Monitoring the healing of diabetic ulcers in the primary network of Salvador-Bahia

Acompanhamento da cura de úlceras diabéticas na rede primária de Salvador-Bahia

Monitoreo de la cicatrización de las úlceras diabéticas en la red primaria de Salvador-Bahia

RESUMO

Objetivo: Descrever os desfechos de cura e tratamento de úlceras diabéticas com o uso de curativos especiais em pacientes atendidos nas salas de curativos das unidades de saúde da rede primária de Salvador- Bahia. Método: Trata-se de um estudo retrospectivo que acompanhou 19 pacientes, maiores de 18 anos. Sete pacientes que evoluíram com desfecho de cura, considerando um óbito e os demais foram excluídos da amostra pela irregularidade nos retornos agendados. Resultados: A etiologia das úlceras foram neuro isquêmicas e neuropáticas, o trauma foi a principal causa do surgimento, sendo que todos apresentaram infecção leve. O tamanho inicial das lesões variou entre quatro cm2 até 16cm2, com percentual médio de redução dos diâmetros de 36% nas primeiras quatro semanas. Conclusão: As coberturas e tratamentos coadjuvantes, assim como ações educativas e o acompanhamento multiprofissional contribuíram para a cicatrização completa, o que aponta para importância da enfermeira sobretudo nas quatro primeiras semanas.

DESCRITORES: Enfermagem em Saúde Comunitária; Diabetes Mellitus; Atenção Primária à Saúde; Pé Diabético; Neuropatias Diabéticas.

ABSTRACT

Objective: To describe the healing and treatment outcomes of diabetic ulcers with the use of special dressings in patients treated in the dressing rooms of primary healthcare units in Salvador-Bahia. Method: This is a cross-sectional, descriptive study that followed 19 patients, over 18 years of age, from October 2017 to September 2018. Seven patients evolved with a cure, considering one death and the others were excluded from the sample due to irregularity in scheduled returns. Results: The etiology of the ulcers were neuroischemic and neuropathic, trauma was the main cause of emergence, all patients had signs of infection with mild classification, which revealed the importance of early intervention for the infection. The initial size of the lesions ranged from four cm2 to 16 cm2. The mean percentage of ulcer diameter reduction was 36% in the first four weeks. Covers were used: polyurethane foam with and without ionic silver; hydrofiber with and without ionic silver; compress with solid vaseline and iodine cadexomer, in addition to clinical and surgical interventions, such as the use of antibiotics, instrumental debridement and hyperbaric oxygen therapy that helped in the healing outcome between three to six months. Conclusion: The dressings and supporting treatments, as well as educational actions and multidisciplinary monitoring contributed to complete healing. The study reveals that the Nurse must be attentive to the favorable evolution of ulcers in the first four weeks, which helps in the evolution of healing in the referred period.

DESCRIPTORS: Community Health Nursing; Diabetes Mellitus; Primary Health Care; Diabetic Foot; Diabetic Neuropathies

RESUMEN

Objetivo: Describir los resultados de curación y tratamiento de las úlceras diabéticas con el uso de apósitos especiales en pacientes atendidos en los vestuarios de unidades de atención primaria de salud en Salvador-Bahia. Método: Se trata de un estudio descriptivo transversal que siguió a 19 pacientes, mayores de 18 años, desde octubre de 2017 hasta septiembre de 2018. Siete pacientes evolucionaron con curación, considerándose uno óbito y los demás fueron excluidos de la muestra por irregularidad. en devoluciones programadas. Resultados: La etiología de las úlceras fue neuroisquémica y neuropática, el traumatismo fue la principal causa de aparición, todos los pacientes presentaron signos de infección con clasificación leve, lo que reveló la importancia de la intervención temprana de la infección. El tamaño inicial de las lesiones varió de cuatro cm2 a 16 cm2. El porcentaje medio de reducción del diámetro de la úlcera fue del 36% en las primeras cuatro semanas. Se utilizaron cobertores: espuma de poliuretano con y sin plata iónica; hidrofibra con y sin plata iónica; compresa con vaselina sólida y cadexómero yodado, además de intervenciones clínicas y quirúrgicas, como el uso de antibióticos, desbridamiento instrumental y oxigenoterapia hiperbárica que ayudaron en la cicatrización entre tres y seis meses. Conclusión: Los apósitos y tratamientos de sostén, así como las acciones educativas y el seguimiento multidisciplinario contribuyeron a la curación completa. El estudio revela que el Enfermero debe estar atento a la evolución favorable de las úlceras en las primeras cuatro semanas, lo que ayuda en la evolución de la cicatrización en el referido período.

