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Case Nursing Care for a Patient with Diabetes Mellitus Complicated by Multiple Lower Extremity Venous Ulcers

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Abstract

This article summarizes the nursing experience of wound care for a patient with diabetes mellitus complicated by multiple lower extremity venous ulcers. Based on comprehensive assessment and analysis of etiology with removal of causative factors, and according to the TIME-H principle of international wound treatment guidelines, staged interventions were implemented during different phases of wound healing to eliminate factors impeding wound healing; concurrently, grounded in evidence-based nursing practice, multiple assessment scales were utilized to conduct comprehensive and quantitative evaluations of the patient from a holistic to local perspective, and from physiological to psychosocial dimensions, thereby developing targeted, individualized, and precision-oriented holistic nursing care plans; under multidisciplinary collaboration, comprehensive nursing interventions encompassing blood glucose regulation, psychological care, pain management, and dietary and exercise guidance were implemented. These measures effectively ameliorated the patient's symptoms and promoted wound healing.

Full Text

Nursing Care of a Diabetic Patient with Multiple Venous Ulcers of the Lower Extremities: A Case Report

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Abstract

This article summarizes the wound care experience for a diabetic patient with multiple venous leg ulcers. Based on a comprehensive assessment and etiological

analysis to identify and address underlying causes, we implemented staged treatments according to the TIME-H principle of international wound care guidelines during different phases of wound healing to eliminate factors impeding recovery. Simultaneously, guided by evidence-based nursing practice, we employed multiple scales to conduct comprehensive and quantitative evaluations of the patient from systemic to local levels and from physiological to psychosocial dimensions, enabling the development of a targeted, individualized, and precise holistic nursing plan. Through multidisciplinary collaboration, we delivered comprehensive nursing interventions including glycemic control, psychological care, pain management, and dietary and exercise guidance. These measures effectively improved the patient's symptoms and promoted wound healing.

Keywords: venous leg ulcer; TIME-H principle; evidence-based nursing; holistic care; case report

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Venous leg ulcer (VLU) is a peripheral vascular disease associated with elevated venous pressure caused by deep venous valve insufficiency and impaired deep venous blood return due to calf muscle pump dysfunction [1]. Characteristically, VLU commonly occurs in the lower third of the calf (the "gaiter area"), exhibits recurrent episodes, and presents significant healing challenges. Factors such as obesity and diabetes can exacerbate chronic venous insufficiency, leading to persistent ulcers with courses lasting from months to years. These ulcers are frequently accompanied by periwound edema, marked capillary proliferation, and significant pain [2], severely impacting patients' quality of life and imposing substantial economic burdens on families and society. The patient in this case represents a typical VLU complicated by multiple factors affecting wound healing.

This case employed the TIME-H principle [3] for local wound intervention while developing a holistic nursing plan based on evidence-based practice guidelines to address the patient's systemic condition. Through comprehensive nursing interventions, we achieved favorable outcomes, which we now report.

1.1 General Information

The patient was an 86-year-old male, 1.8 m in height, weighing 86 kg (BMI 26.5), admitted on September 19, 2016. His chief complaint was: "Multiple ulcerations on both lower legs with severe pain, untreated for two years despite visiting multiple hospitals with progressively worsening condition. One week prior, a vascular surgery specialist at another hospital recommended surgical debridement with skin grafting or conservative dressing changes. The patient declined skin grafting and presented to our hospital." Past medical history included varicose veins for over 20 years, type 2 diabetes for over 10 years, knee arthritis for 8 years, and essential thrombocythemia diagnosed 5 years previously. He had been taking hydroxyurea and aspirin orally for platelet reduction continuously. Due to pain and limited mobility from lower extremity

ulcers, he had not visited the hematology department for follow-up in two years. He also took metformin and acarbose orally with poor glycemic control. The patient had stable vital signs, denied histories of hypertension, cardiovascular or cerebrovascular diseases, or immune system disorders, and reported no drug or food allergies. He had no smoking history. For the past two months, pain at the ulcer sites had caused poor sleep and limited daily activities.

Visual inspection revealed three ulcers: left ankle measuring 3.0 cm × 3.0 cm; left ankle superior region measuring 8.5 cm × 5.0 cm (lateral lower third of calf). Ulcers and showed tissue composition of <25% black and >75% yellow tissue with moderate, viscous yellow-green exudate. right Achilles tendon region measuring 3.2 cm × 3.5 cm with 100% yellow tissue and minimal yellow exudate. A foul odor was detectable at arm's length. Both lower extremities exhibited marked pigmentation with obvious periwound erythema.

Palpation revealed elevated skin temperature and significant tenderness within approximately 5 cm of the wounds, with a pain score of 6. Pitting edema was present below both knees. Ancillary examinations included: handheld Doppler: bilateral ABI = 1.0 (normal); lower extremity CTA: no arterial abnormalities; lower extremity venous color Doppler ultrasound: indicated venous insufficiency. Specialized neurological examination for diabetic neuropathy showed normal pain sensation, temperature sensation, pressure sensation, vibration sense, and ankle reflexes in both feet.

