necrosis and peripheral ulcers.[2,13] Facing a state of necrosis, there is progressive loss of tissue, which influences the thickness of the lesion, namely, in the compromise of the depth of the lesion, supporting the statistical association between smoking and the indicator, *thickness*.[2]

Alcoholism also undermines the integrity of the skin; in addition to acting in the myelin sheath, it may cause neuropathies. Ethyl alcohol has the ability to satisfy hunger and reduce the intake of nutrients, resulting in greater skin fragility, accelerating the rate of scaling, diminishing superficial and deep tactile sensitivity, and decreasing tissue oxygenation.[2] Ethyl alcohol consumes, for its metabolism, large amounts

of vitamins that influence wound healing. This fact, added to the reduction in tissue oxygenation, delays the healing process, causing the inflammatory phase of lesion to last a longer time, leading to increased exudate, given that this is a physiological process in this inflammatory phase.[2] This fact justifies the statistical association found in this study between alcoholism and the indicator, *exudate*. A study conducted in Northeastern Brazil demonstrated an association of tobacco and alcohol as risk factors in the occurrence of thromboembolic events. Alcohol use was associated with the occurrence of thrombosis, increasing the odds of developing it by five times.[13]

Obesity, defined by the World Health Organization as a BMI ≥ 30 kg/m^2,[14] has been recognized globally as a public health problem, and is associated with many dermatological diseases, not only in relationship to its prevalence but also in terms of the intensity of the symptoms.[15] Obesity has been recognized as a risk factor for CVI, both in men as well as in women, because the increase in intra-abdominal pressure causes increased resistance to venous return.[16] In addition to this, the obese individual has difficulty in mobilization and ambulation, leading him to a sedentary lifestyle, which can cause disorders such as venous hypertension, interfering with wound healing. Obesity also acts as immunosuppressive disease, which can lead to the inhibition of an inflammatory reaction and, consequently, alterations in wound healing.[2]

In this perspective, the performance of regular physical exercise for individuals with VU is important, to improve their circulation, diminish glycemia, collaborate in the control of weight and SAH, and in the reduction of cholesterol and triglycerides.[11] Therefore, physical inactivity negatively interferes in all these aspects. The practice of physical exercise increases muscle tone of the lower limbs, and can improve their action on the venous system. For example, with the contraction of the calf muscle the pressure in the deep venous system decreases, causing blood to flow from the superficial system to the deep veins, by means of the communicating veins.[17]

However, the presence of the ulcer causes frequent pain and loss of functional mobility, affecting the individual's ability to work, a fact that generates disability retirement, in addition to restricting the activities of daily living and leisure. This explains why, in the current study, physical inactivity in patients with VU showed a frequency of 96%.

Heredity or family tendency is also considered to be a predisposing factor for varicose veins and, consequently, for the development of VU.[18] Family history of VU was present in 46% of the patients researched, corroborating data from other research, which identified family history of VU as related to their development.[19] During pregnancy, new varicose veins can appear or those already in existence can be augmented, predisposing these women to the development of ulcers of a venous origin. Approximately 20% of pregnant women develop varicose veins during their pregnancy. Customarily, these will regress after the birth, but with subsequent pregnancies, they generally regress less. The use of elastic stockings may be useful in controlling the symptoms and for prophylaxis.[20]

The adoption of surgical procedures by vascular physicians is common and has the outcome of repairing or optimizing venous circulation in the leg and, consequently, contributes to more effective wound healing[21] The surgical treatment seeks to excise all varicose veins and eliminate points of reflux from the deep to the superficial system.20 In the present study, 22% of the patients had already undergone this type of surgical treatment, according to data from another study conducted in the outpatient clinic of the public network and in patients' homes in Northeastern of Brazil. The graft and surgical debridement of the lesion were performed in only 6% of the sample, demonstrating that, sometimes, access to vascular specialty services is restricted in Brazil.[21]

Some risk factors, although statistically significant, were not associated in a logical clinically fashion with the nursing outcome indicators studied. No literature was found to support dyslipidemia in relation to *erythema* and physical activity in

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relation to *hydration*. Verified correlations and associations between the risk factors of patients with VU and the nursing outcome of the study activities generated information relevant to the development of new guidelines for the treatment of VU, contributing to a reduction in treatment time, inconvenience, restrictions, and costs, increasing the quality of life for individuals and their families.

Knowledge and utilization of our own professional reference, as is the case of the NOC nursing outcomes, improve the conduct of professional nurses and directs them to perform care that is able to meet the needs of this population in a period that demands singular attention. This study presents a limitation due to the fact that it was performed only on patients with lesions of venous origin, since the instrument was directed toward these patients. The development of new studies is proposed that includes injuries from other sources, in order to compare the results and to promote specific interventions and achieve outcomes of a better quality of life for patients with any type of lesion.

The identification and characterization of risk factors in patients with VU, and the establishment of associations between them and the nursing outcome under study, generates information relevant for the development of guidelines for the monitoring and treatment of VU. In this context, it is imperative that the health care team, especially the nurse, based on data from studies such as this example, develop new processes of teaching-learning, potentiating the actions of health education and thus contributing to the improvement and better resolution of care provided to patients with VU.

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