DESCRIPTORES: Enfermería en Salud Comunitaria; Diabetes Mellitus; Atención Primaria de Salud; Pie Diabético; Neuropatías Diabéticas

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INTRODUCTION

Diabetic foot ulcer (DFU) is a serious complication of Diabetes mellitus (DM) that can result in lower limb amputation. It is considered a public health problem due to its morbidity and mortality, with high costs for the Unified Health System (SUS) 1 due to prolonged hospitalizations and decreased quality of life. Worldwide, it is estimated that more than 500 million people live with diabetes, and Brazil occupies the 5th position. 2 Thus, it is necessary for primary health care professionals to be trained to perform dressings, including the correct indication of special coverings that will result in the outcome of the cure and in the action for the process of prevention of the contralateral limb.

In a perspective that in Brazil there is a prevalence of 6.4% diabetics, totaling 9.2 million adults, about 829,724 would develop neuroischemic foot, of which 43,726 with ulcers. It is estimated that most of these individuals would be followed up in outpatient care (n = 42,983), and of these, half would have an infected ulcer (n = 21,492). So the estimate of amputees would be 11,284.[1]

For the treatment of DFU, it is necessary to understand that it is a complex process, as neuropathy and/or peripheral arterial disease may be present, in addition, involves protein alterations such as the glycation of proteins that deregulate the matrix of metalloproteinases, which accentuate or limit the healing process.[2] That is, the FDU does not exhibit an orderly cascade of events that favor normal wound healing, there is the generation of inflammatory cytokines that delay the formation of granulation tissue and the maturation phase.[2] This results in a prolonged time for healing, which favors the large occupation of hospital beds, especially in developing countries where the problems are aggravated, mainly, by the lack of access to health services.[3]

According to the Ministry of Health, government costs for DM care are two to three times higher than those paid to non-diabetic people, these costs are directly related to the occurrence of severe chronic

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complications, generating financial and social impacts, with a consequent decrease in the quality of life of individuals. [4] When referring to annual medical investments within the scope of the Unified Health System (SUS) for monitoring people with diabetic foot, we have the following statistical data: for outpatient treatment of a diabetic foot without ulcer, the cost is approximately R$ 600.44; for the care of a person with an uninfected ulcer, expenses of approximately R$ 712.95; for the care of a foot with an infected ulcer, on average R$ 2,824.89; and for clinical assistance to an amputee, approximately R$ 1,047.85 is spent annually. Annual medical expenses total an estimated value of BRL 586.1 million for the whole of Brazil, with the majority of costs (85%) for the care of people with ulcerated neuroischemic foot, approximately BRL 498.4 million. [1]

In view of the representativeness of the related factors 5 to DM that lead to unfavorable outcomes in wound healing, it is necessary to institute measures capable of controlling these factors and thus providing greater resolution in the promotion and recovery for the cure of DFU. [6] Therefore, it is necessary to establish a set of integrated actions preferably developed by qualified professionals in an integrated network, whose efforts are aimed at indicating the correct coverage as well as patient education that should favor behavior, knowledge and self-efficacy of regular and continuous care. [3]

In this sense, it is important to develop research whose results point to the improvement of care aimed at the recovery of DFU and consequent contribution to improving the health of these individuals. Considering primary health care at the gateway for diabetic patients, it is urgent that professionals are trained to treat these injuries and especially for the process of preventing diabetic foot. In this context, it is urgent that actions are carried out by nurses working in PHC, through social technologies, in order to reduce medical costs, control factors that predispose to diabetes and also to avoid further complications resulting from foot ulcers.