Laboratory abnormalities included: white blood cell count 11×10^9/L, neutrophils 66.2%, C-reactive protein 5.6 mg/L, fasting glucose 8.1 mmol/L, 2-hour postprandial glucose 12.3 mmol/L, and positive wound bacterial culture. Platelet count (280×10^9/L) and other parameters were normal. Clinical diagnosis: lower extremity venous ulcer; soft tissue infection; type 2 diabetes.

1.2 Treatment and Outcome

Upon admission, the patient received: intravenous anti-infection therapy and surgical debridement; antibiotics were discontinued after 2 weeks when local redness and swelling resolved. adjusted hypoglycemic medications for intensive glycemic control. oral analgesics as needed. hematology follow-up with temporary discontinuation of hydroxyurea per physician orders, monthly platelet count monitoring, and prompt re-evaluation if abnormalities occurred.

After 2 weeks of intervention, wound infection was controlled. The patient was discharged for outpatient dressing changes until complete wound healing.

2.1 Nursing Assessment

Specialized assessments included: CEAP classification (Clinical-Etiology-Anatomy-Pathophysiology): C6 (severe) [1]; Clinical severity VCSS score: 22 (severe) [1]; TIME-H healing potential assessment: 11 (uncertain healing) [3].

Holistic assessments comprised: wound pain score: NRS score 6 (moderate) [4]; Hospital Anxiety and Depression Scale HAD score:

2.2.1 Holistic Nursing Care

Debridement and Infection Control: We thoroughly removed necrotic tissue to reduce bioburden and exudate while controlling local infection. Within 4 weeks, granulation tissue coverage exceeded 75%. After inflammation resolved at 4 weeks, short-stretch compression bandaging was initiated until wound healing was achieved at 30 weeks.

Pain Management: For pre-dressing-change pain scores of 4–6, patients were instructed to take oral NSAIDs or centrally acting analgesics 30 minutes beforehand. If pain exceeded 6 during the procedure, a 0.5% lidocaine saline gauze was applied for 15 minutes before continuing [5]. Gentle technique, patient reassurance, and distraction through conversation were employed. Patients were advised to rest briefly before slowly rising after dressing changes. The patient reported gradually decreasing ulcer pain, reaching 0 on the VRS by 30 weeks. Pain scores decreased progressively with wound healing, dropping to 4 at 4 weeks. Analgesics were discontinued when resting pain fell below 4, with complete wound healing achieved by 25 weeks.

Dietary Guidance: The patient was advised to increase intake of vitamin- and micronutrient-rich foods and adequate protein (lean meat, eggs, milk) to support wound healing. Due to low activity levels and BMI of 26.5, a low-carbohydrate, light diet was recommended, with carbohydrates comprising 26%–45% of total daily energy intake [6] to maintain stable glycemic control.

Glycemic Monitoring: Patients were instructed to take medications as prescribed on schedule, targeting fasting glucose below 7 mmol/L and 2-hour postprandial glucose below 10 mmol/L.

Skin Protection: Throughout treatment, periwound dry and fragile skin was protected with barrier preparations to prevent pruritus and new ulcer formation from scratching.

Exercise Guidance: Patients were instructed to perform supine ankle pump exercises and bicycling movements, 5 sets each morning and afternoon, with each set lasting 1 minute, and to elevate the lower legs during rest to promote venous return and reduce edema [7].

Psychological Care: Patients were advised to listen to soothing music or read before bedtime to improve sleep and encouraged to increase physical activity. HAD anxiety scoring was performed every 4 weeks, decreasing to below 7 (normal) within 4 weeks. Family communication was facilitated, with children encouraged to maintain contact via WeChat and accompany the patient on weekly outings when possible. Community activities (Tai Chi, chess, singing) were encouraged to alleviate loneliness, with music, audiobooks, and television

recommended during solitary time. Social support assessment reached good (50 points) within 4 weeks.

2.2.2 Wound Care

Based on the patient's condition, wound care was divided into three phases.

Phase 1: Infection Control Period (Weeks 1–2): This phase focused on removing etiological factors, controlling infection, and providing systemic support. Necrotic tissue debridement was completed within 2 weeks, with disseminated infection controlled, periwound inflammatory signs eliminated, and viable tissue restored. No new ulcers or necrotic tissue developed, reducing reinfection risk. Conservative surgical debridement was primary, supplemented by autolytic debridement, using silver-containing lipid colloid dressings, foam dressings, and sterile cotton pads. Dressing changes occurred every 1–3 days based on exudate volume. Week 3 assessment showed: no odor; pain score 4 during changes; tissue type <25% yellow, >75% red; wound areas: 2.6 cm × 2.5 cm, 8 cm × 4.7 cm, 4 cm × 5 cm (all significantly reduced); minimal serous exudate; no periwound inflammatory signs with restored tissue viability.

