

## Nursing care in a patient with post-traumatic cellulitis: A case study

Cuidados de enfermería en paciente con celulitis postraumática: estudio de caso  
Assistência de enfermagem em pacientes com celulite pós-traumática: estudo de caso

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### ABSTRACT

Cellulitis is a localized infection of soft tissues that occurs due to the entry of bacteria through a disruption in the skin barrier. This clinical case presents the results of implementing nursing care in a patient with post-traumatic cellulitis. This is a qualitative case study in which Maryory Gordon's functional patterns were assessed in the patient, and a care plan was applied using the NANDA, NIC, and NOC taxonomies. Comfort, pain, and self-perception of her image were the prioritized diagnoses in the patient. This helped make interventions aimed at improving health and quality of life. It was determined that the nursing care provided helped maintain a balance in the patient's health condition, thus achieving progressive recovery.

**Keywords:** cellulitis; health education; nursing care; therapeutic interventions.

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### Scientific contribution:

This case provides practical evidence regarding the recovery of a patient with post-traumatic cellulitis, highlighting the value of nursing clinical judgment as a key tool for guiding timely and effective interventions in primary care settings, particularly in resource-limited contexts.

## INTRODUCTION

The outermost organ of our body is the skin. It can regenerate and function both as a protective barrier and an immune regulator. When any process alters its integrity, an infection may develop (1).

Depending on the process and manifestation, skin infections can be classified as primary, secondary (superinfections), or toxin-mediated. Based on the microorganism that causes them, they are categorized as bacterial, viral, and fungal (2).

Cellulitis is a localized infection of the soft tissues that occurs when bacteria enter through an alteration in the skin barrier. These conditions are quite common in healthcare services, making early diagnosis essential to ensure timely and appropriate treatment. Healthcare experts must be properly trained in their clinical presentation, diagnosis, and therapeutic alternatives to provide effective care (3).

Post-traumatic cellulitis is defined as a bacterial infection that develops after a skin injury, particularly when wounds are managed under less-than-ideal conditions. Its management requires the use of broad-spectrum antibiotics, drainage of secretions if necessary, and rigorous monitoring to prevent complications such as abscess formation, septic arthritis, or even necrotizing fasciitis (4).

Skin and soft tissue infections (SSTIs) are one of the main reasons for medical consultation globally, surpassed only by respiratory and urinary tract infections (5). In Colombia, the prevalence of these infections is often associated with the microorganism *Staphylococcus aureus*, with 1,134 cases reported between 2009 and 2016 (6).

The purpose of this case study is to ensure comprehensive, humanized, and dignified care, focused on providing greater comfort to the patient during her recovery process and adaptation to changes in self-care habits and prevention of complications. Based on the above, it is necessary to perform an assessment using Marjory Gordon's eleven

functional health patterns (7), followed by classification according to the human need hierarchy proposed by Maslow and Kalish (8). Subsequently, nursing care planning and implementation are carried out using the NANDA (9), NOC, and NIC (10) taxonomies.

This report was prepared in accordance with the ethical principles established in the Declaration of Helsinki (11). At the same time, the patient was duly informed about the objectives, scope, and characteristics of the publication, and gave her written informed consent for the use of her clinical information in a confidential and anonymized manner. The protection of her identity and respect for her dignity and autonomy were always guaranteed.

## CASE PRESENTATION

This report documents the nursing care experience provided to an adult female patient who was involved in a traffic accident on March 16, 2025, while riding a motorcycle on her way home. As a consequence, the patient presented with a V-shaped traumatic wound on the left knee, approximately 6 centimeters in length, which was initially treated at a low-complexity healthcare center. However, the following day, she returned with clear signs of infection: severe pain, edema, erythema, localized warmth, and foul-smelling discharge from the suture area. She even experienced fever spikes. During a comprehensive assessment conducted by the interdisciplinary team, local inflammatory signs consistent with soft tissue infection were identified. After the team's assessment, the patient was diagnosed with post-traumatic cellulitis, with clinical progression consistent with a soft tissue infection secondary to trauma. This situation highlights the importance of a transdisciplinary approach in the care provided to the patient, recognizing the active participation of nursing, medical, and other healthcare professionals in providing comprehensive care.