Such actions require that these nurses are prepared to assess, guide and monitor people with diabetes who are at risk or have already developed the disease. Study points to the importance of good care from professionals to improve the treatment of diabetes and reduce complications[7]

For the treatment of DFU, it is necessary to understand that it is a complex process, as neuropathy and/or peripheral arterial disease may be present, in addition, involves protein alterations such as the glycation of proteins that deregulate the matrix of metalloproteinases, which accentuate or limit the healing process.

Thus, the objective of this study was to describe the healing and treatment outcomes of diabetic ulcers with the use of special dressings in patients treated in the dressing rooms of primary healthcare units in Salvador-Bahia.

We believe that works like this may provide subsidies for the development of theoretical knowledge about the promotion, prevention and treatment of DFU in the scope of primary health care.

METHOD

This is a descriptive, case series and retrospective cohort study. 8 The choice of method was due to the fact that there has been a decrease in cases of lower limb amputations for years, and in this way to carry out an analysis of the relationship with the care provided in primary health care. It was carried out with patients treated at three Basic Health Units (UBS) of the primary network in the city of Salvador, Bahia. The city of Salvador has 120 units of Primary Health Care, responsible for 56% of the population coverage, constituting the Brazilian capital that most expanded access to primary health services in the country in recent years. [9] It is noteworthy that in that city, about 80% of non-traumatic lower limb amputations occur in patients who developed some type of foot ulcers. [10]

This study is an excerpt from a research project entitled "Special Dressings in the Treatment of Diabetic Ulcers in the Primary Network of Salvador-Ba". It complies with the Regulatory Guidelines and Norms for Research Involving Human Beings of the National Health Council (CNS) No. 466/12, in partnership with Centro de Medicina Hiperbarica do Nordeste, a partner institution for adjuvant therapeutic treatments, such as hyperbaric oxygen therapy. Thus, this work was approved by the Ethics and Research Committee of the School of Nursing of the Federal University of Bahia under Opinion No. 453,482.

19 patients were randomly selected, of these seven evolved with a cure outcome that will be presented in the results, one of the patients died during the study period and the others were excluded due to irregularity in the scheduled returns. Patients were selected with active UPD, over 18

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years of age, who achieved the outcome of cure within six months, followed up from October 1, 2017 to September 30, 2018. The period followed the reference in the literature on the average healing time of diabetic ulcers, which ranges from five to eight months. [11-12] In addition, it is noteworthy that the time frame was related to the decrease in amputation cases in the hospital environment. Considering this indication, it was necessary to carry out a retrospective study so that the description of the data is a follow-up performed previously. The initial procedure consisted of the daily search of patients followed up in these three units with injuries in the foot, using the spreadsheet of the dressing sector of patients followed up with complex wounds. After that, a semi-structured script was built based on the International Consensus on Diabetic Foot [13] and the Manual of arterial hypertension and diabetes mellitus [13-14], normative instrument of the Plan for Reorganizing Attention to Arterial Hypertension and Diabetes Mellitus, used by the Ministry of Health to reorganize primary care.

The semi-structured script contained: aspects related to diabetic foot ulcers, such as etiology, cause, presence of infection and location of the lesion; variation in lesion diameter, Bates Jensen classification; ulcer time and diabetic ulcer follow-up time for healing; covers used and procedures performed. Data collection was carried out by the researchers and two nursing students trained for this purpose, in the morning shift, on Mondays, Wednesdays and Fridays.

For data organization and tabulation, the information was categorized and structured in a database in SPSS software version 13.0, used for data entry. The results and discussion presented in tables and with descriptive analysis were based on the Practical Guidelines of the International Working Group on Diabetic Foot 12 of 2019.

