

Case Report

Development of Pressure Ulcer in a Burn-Injured Patient: An Evidence-Based Nursing Care Process - Case Report

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Abstract

The joint definition of pressure ulcers by the European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) states, "Localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure alone or in combination with shear." Treating pressure ulcers proves challenging and contributes to increased costs due to prolonged hospitalization stays.

In this case study, we address the care of a patient, 18 years of age, hospitalized due to burns, tracheostomized, with a percutaneous endoscopic gastrostomy tube, unconscious, and developed a pressure ulcer. The objective is to provide care for the patient with a stage 3 pressure ulcer on the sacrum by current guidelines. When planning care, a multidimensional assessment was scheduled alongside wound care. Skin assessment and care, appropriate wound dressing selection, nutrition, weight monitoring, hydration, repositioning, and the utilization of support surfaces were carried out as per guidelines. The overall roadmap followed includes: recognizing and staging pressure ulcers, treatment modalities for staged ulcers, monitoring, and basic care principles for pressure ulcers (nutrition, pain management). Following the implemented interventions, the patient's pressure ulcer showed signs of healing.

Keywords: pressure ulcer, nursing, nursing care

Introduction

The common definition of pressure ulcers by the European Pressure Ulcer Advisory Panel (EPUAP) and the National Pressure Ulcer Advisory Panel (NPUAP) states, "Localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure alone or in combination with shear" (EPUAP, 2006). Pressure ulcers, also known as pressure sores or bedsores, occur due to the complete closure of capillaries in the skin and subcutaneous tissues resulting from prolonged or repetitive pressure on affected areas of the body, leading to necrosis and ulceration. These ulcers typically manifest over bony prominences such as the ischium,

greater trochanter, sacrum, heel, and occiput. Both external and internal factors contribute to the formation of these ulcers, with external factors including pressure, friction, shear force, and moisture, while internal factors include fever, malnutrition, anemia, and endothelial dysfunction (EPUAP, 2006; Collins 2001).

Among the etiological factors, individuals with spinal cord injuries, other neurological impairments, or a history of intensive care unit (ICU) admissions are commonly found in the literature. Patients in these groups often fail to relieve pressure due to their unawareness of discomfort, leading to pressure ulcer development from prolonged

pressure exposure. Although pressure ulcers are largely preventable, they continue to pose a significant problem in the healthcare system (Bennett et al., 2004; Reddy et al., 2006). Pressure ulcers cause individuals to experience severe pain and discomfort, prolong hospital stays, require longer and more extensive nursing care, deteriorate individuals' quality of life, and increase mortality rates (Boyko, et al., 2018; Graves et al., 2005; Inan and Oztunc 2012). Bauer et al. (2016) found in their study that the average length of hospital stay for patients with pressure ulcers was 7 days compared to 3 days for those without pressure ulcers. This situation increases care costs and healthcare expenditures. According to the Pressure Ulcer Treatment Cost-Effectiveness Analysis report conducted in Turkey, the average daily cost of a patient with Stage 1 and Stage 2 ulcers was determined to be \$196.5, whereas, for a patient with Stage 3 or Stage 4 ulcers, it was \$268. It was observed that treatment costs increased as the stages progressed (Oksuz et al. 2016) Therefore, the effective utilization of national resources and prioritizing patient benefits by following specific processes (such as risk assessment, skin care, patient and staff education, etc.) are crucial for reducing the incidence of pressure ulcer development. This case study aims to present wound healing, nursing management, and patient rehabilitation in a patient who developed pressure ulcers due to a multitude of internal and external factors (Boykotatiana et al., 2018; Graves et al., 2005; Inan and Oztunc 2012).

Case Report

E.G. A male patient, aged 18, was exposed to smoke and flames during a fire accident at the factory where he worked. As a result, he sustained second and third-degree burns on multiple parts of his body. Following initial treatment in the emergency department, he was admitted to the burn intensive care unit for further evaluation and management. Approximately 60% of the patient's body surface area was covered with second and third-degree burns, as per Wallace's rule of nines (Cheah et al. 2018). During his hospitalization, he received dermatological baths and burn dressings on a daily or every other day basis. The patient underwent a total of 2 skin graft surgeries. During the last graft

surgery, the patient experienced a cardiac arrest and received cardiopulmonary resuscitation. Upon restoration of cardiac rhythm, he was placed on mechanical ventilation via endotracheal intubation and continued to receive treatment in the burn intensive care unit. Throughout his 140-day stay in the burn intensive care unit, the necessary treatments were administered, and a tracheostomy was performed. Following a period of mechanical ventilator support via the tracheostomy, the patient was eventually weaned off and transitioned to room air before being transferred to the general ward. Due to inadequate swallowing reflex, a percutaneous endoscopic gastrostomy (PEG) tube was placed 10 months ago for long-term enteral feeding. The patient, who had been followed up in the burn unit for two years, developed a pressure ulcer in the coccygeal region. The patient was evaluated according to the National Pressure Ulcer Advisory Panel (NPUAP) classification, revealing stage 3 pressure ulcers in the coccyx. (table 1-foto-1)

Pressure Ulcer Nursing Care

The nursing care applied for pressure ulcers has been prepared by the guidelines for the Prevention and Treatment of Pressure Ulcers/Wounds, as established by the European Pressure Ulcer Advisory Panel (EPUAP), National Pressure Ulcer Advisory Panel (NPUAP), and Pan Pacific Pressure Injury Alliance. Evidence-based interventions tailored to the patient have been implemented (EPUAP, 2006).