The following section presents the progression of the wound based on the nursing care provided during the patient's hospital stay and recovery process.

**Table 1.** Timeline of Post-Traumatic Cellulitis.


Wound progression from March 16 to March 29, 2025		
Day	Wound Photographs	Description
Day 1		On the first day, an abrasive laceration-type wound was observed on the left knee, with two wounds located in the patellar region—one in the upper part and the other in the lower part. Both wounds were approximated by primary intention and showed no signs of infection. In addition, satellite lacerations were evident in the proximal area, while in the distal region, linear lacerations of shallow depth and moderate length were observed, measuring approximately 10 cm, involving the subcutaneous tissue.

Table 1. (Continuation).






Wound progression from March 16 to March 29, 2025		
Day	Wound Photographs	Description
Day 3		The wounds showed signs of infection, characterized by redness, edema, and increased temperature in the area. Moreover, the patient reported applying aloe vera and blackberry leaves to the wound, later covering it with kitchen cloth, which may have contributed to the development of the infection.
Day 5		The lesions showed clear signs of infection, including erythema, edema, and increased temperature in the area. The patient reported having applied magnesium sulfate to the wound and, after walking, began to experience drainage of a bloody, foul-smelling exudate, suggesting a progressive superinfection.
Day 7		In this image, a partial improvement of the post-traumatic cellulitis can be observed, with a reduction in edema and decreased local temperature. The wound shows granulation tissue formation, although with irregular and indurated areas. In addition, moderate sensitivity is evidenced upon palpation, and gentle pressure over the suture area revealed the drainage of bloody exudate, indicating a persistent inflammatory process and incomplete healing.
Day 9		The wound was in the proliferative phase of healing, with active formation of granulation tissue. A reduction in edema and local temperature was observed, although mild induration persisted in the area. Moreover, vascularization was evident, which promotes tissue regeneration. On palpation, sensitivity has decreased; however, a small amount of bloody exudate is still evident, indicating that the healing process is progressing, although it is not yet fully consolidated.
Day 11		Post-traumatic cellulitis was observed in the affected area, characterized by edema and increased temperature. In addition, the skin showed induration and increased sensitivity on palpation. When pressure was applied to the suture area, purulent exudate was observed, suggesting an active infectious process with possible abscess formation.

Table 1. (Continuation).

Wound progression from March 16 to March 29, 2025		
Day	Wound Photographs	Description
Day 1		On the first day, an abrasive laceration-type wound was observed on the left knee, with two wounds located in the patellar region—one in the upper part and the other in the lower part. Both wounds were approximated by primary intention and showed no signs of infection. In addition, satellite lacerations were evident in the proximal area, while in the distal region, linear lacerations of shallow depth and moderate length were observed, measuring approximately 10 cm, involving the subcutaneous tissue.

## TREATMENT PLAN

Initial wound management was performed at a low-complexity hospital with access to basic wound care supplies but with structured protocols and manuals for wound management. Similarly, a comprehensive approach based on scientific evidence and appropriate in-hospital care processes was applied, including the prevention of concomitant infections, tissue decontamination, and the promotion of early wound healing, which yielded positive results without the need for advanced techniques.

The intervention focused on the patient's daily education, prioritizing the non-contamination of the wound with other fluids, reducing the mobility of the affected limb, adjusting the hospital diet (high-protein and high-fiber diet), and adjusting the pharmacological therapy to ensure broad-spectrum analgesia.

Within the in-hospital practice, regulated wound cleansing was performed using a povidone-iodine solution, an antiseptic with broad-spectrum activity and over half a century of validated clinical use. Povidone-iodine is effective against gram-positive and gram-negative bacteria, fungi, viruses, and spores, making it a key tool for decontamination in primary care settings. Unlike other antiseptics, its use does not generate bacterial resistance and has an acceptable safety profile when used correctly. Its availability, low cost, and proven effectiveness make it recommended even by international guidelines for the initial treatment of wounds.