RESULTS

The sample was characterized by seven

Table 1 - Aspects Related to Diabetic Foot Ulcer. Salvador-BA, 2022

	n (7)	%
ETIOLOGY		
Neuropathic	3	42,86
Neuroischemic	4	57,14
CAUSE		
Trauma	3	42,86
Spontaneous	1	14,28
Callosity	2	28,58
More than two factors	1	14,28
INFECTION		
Grade 1/mild-presence of purulent exudate and or two or more signs of inflammation.	7	100
LOCALIZATION		
Hallux	2	28,58
Plantar	3	42,86
Side dorsum	1	14,28
2nd to 5th PDD	1	14,28

Source: Own elaboration, 2022

Table 2 - Variation in Injury Diameter and Bates Jensen Classification by User, 2022

User	Initial Diameter	Diameter (4 weeks)	%	Initial Bates Jensen	Bates Jensen(4 Weeks)	%
1	3cm2 (<4cm2)	2cm2 (<4cm2)	33	41	27	34,14
2	8,5cm2 (4-< 16cm2)	4,2cm2 (4-< 16cm2)	50,6	44	22	50
3	3,75cm2 (<4cm2)	2cm2 (<4cm2)	46,66	43	34	20,93
4	3,75cm2 (<4cm2)	2cm2 (<4cm2)	46,66	42	27	35,71
5	10cm2 (4-< 16cm2)	7cm2 (4-< 16cm2)	30	35	22	37,14
6	6,75cm2(4-< 16cm2)	6cm2 (4-< 16cm2)	11,11	38	33	13,15
7	6cm2 (4-< 16cm2)	6cm2 (4-< 16cm2)	0	38	27	28,94
Means	5,96 (4-<16cm2)	4,17 (4-<16cm2)	36%	40,14	28,6	34,43%

Source: Own elaboration, 2022

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patients, who were aged between 45 and 63 years, four patients were male and three were female, who evolved with the outcome of complete healing of the diabetic ulcer.

Aspects Related to Diabetic Foot Ulcer

Aspects related to diabetic foot ulcer (DFU), such as etiology, cause, presence of infection and location of the lesion were evaluated. The results are described in Table 1.

Table 3 - Ulcer Time and Diabetic Ulcer Follow-up Time, 2022

	N	%
ULCER TIME		
0-2 months- 1	2	28,58
2-6 months	4	57,14
>6 months	1	14,28
FOLLOW-UP TIME		
> 3 months and ≤ 6 months	7	100

Source: Own Elaboration, 2022

Diameter and Evolution of Diabetic Foot Ulcer (DFU)

The variation in the size of the DFU, as well as the reduction in the Bates Jensen scale score were evaluated in this study over time, as shown in Table 2. The outcome for cure was related to the evolution of total epithelialization in the DFU region of each of the seven patients.

The Bates-Jensen Wound Assessment Tool (BWAT) scale was used to evaluate the effectiveness of the response and follow-up of the scar repair conditions of the ulcers.[25] The BAWT contains 13 items that assess size, depth, edges, detachment, type and amount of necrotic tissue, type and amount of exudate, edema and induration of peripheral tissue, skin color around the wound, granulation tissue and epithelialization. The measurement scale is of the Likert type, with five points, where the number one indicates the best situation of the wound and five the worst. The total score is obtained as the sum of all items and can range from 13 to 65 points, with the highest scores indicating the worst wound situations. [25]

Bates Jensen's starting score ranged from 35 to 44, with an average of 40.14 points. After four weeks of treatment using the BAWT scale, there was a decrease of 22 to 34 points (mean 28.6 points) and an average rate of reduction of 34.43% in relation to the initial score according to Table 2.

Healing time of Diabetic Foot Ulcer (DFU)

The seven patients evolved with a DFU healing outcome with a follow-up time of more than three months and less than or equal to six months. This may be related to the care provided in primary health care. It is known that the care offered by PHC can reduce the rates of hospitalizations, costs and complications related to the disease, with foot ulcers being the main one and, consequently, amputations.

DISCUSSION

Regarding the etiology of the lesions, four had a diagnosis of neuroischemic etiology and three had a neuropathic presentation. According to the Brazilian Diabetes Society [6], peripheral neuropathy is present in 50% of patients with DM, it is recognized as the most common complication with a relevant factor for the emergence of DFU, specifically due to the loss of protective sensation that increases the risk of ulceration by seven times. [15] Epidemiological data show that in developed countries, lesions arise more frequently as a result of peripheral arterial disease to the detriment of peripheral neuropathy. [16]

It is observed in the sample that trauma was the main cause of the appearance of ulcers in three patients, followed by two due to calluses and one due to spontaneous causes. National and international studies indicate that the causes of emergence of DFU are diverse, but predominantly related to trauma due to lack of sensitivity, arising from the late complication of DM. [17-19]