Risk Assessment

It is important for healthcare professionals to have comprehensive knowledge on how to perform a thorough skin assessment. Evaluating and monitoring the skin for localized temperature, edema, induration, pain, and pressure caused by medical devices should be increased if there is any deterioration in the individual's condition (Evidence B, strong positive recommend).

The patient's risk of pressure ulcers has been assessed daily. The Braden Risk Assessment Scale has been utilized for risk assessment. The Braden Risk Assessment Scale consists of 6 subscales: sensory perception, moisture, activity, mobility, nutrition, friction, and

shear. The total score ranges from 6 to 23, with a lower total score indicating a greater risk of pressure ulcer development.

Despite previously taken precautions, in cases where pressure ulcers develop, the priority intervention is to determine the stage of the ulcer and adjust the treatment accordingly. In this case, the pressure ulcer stage was determined to be stage 3 according to the staging system established by NPUAP-EPUAP (Evidence A, strong positive recommendation).

Skin Assessment and Care

The patient, being tracheostomized, unconscious, immobilized, and having extensive burn areas, has been determined to

be at high risk for pressure ulcers (Evidence A, strong positive recommendation). Therefore, the patient has been taken to the hydrotherapy room daily for dermatological baths and dressings, ensuring that the entire body is evaluated for pressure ulcers at least once daily (Evidence B2, strong positive recommendation). Particularly high-risk areas such as the heels, sacrum, ischial prominences, femoral trochanters, body areas exposed to pressure, friction, and shearing forces during daily activities, body parts subject to external forces with clothing and devices, elbows, temporal region of the skull, occiput, and toe tips have been monitored for potential new pressure ulcers (Evidence C, weak positive recommendation).

Table 1: Pressure Ulcer Staging System

Suspected deep tissue damage	Skin integrity is intact.
Stage 1	Redness that does not fade with pressure
Stage 2	Partial loss of the dermis layer
Stage 3	Loss in skin and subcutaneous tissue layers
Stage 4	Full thickness tissue loss
stage that cannot be staged	Loss of all layers of skin or tissues (depth unknown)



Stage 3 coccyx pressure sore (14.05.2023)



After Stage 1 treatment (02.06.2022)

The existing pressure ulcer's location, stage, dimensions, tissue type(s), condition of the

wound bed and surrounding skin, wound edges, exudate, necrotic tissue, odor, presence

of granulation tissue, and epithelialization have been evaluated. Intensive care nursing observations have been recorded hourly and daily. The patient, who receives daily skin cleansing, has had the selection of wound dressings changed according to the condition of the wound during the treatment period (Figure 1). The wound care product used has been selected based on its ability to remove excess exudate, provide effective drainage, and have good absorbent properties (Evidence B1, strong positive recommendation). Mostly, boric acid has been used as the wound dressing. Studies have shown that fibroblast culture environments exhibit increased TNF-

α and mRNA levels after boron treatment, which is crucial for wound healing (Engels 2016). Especially, it has been reported that boric acid is readily absorbed through torn or damaged skin (Engels 2016). We have also confirmed this in our patient. A photograph of the pressure ulcer area has been taken at each dressing change. Aseptic wound washing has been performed as the dressing becomes soiled or every 8 hours, following physician orders. Skin barrier creams have been used to prevent moisture exposure and contact with stool for patients using diapers, as per physician request (Evidence B2, strong positive recommendation).