Similarly, as part of the edema control strategy and the removal of purulent exudate, a magnesium sulfate solution was used. Its osmotic properties are effective in promoting local drainage and reducing pain and inflammation. Although its use has been largely

replaced in high-complexity centers by more sophisticated alternatives, it remains a valid option at the first level of complexity, especially when used under clear clinical criteria and with daily monitoring of tissue status.

In line with the adequate progression of the wound, nitrofurazone ointment was introduced as an adjuvant treatment due to its effective antimicrobial activity against a broad spectrum of bacteria. This medication is notable for its ability to interfere with bacterial enzyme synthesis, enabling it to act on both gram-positive and gram-negative bacteria. It represents a valuable therapeutic option for the topical management of complicated wounds, particularly when the patient has not developed clear signs of systemic infection, such as sepsis, bacteremia, or multiple organ failure.

It is worth noting that the interventions described were not only clinically appropriate for the context but also aligned with an evidence-based approach, tailored to the resources available at the low-complexity institution. The subsequent clinical evolution—marked by a reduction in erythema, pain, and purulent secretion, along with an increase in scar tissue—confirms the efficiency of the treatment provided. This demonstrates that, even under limited conditions, it is possible to provide safe and effective care through the correct application of nursing clinical judgment and the optimal use of available resources.

After the assessment of Marjory Gordon's eleven functional health patterns, the three priority nursing diagnoses were selected, considering the hierarchy of physiological needs described by Maslow and Kalish. Based on these diagnoses, the expected outcomes and nursing interventions were established.

**Table 2.** Care plan.

NANDA Diagnoses	NOC Planning	NIC Interventions
<p>Domain 11: Safety and protection</p> <p>Class 2: Physical injury</p> <p>Dx: Impaired tissue integrity (00044)</p> <p>(R/T): Inadequate caregiver knowledge regarding maintenance of tissue integrity; inadequate caregiver knowledge regarding protection of tissue integrity; inappropriate use of chemical agent.</p> <p>(MB): Acute pain, decreased muscle strength, impaired skin integrity, edema, erythema, localized warmth, foul-smelling discharge in the suture area, and hyperthermia.</p>	<p>Pain Level (2102)</p> <p>Domain: Perceived Health (V)</p> <p>Class: Symptomatology (V)</p> <p>Definition: Intensity of referred or manifested pain.</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• Facial expressions of pain (210206)</li> <li>• Restlessness (210208)</li> <li>• Grimacing due to pain (210224)</li> </ul>	<p>Pain Management (1400)</p> <p>Field: Physiological-basic</p> <p>Care that supports physical functioning.</p> <p>Class: (E) Promotion of physical comfort. Interventions to promote comfort using physical techniques.</p> <p>Activities:</p> <ul style="list-style-type: none"> <li>• Activities were carried out to help reduce or prevent increased pain, such as raising the bed rails to prevent falls and worsening of pain, as well as dressing the wound.</li> <li>• The wound area was immobilized to reduce pain.</li> <li>• Antibiotics were administered to control the infection that was causing the patient's pain.</li> <li>• The Kardex was updated and adjusted for better management.</li> <li>• Analgesics were administered at the appropriate times to prevent fluctuations in pain relief, particularly during episodes of greater intensity.</li> <li>• Optimal pain relief was achieved using the prescribed analgesics.</li> </ul>
<p>Domain 6: Self-perception</p> <p>Class 2: Self-esteem</p> <p>Dx: Situational Low Self-Esteem (00120)</p> <p>(R/T): Difficulty ambulating, functional limitation resulting from the infectious process, partial dependence on others for basic activities, financial problems in the family, disruption of usual household role, perception of personal inadequacy, and altered body image secondary to the infected wound.</p> <p>(MB): Expresses feelings of being a burden on the family, constant concern about the impact of health status on the environment, verbalizes discouragement, decreased interest in self-care, displays a passive attitude toward the recovery process, occasional crying without apparent cause, exhibits body language suggestive of sadness or social withdrawal.</p>	<p>Self-esteem (1205)</p> <p>Domain: Psychosocial health (III)</p> <p>Class: Psychological well-being (M)</p> <p>Definition: Personal judgment about one's own abilities.</p> <p>Indicators:</p> <ul style="list-style-type: none"> <li>• Verbalizations of self-acceptance (120501)</li> <li>• Statements of pride (120518)</li> <li>• Feelings about oneself (120519)</li> </ul>	<p>Self-Esteem Enhancement (5400)</p> <p>Field: Behavioral (Cont.)</p> <p>Class: (R) Coping Assistance</p> <p>Activities:</p> <ul style="list-style-type: none"> <li>• A supportive environment was facilitated, and activities aimed at strengthening the patient's self-esteem were implemented.</li> <li>• Situations that triggered the patient's emotions were explored.</li> <li>• Empathic and supportive statements were provided to enhance her emotional well-being.</li> <li>• The patient was accompanied during periods of heightened anxiety, offering reassurance and support.</li> <li>• Assistance was provided in decision-making to foster her confidence and autonomy.</li> <li>• She was guided by exploring a new business venture that could help improve her financial situation and, in turn, her emotional well-being.</li> <li>• She was educated and provided with resources and skills to facilitate access to financial assistance.</li> </ul>