Regarding the presence of infection, all patients had signs of infection classified as Grade I/mild. Grade I is characterized by purulent exudate plus the presence of two or more signs of inflammation, as classified by the International Working Group on Diabetic Foot (IWGDF) Practice Guidelines 12 of 2019. About 56% of diabetic ulcers progress to infection, and in general, approximately 20% of patients with an infected wound undergo limb amputation. [4] In developing countries, infection is the most common complication of ulcers. [16]

It is urgent to emphasize the importance of early intervention in the infection, helping to prevent failures in the healing of complex wounds, in this sense the nurse must be attentive, because the products contained in the purulent exudate, such as enzymes (collagenases, metalloproteinases and elastases) and toxins produced by bacteria, can damage viable cells and tissues and trigger or maintain a chronic inflammatory response delaying the healing process. [20] In addition, topical antimicrobials can be beneficial for the control of inflammation and infection, as they can provide high local concentrations, and as an advantage, potentially reduce bacterial load and protect from further contamination. [21]

Regarding the location of the ulcers, three patients had ulcers in the plantar region, two in the hallux and one in the dorsum region of the lateral foot. Neuropathic ulcers are usually located in areas under frequent pressure and friction, they are common in the plantar region of the hallux, head of the first metatarsal and dorsal region of the fingers, followed by

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the plantar regions of the other toes, heads of the other metatarsal bones, arch of the foot and heel. In ischemic ulcers, the location is distal, especially in the toes, in the interdigital regions and heels or in other places due to arterial occlusion. [22]

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The diameter of ulcers contributes to the outcomes of the variables in wound healing, in addition to being related to increased costs. [23] Lesions were measured from the linear dimensions (length and width) determined by the measurements of the greatest length and greatest width, with results expressed in square centimeters (cm2).

The initial size of the lesions ranged from less than four cm2 to up to 16 cm2. The ulcers had a healing outcome with a time greater than three months and less than or equal to six months. The mean percentage of ulcer diameter reduction was 36% in the first four weeks. The results suggest that the favorable evolution in wound healing in a shorter time helps in the healing process. This finding is pointed out in a study carried out in New York that evaluated 241 ulcers and revealed an average of 50% healing in 12 weeks. 25 Another study adds that a reduction of the area after four weeks of treatment was considered a valid tool to estimate the probability of healing of lesions. The authors recommend reassessing treatment for wounds that do not achieve 50% area reduction within the first four weeks of therapy. [26]

Regarding healing time, the time outcome presented by the research is characterized as a good result for DFU, considering that the average expected final cure is around six months among studies with clinical evidence, as they usually present a healing time longer than expected. [14,27]

The healing time of the diabetic foot ulcer, as well as the ulcer time are described in Table 3. Regarding the previous ulcer time, it was found that two patients had between 0-2 months (28.58%), four (57.14%) with >2-6 months and one (14.28%) with more than 06 months of injury time. DFU usually has a longer healing time than expected due to molecular and cellular changes that hinder or delay the physiological healing process. [27]

This process is often related to factors relevant to the etiology of the pathology, resulting in changes in the concentrations of metalloproteinases, excessive formation of advanced glycoxidation products, deficient neoangiogenesis, imbalance between metabolism and nutrient delivery, inadequate concentrations of growth factors and gene expression regulators, cellular abnormalities, neuropathy and high probability of infection and non-physiological inflammatory response. [27] An international study reveals that reported rates of neuropathic ulcer healing time ranged from 12 weeks, 20 weeks, six months, and 12 months. [28]

The dressings used during the treatments of the seven patients helped the healing outcome, polyurethane foam with and without ionic silver, hydrofiber with and without ionic silver, compress with solid Vaseline and iodine cadexomer were used. The dressings were used according to the clinical aspects presented during the follow-up of the lesion, according to the protocol developed by the research participants.

