



A Research Paper on “Development of Risk of Pressure Injury”

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KEYWORDS

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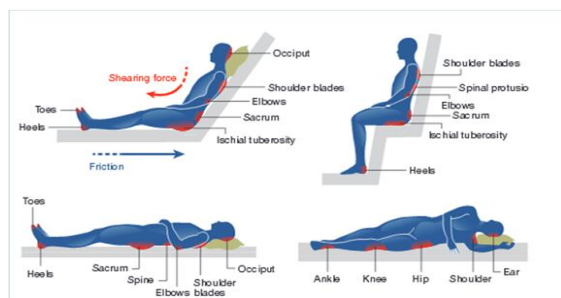
ABSTRACT:

Pressure, from lying or sitting on a particular part of the body results in reduced oxygen and nutrient supply, impaired drainage of waste products and damage to cells. If a patient with an existing pressure ulcer continues to lie or bear weight on the affected area, the tissues become depleted of blood flow and there is no oxygen or nutrient supply to the wound, and no removal of waste products from the wound, all of which are necessary for healing. Patients who cannot reposition themselves require assistance. International best practice advocates the use of repositioning as an integral component of a pressure ulcer management strategy. This review has been conducted to clarify the role of repositioning in the management of patients with pressure ulcers.

Educational activities on pressure Injury.

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Pressure injuries in elderly individuals can cause significant morbidity and mortality and are a major economic burden to the health care system. Prevention

should be the ultimate objective of pressure injuries care, and it requires an understanding of the pathophysiology leading to pressure injuries and the means of reducing both intrinsic and extrinsic risk factors. Clinical manifestations are protean, and early recognition requires a low threshold of suspicion. Clinical examination often underestimates the degree of deep-tissue involvement, and its findings are inadequate for the detection of associated osteomyelitis. Microbiological data, if obtained from deep-tissue biopsy, are useful for directing antimicrobial therapy, but they are insufficient as the sole criterion for the diagnosis of infection. Imaging studies, such as computed tomography and magnetic resonance imaging, are useful, but bone biopsy and histopathological evaluation remain the "gold standard" for the detection of osteomyelitis. The goals of treatment of pressure injuries should be resolution of infection, promotion of wound healing, and establishment of effective infection control

These injuries can lead to a significant reduction in the patient's quality of life, impose substantial costs on both patients and the healthcare system, and even increase morbidity and mortality.

Prompt diagnosis and effective treatment of pressure injuries This activity provides healthcare professionals with the knowledge and skills necessary for. Furthermore, the course covers deep tissue pressure injuries that can occur without prominent overlying skin ulceration, providing clinicians with the latest insights into classification and management. The activity also



emphasizes the crucial role of the interprofessional healthcare team in improving patient care and preventing these injuries.

Purpose

A predictive model of community-acquired pressure injury (CAPI) was established and validated to allow the early identification of the risk of pressure injuries by family caregivers and community workers.

Objectives:

- Identify pressure injuries promptly upon presentation, recognizing their characteristic features and differentiating them from other skin conditions.
- Differentiating among different stages of pressure injury including deep tissue injuries, to inform appropriate treatment strategies
- Implement evidence-based interventions for the prevention and treatment of pressure injuries, adhering to the latest guidelines and best practices.
- Strategize interprofessional team strategies for improving care coordination and communication to improve the treatment of pressure injuries and outcomes.
- The extent to which pressure-relieving support surfaces reduce the incidence of pressure ulcers compared with standard support surfaces.
- Their comparative effectiveness in ulcer prevention.

Introduction

Pressure injuries are localized damage to the skin and underlying soft tissue, usually occurring over a bony prominence or related to medical devices. They result from prolonged or severe pressure with contributions from shear and friction forces. These skin and soft tissue injuries remain a significant problem within hospitals and long-term care facilities and result in decreased quality of life, high costs for the patient and our health care system, and increased morbidity and mortality. As pressure injuries may be considered an indicator of the quality of care of a facility, inadequate steps in prevention or treatment can lead to litigation. Awareness

of factors that may contribute to the pathogenesis of pressure injuries enables the identification of those patients at risk for their development, and preventive measures can be aimed toward these patients. As treatments for pressure injuries have been characterized and evaluated with variable degrees of completeness, there remains uncertainty regarding the best options for management.