Based on NANDA I 2021-2023, NOC 2023, and NIC 2023 (12-14). DX: diagnosis; R/T: 'related to'; MB: 'manifested by'; Cont.: continuation of intervention.

Table 2. (Continuation).

NANDA Diagnoses	NOC Planning	NIC Interventions
Domain 1: Health Promotion Class 2: Health Management Dx: Risk-Prone Health Behavior (00188) (R/T): Inadequate understanding of health management. Does not take measures to prevent health problems. (MB): Improper wound management during dressing changes. Poor adherence to pharmacological treatment at home. Covers the wound with dirty T-shirts. Inadequate nutrition.	Risk control: Infectious process (1924) Domain: Health Knowledge and Behavior (IV) Class: Risk Control and Safety (T) Definition: Personal actions to understand, avoid, eliminate, or reduce the threat of acquiring an infection. Indicators: <ul style="list-style-type: none"> <li>Identifies risk factors for infection (192426)</li> <li>Identifies signs and symptoms of infection (192405)</li> <li>Controls personal behaviors associated with factors related to the risk of infection (192408)</li> </ul>	Facilitating Self-Responsibility (4480) Field: Behavioral (Cont.) Class: (O) Behavioral Therapy Activities: <ul style="list-style-type: none"> <li>The degree of responsibility for the patient's current health condition was discussed with her.</li> <li>It was determined whether the patient had adequate knowledge about her health condition and care.</li> <li>She was explained about the consequences of not assuming responsibility for the proper management of her own health.</li> <li>Risks that could affect her health condition were identified, such as wearing a shirt on her foot, applying herbs over her knee, poor nutrition, and environmental factors, and she was provided with information on the importance of proper care.</li> <li>The patient was encouraged to assume as much responsibility as possible for her own self-care.</li> </ul>

Based on NANDA I 2021-2023, NOC 2023, and NIC 2023 (12-14). DX: diagnosis; R/T: 'related to'; MB: 'manifested by'; Cont.: continuation of intervention.

## DISCUSSION

The main purpose of this case study is to critically, reflectively, and thoroughly analyze the nursing care provided to a female patient with post-traumatic cellulitis in the context of a low-complexity health center. This scenario presents significant challenges for clinical practice, particularly regarding the availability of resources and diagnostic support. These limitations are not attributable to shortcomings in the preparation of highly trained and committed staff but rather reflect persistent structural barriers within the healthcare system, stemming from insufficient funding that affects the quality and continuity of care at the primary healthcare level.