In the topical treatment of diabetic ulcers, usually due to the characteristic chronicity of these lesions, the use of dressings is more frequently observed in order to maintain the moisture balance in the wound bed and provide infection control. Thus, calcium alginates, hydrogels, hydrofibers, absorbent foams and coatings with antimicrobials such as silver are used more frequently according to clinical protocols. [22]

In this way, it is up to the nursing professionals involved in wound care to carefully establish the best coverage that corresponds to the clinical appearance of the lesion according to factors such as wound location, wound extension (dimension and depth), amount and type of exudate, predominant tissue type in the wound, perilesional skin conditions, presence/risk of infection. [22] Furthermore, the dressings must have specific properties to provide a suitable environment for the healing process 28 and evaluated for comfort for the patient.

In general, topical dressings help in a positive way in the healing process. In a study carried out through a systematic review on the comparison of dressings used for the treatment of DFU, no statistically significant differences were found in relation to the superiority of efficacy between the dressings. [30]

In addition to the use of special dressings, patients with a cured outcome underwent clinical and surgical interventions, such as the use of oral antibiotics, instrumental wound debridement, and hyperbaric oxygen therapy. Considering the aspects involved in curing the DFU, the treatment must encompass, in addition to the use of specific dressings, infection control, debridement, pressure relief, antimicrobial therapy, metabolic control, revascularizations when there is arterial compromise, adjuvant therapies and preventive measures that help in the healing process or prevent the appearance of new ulcers. [21] Studies add that negative pressure therapy, biological dressings, hyperbaric oxygen therapy and growth factors have reports of good results despite the high cost. [31]

Given the etiological complexity and complications resulting from diabetic foot ulcerations, prevention through specific care can reduce both the frequency and duration of hospitalizations and the incidence of amputations, infections, sepsis

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and morbidity and mortality. [14]

Consistent evidence highlights that patient education for the use of appropriate footwear and access to regular care by the multiprofessional team reduces the incidence of ulcer and amputation in patients with loss of protective sensation in the feet, considering that this alteration confers a seven times greater risk of developing a foot ulcer in diabetic patients. [14,31-33]

The Diabetic Foot International Consensus refers to the importance of implementing basic services in the community, with outpatient clinics linked to hospitals or specialized centers, in order to gradually establish an integrated network for the care of DM patients with varying degrees of foot problems, preferably conducted by general practitioners and endocrinologists and nurses. Research confirms this operating model as a determining factor in reducing amputations from 50 to 70%. [13-14,31-34]

In this way, the nurse's clinical experience in relation to coverage must be taken into account, as well as the guidelines that involve the self-care of Diabetes mellitus need to be present, such as the use of appropriate footwear, recommendation of zero load when appropriate, adequate hygiene of the lower limbs, attention to glycemic indices and especially glycated hemoglobin every three months, adequate physical activity and control of the emotional state to favor the healing process.

CONCLUSION

Patients with diabetes mellitus who presented healing outcomes in the dressing rooms of primary healthcare units in Salvador-Bahia, used special dressings and also adjuvant therapies, which corresponds to the literature recommendation when faced with complex wounds. The relevance of this work is related to the cure outcomes and the care provided to the patient in PHC.

The results obtained revealed that the management of infection control, the use of dressings, clinical and surgical interventions, as well as educational actions and multidisciplinary follow-up contributed to the healing outcome of diabetic foot ulcers. The study reveals that the favorable evolution in the first four weeks helps in the healing of the lesion in a shorter time, thus, the nurse must be attentive to the period and use of the chosen coverage and other therapy involved for the cure outcome, in order to achieve a reduction in the extension for the progression of complete closure in a period of up to six months.

By describing the cases that resulted in healing, this study intends to contribute as a relevant management tool for the institution of measures in the basic health unit that aim to accelerate the healing time, minimize the risk of complications, reduce costs and improve the quality of life of patients with diabetic ulcers.

The limitation of the study is related to the method chosen being a descriptive study, retrospective type, with regard to purely descriptive information, observed in highly selected individuals, with a specific pathology, but not compared to a reference population, with simultaneous determination of the factor of interest and the outcome under investigation. In addition, it was difficult to collect the data because they are retrospective. However, these cases are important tools for identifying risk groups, for more effective preventive and therapeutic action, in addition to stimulating the initiation of more detailed epidemiological studies on diabetic foot ulcers.

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