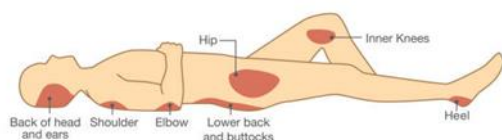
The superficial skin layer is less prone to be affected by pressure injury; the overall physical examination may underestimate the extent of the damage. The underlying history of immobility (including but not limited to patients with bed-ridden status or chair-bound individuals) is usually present. However, poorly fitting casts, other medical equipment, devices, and implants also play a role. Medical devices may induce mucosal pressure injury.

Skin and soft tissue pressure-induced injuries are identified as localized skin with and without underlying tissue involvement. However, they usually occur over a bony prominence. The inciting factors are pressure or pressure accompanied by shear stress. The sacrum, calcaneus, and ischium are the most common bony prominences. Significantly, superficial moisture-induced lesions, skin tears, tape burns, perineal dermatitis, or excoriation should be differentiated from pressure injury-induced lesions.

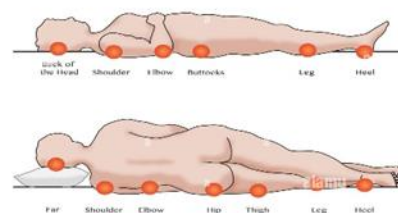
According to the National Pressure Injury Advisory Panel system updates, the term "pressure injury" instead of "pressure ulcer" is preferred. The former recognizes that minimal skin damage due to pressure may not necessarily be associated with ulceration and is categorized as stage 1. Moreover, deep tissue pressure injury might occur without prominent overlying skin ulceration.

Etiology

The pressure of an individual's body weight or pressure from a medical device above a certain threshold for a prolonged period is thought to be the cause of pressure injuries. In patients with sensory deficits, an absent pressure feedback response may result in sustained pressure for a prolonged period, leading to tissue injury. Many factors contribute to pressure ulcers and injury formation, such as increased arteriole pressure, shearing forces, friction, moisture, and nutrition status.



Pressure Sore Locations



PRESSURE SORES

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Epidemiology

Saudi Arabian (SA) study reported acute care PU prevalence of 44.4% and incidence of 38.6%. Pressure injuries of the skin and soft tissues affect an estimated 1 to 3 million people in the United States annually. The incidence differs based on the clinical setting. For example, the prevalence of pressure injuries among hospitalized patients is 5% to 15%, with the percentage considerably higher in some long-term care environments and intensive care units. Risk factors for developing pressure injuries, in general, include immobility, reduced perfusion, malnutrition, and sensory loss. Other patients at increased risk for pressure injury development include those with cerebrovascular or cardiovascular disease, recent fracture of a lower extremity, diabetes, and incontinence. Older patients are also at increased risk for the formation of pressure injuries due to skin changes associated with aging, which include thinning of the dermis and epidermis and can result in decreased resistance to shearing forces.

Pathophysiology

Pressure injuries of the skin and soft tissue are formed when the pressure above a certain threshold causes prolonged tissue ischemia, eventually leading to necrosis. Injury from reperfusion is also a contributing factor, as the return of blood supply after a period of ischemia can cause the formation of reactive oxygen species, triggering an inflammatory response. In patients positioned at an incline, internal structures such as bone and muscle are displaced downward due to gravity, leading to tissue hypoxia as blood vessels are distorted or flattened.

One type of pressure injury is the Kennedy ulcer, which can occur suddenly in a patient who is terminal. There are gaps regarding the physiopathology of this ulcer

as the current knowledge is based on hypotheses. There is a lack of knowledge about care approaches, but the main objective in this situation at the end of life would be to prioritize patient comfort and quality of life.

History and Physical

Areas of skin breakdown should be examined for length, width, and depth. The following characteristics should be evaluated in detail and recorded: the presence of sinus tracts, necrotic tissue, exudate, and granulation.