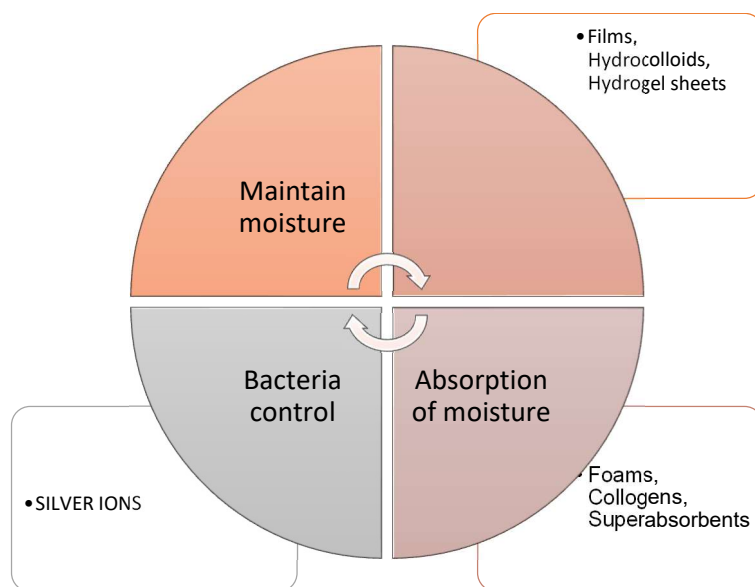


Figure 1: Wound Dressing Selection

Nutrition

A comprehensive nutritional assessment has been conducted for the patient since admission due to the risk of pressure ulcers. Nutritional status affects the incidence and severity of pressure ulcers. It is important to assess the nutritional status of at-risk individuals and monitor their nutritional outcomes. (Evidence B2, strong positive recommendation). The patient has been weighed every Monday before dressing

changes. The patient's weight was recorded at 65 kg on 14.02.2022. The patient's height is 1.76 m. Subsequent measurements showed a fluctuation of ± 1 kg in weight. A personalized nutritional care plan has been developed and implemented in collaboration with a dietitian. The patient receives an enteral solution twice daily. The enteral product provided to the patient is high in calories, protein, and vitamins. The patient is receiving 30 to 35 kcal per kilogram of body weight and 1.2 to 1.5 grams of protein per kilogram of body

weight daily (Evidence B1, strong positive recommendation). The patient's blood values have been regularly monitored every week on a specified day.

The patient has been closely monitored, especially for hemoglobin and serum albumin levels. Low hemoglobin levels can increase the risk of pressure ulcer development due to reduced oxygen delivery to tissues (Pilsbury 2007).

Therefore, regular monitoring is necessary. Low serum albumin levels can lead to edema due to decreased oncotic pressure and disrupt blood circulation. Additionally, tissue integrity can be easily compromised with pressure, friction, or trauma (Stetler et al., 2007; Schoonhoven et al., 2002).

Therefore, blood values have been checked at regular intervals. Fluid intake and output monitoring have been conducted daily to ensure adequate hydration for the patient. (Best Practice Implementation IUB)

Positioning and Use of Support Surfaces

Initially, an air mattress was placed for the patient due to unconsciousness and immobility (Evidence B1, strong positive recommendation). Wrinkles and creases in the bed sheet have been checked and prevented with each change of position (IUB). To prevent prolonged pressure on bony prominences, minimize contact between them, and reduce damage from friction and shearing, the patient's position in bed has been changed every two hours. The bed has not been elevated more than 30 degrees at the head to prevent the patient from slipping. The head of the bed has been kept as flat as possible.

(Evidence B1, strong positive recommendation) A program of positioning the patient on the right side, supine, and left side at 30-degree angles has been implemented. Prone positioning has not been used for extended periods unless necessary.

(Evidence B1, strong positive recommendation) Heels have been supported to prevent foot drop. When positioning the patient, lifting with sheets rather than pulling has been ensured. (Evidence B2, weak positive recommendation) Range of motion (ROM) exercises have been performed to

facilitate movement by the change in position. Since the burn wound is highly exudative, sheet changes have been performed at frequent intervals to prevent excessive exposure to moisture.

The use of support surfaces is crucial in the prevention of pressure ulcers. As an appropriate support surface, we used a silicone cushion for the patient. Additionally, we evaluated the effectiveness of the support surface each time (Evidence C).

Discussion

Pressure ulcers represent a condition that disrupts skin integrity, increases infection risk, reduces the patient's quality of life, and prolongs treatment duration (Suva et al., 2018; Lin et al., 2020). They are considered a key indicator of healthcare quality worldwide and in our country, highlighting the need for improvement in care standards. Despite being largely preventable, their frequent occurrence often signifies insufficient healthcare quality.

Evidence-based practices for preventing pressure injuries have been identified as crucial for delivering safe healthcare services (Joyce et al., 2018; Atkinson et al., 2018; Tezcan & Gulseven 2021). In the literature, numerous guidelines (Chapman 2017; Haesler et al. 2022; Mitchell 2018) emphasize key points such as risk assessment, skincare, nutrition, repositioning, mobilization, and education to prevent pressure ulcers.

Consistently implementing these measures and carrying out planned interventions are critically important for preventing and effectively treating pressure ulcers. Nurses play a significant role in pressure ulcer care, undertaking tasks such as assessing risk factors, providing effective skin care, advising on proper nutrition and repositioning, and educating patients and caregivers (Saghaleini et al., 2018; Gage 2015).

Additionally, they work on utilizing new technologies to prevent and manage pressure ulcers effectively. The critical roles of nurses contribute significantly to reducing the incidence of pressure ulcers and improving the quality of patient care (Carlsson 2017; Demarre 2015; Orhan 2017).

Conclusion: An important aspect of approaching pressure ulcers is determining

the treatment based on the stage and size of the wound. As demonstrated in this case, regularly planned and executed interventions will facilitate the healing of pressure ulcers.

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