In line with the above, it is evident that the lack of post-discharge home care represented a weak link in the continuum of care, the absence of which had direct implications for the unfavorable progression of the patient's clinical condition. Despite the timely intervention provided within the institutional setting, the continuity of care was disrupted by the lack of structured and funded mechanisms to enable extramural follow-up—a common reality in many primary healthcare settings.

Home care, when properly implemented, constitutes a fundamental strategy for treatment adherence, provides contextualized care, and detects complica-

tions or deviations from the therapeutic plan. This model allows healthcare professionals to closely monitor the patient's health condition, provide educational reinforcement, adjust interventions, and prevent adverse outcomes. As a result, not only is the patient's quality of life improved and the risk of hospital readmissions reduced, but healthcare costs are also lowered by avoiding unnecessary hospitalizations and optimizing the use of available resources (15, 16).

In line with the above, three critical factors were identified that directly compromised the patient's clinical progression: Non-compliance with the prophylactic antibiotic scheme, improper wound management without aseptic technique or professional supervision, and the adoption of traditional interventions lacking scientific evidence—such as the application of black nightshade, aloe vera, and unidentified chemical substances on the sutured area—were identified. These practices, which are deeply rooted in certain cultural contexts, can alter skin pH, cause irritative reactions, and promote microbial proliferation.

According to a study conducted by Naik et al. (17), it was demonstrated that the ethanolic extract of aloe vera leaves exhibits significant antibacterial activity, with a mean inhibition zone diameter of  $13.0 \pm 6.0$  mm against *Staphylococcus aureus* and  $16.7 \pm 8.4$  mm

against enterobacteria, using the Punch Well method ( $p \leq 0.002$ ). In contrast, natural aloe vera gel showed no inhibitory effect against any of the isolated bacteria analyzed ( $p < 0.001$ ). Similarly, a mean minimum inhibitory concentration (MIC) of  $94 \pm 41.23$  mg/mL against *S. aureus* and  $45.6 \pm 20$  mg/mL against enterobacteria was documented ( $p < 0.001$ ), while the minimum bactericidal concentration (MBC) was  $188 \pm 82.46$  mg/mL and  $91.18 \pm 40$  mg/mL, respectively ( $p < 0.001$ ).

These findings not only reinforce the antimicrobial potential of ethanolic extract but also call into question the widespread empirical use of natural aloe vera gel, particularly in contexts of traditional or home-based medicine. Far from providing a therapeutic benefit, its direct application to healing tissues could pose a clinical risk by potentially acting as a vector for microbial contamination, thereby compromising the integrity of the repair process. Consequently, this underscores the need to differentiate between processed extracts supported by scientific evidence of antimicrobial efficacy and raw forms lacking such validation, particularly when applied to vulnerable or exposed surfaces.

## CONCLUSIONS

The initial assessment served as a key tool in identifying critical alterations in the patient's health condition, such as severe pain, difficulty falling asleep, and ineffective management of analgesics. This phase allowed us not only to establish an accurate diagnosis but also to design an individualized care plan aimed at improving comfort, promoting recovery, and preserving quality of life.

The use of the NANDA, NIC, and NOC taxonomies facilitated the structuring of an evidence-based nursing care process, enabling the identification of diagnoses that comprehensively addressed the patient's physical, emotional, and behavioral dimensions. Among the main issues identified were impaired skin integrity, risk of infection, situational low self-esteem, and health behavior prone to risks. The implementation of specific and contextualized interventions promoted a favorable clinical evolution, demonstrating both the effectiveness of nursing clinical judgment and the value of person-centered care.

### Conflict of Interest:

The authors declare no conflict of interest.

### Funding:

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### Ethical Approval:

The patient gave her written informed consent for the confidential and anonymized use of her clinical information in this case study.

### Authorship Contribution:

**PYNP:** conceptualization, data curation, formal analysis, research, writing of the original draft.

**CAPB, CSOC:** writing of the original draft, writing - review & editing.

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