Phase 2: Granulation Growth Period (Weeks 3–10): This phase provided a moist environment suitable for granulation tissue growth while protecting periwound skin to prevent new ulcers. Literature reports indicate hydroxyurea skin toxicity can cause lower extremity ulcers [8–9]; therefore, hydroxyurea was temporarily discontinued per physician orders after normal hematology results, reducing pathogenic factors. The goal was maintaining moisture balance and promoting granulation growth using hydrogel sheets or lipid colloid dressings covered with foam, with dressing changes every 5–7 days. Week 10 assessment showed: pain score 2 during changes; 100% red granulation tissue covering all wound beds; wound areas: 2.3 cm × 2 cm, 4.2 cm × 2.4 cm, 3.8 cm × 3.5 cm (further reduced); minimal serous exudate; slightly dry, itchy periwound skin treated with lipid-based protectant. Short-stretch compression bandaging was initiated to promote venous return and prevent increased tissue permeability from venous hypertension that could disrupt the wound healing microenvironment.

Phase 3: Epithelialization Period (Weeks 11–25): As the patient refused skin grafting, dressing changes continued using acellular dermal matrix dressings to facilitate epithelial coverage and bridge healing deficits, with dressing changes every 10 days. Compression therapy continued until complete epithelial coverage was achieved at 25 weeks, with all three wounds healed.

The treatment process is illustrated in Figures 1 [Figure 1: see original paper]–3: Figure 1 shows infection control completion at Week 3 (October 12); Figure 2 [Figure 2: see original paper] shows granulation growth completion at Week 10 (December 2); Figure 3 [Figure 3: see original paper] shows epithelialization at Week 24 (March 6).

2.3 Nursing Effectiveness Evaluation

Intervention outcomes are shown in Figures 4 [Figure 4: see original paper]–6: Figure 4 shows initial presentation on September 19; Figure 5 [Figure 5: see original paper] shows healed wounds at Week 25 (March 15); comparison of pre- and post-treatment.

3 Results and Follow-up

After healing, monthly WeChat follow-up was conducted for one year to guide prevention of recurrence and prompt medical attention if problems arose. The patient was advised to continue hypoglycemic medications and maintain healthy lifestyle and dietary habits. The patient expressed high satisfaction with the entire treatment process, established good relationships with healthcare staff, and demonstrated strong compliance.

This case was identified as a refractory lower extremity venous ulcer through VCSS assessment, CEAP classification, and wound healing potential evaluation. Chronic wounds lose natural healing capacity and require identification and removal of various impeding factors to create a favorable local microenvironment for physiological healing. By identifying etiologies and actively controlling underlying diseases, adjusting medications per physician orders, and removing systemic pathogenic factors, combined with TIME-H principle-based local debridement, appropriate wound care products, and periwound skin protection, we achieved local infection control, provided suitable conditions for granulation growth, and prevented new ulcer formation. This principle provides a theoretical foundation for VLU clinical practice.

Compression therapy is the gold standard for lower extremity venous disease [10], demonstrating significant efficacy in preventing and treating VLU and lymphedema. With normal ABI and no lower extremity arterial disease, this patient received short-stretch compression bandaging, which effectively improved venous hypertension from inadequate calf muscle pump function due to mobility limitations, promoted venous return, and improved the interstitial microenvironment. The high working pressure and low resting pressure characteristics maintained comfort without compromising arterial supply, effectively promoting VLU healing [11].

Refractory wounds result from multifactorial skin damage; wounds cannot heal without etiological control. Accurate identification and specialized management of causes combined with proper wound care are essential for ultimate healing [12]. The multidisciplinary collaborative nursing model, centered on the patient and strengthening physician-nurse synergy, facilitates timely adjustment of treatment plans and rapid implementation of nursing measures, creating a seamless and efficient care model while avoiding wasted medical resources from multiple appointments. This case involved a multidisciplinary team comprising endocrinology, surgery, and dermatology physicians, rehabilitation therapists, and wound care specialists, providing comprehensive interventions including dis-

ease control, surgical debridement, pain management, rehabilitation training, psychological counseling, and dietary guidance. This approach delivered more comprehensive, humanistic, and continuous quality care, improving healthcare accessibility and implementing innovative medical service models worthy of promotion.

This nursing approach, focusing on wound care, disease control, pain management, psychological support, and rehabilitation training, achieved excellent outcomes, improved quality of life, and created positive social benefits. However, diabetic lower extremity venous ulcers present complex conditions with significant treatment challenges and long cycles, requiring active patient and family cooperation. Therefore, wound care specialists must continuously learn more efficient healing strategies to shorten treatment duration and minimize patient suffering [13].

Informed consent for case report publication was obtained from the patient and family.

Conflict of Interest Statement: The authors declare no conflicts of interest.

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