While performing the clinical evaluation, the characteristics of the National Pressure Injury Advisory Panel staging should be evaluated:

Stage 1: The skin is intact. However, non-blanchable erythema lasting more than an hour following pressure relief is predicted.

Stage 2: Bullae and or blister formation or dermal breakdown, accompanied by a partial-thickness dermal loss. The presence of infectious evidence is not mandatory at this stage.

Stage 3: Full-thickness tissue loss. Subcutaneous fat might be evident, and tissue damage involving muscular layers is predicted. Further characteristics of this stage are tissue undermining and tunneling.

Stage 4: Physical examination reveals a full-thickness tissue loss with bone, tendon, or joint involvement.

Unstageable: The base of ulcer coverage with either tissue sloughing or eschar formation prevents a discrete classification.

Deep tissue pressure injury: Presence of a localized purple or maroon discoloration due to either a pressure or a shear injury and a blister full of blood.



Obtaining specific patient history information can help determine any potential risk factors for wound development and nonhealing. Providers should ask about a patient's prior history of wounds, etiology, location, duration, and treatment. Inquiring specifically about medical conditions such as diabetes and associated neuropathy, chronic kidney disease, peripheral artery disease, immunocompromised states, and impaired nutritional status may give providers more information about a patient's healing potential.

Patients may be able to provide qualitative information regarding their current wound history, including:

Location Duration Potential causes or inciting factors
Changes in size

Pain (type, severity, frequency, aggravating or alleviating factors) Previous wound manipulation or treatment Presence of erythema, odor, or exudate

Assessing specific locations for any signs of pressure injury during physical exams is important. Pressure injuries commonly develop in these areas:

- Sacrum Greater trochanter
Ischial tuberosity
Lateral malleolus
- The heel of the foot

Characteristics of pressure injuries that should be assessed include, but are not limited to:

- Location Length Width
Depth (both quantitative and qualitative)

Document the presence of any of the following:

- Undermining Tunneling
Necrosis
- Signs of infection:
 - Erythema Induration
Warmth Tenderness
or pain with palpation

- Drainage (also noting amount, type, odor, and color)

Evaluation

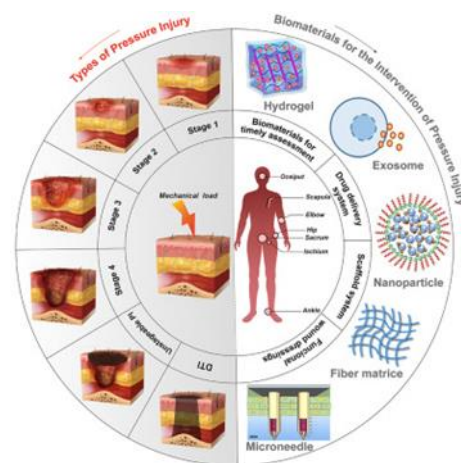
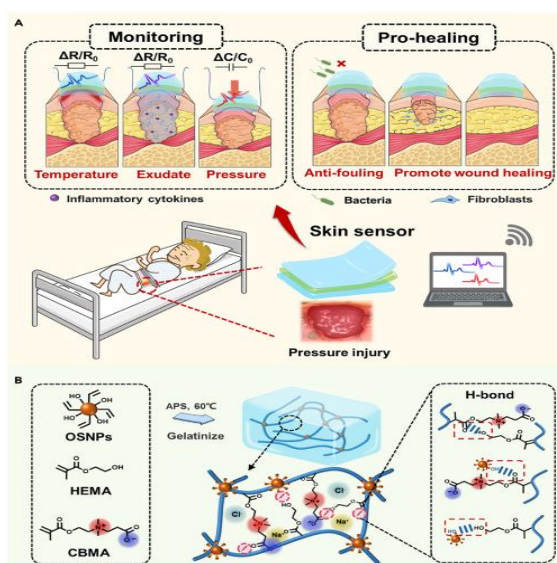
A staging system should be used to assess all pressure injuries. At this time, there is a lack of a universal classification system for pressure injuries, but the National Pressure Injury Advisory Panel staging system is widely used, as listed below:

- Stage 1: Non-blanchable erythema of intact skin and erythema remains for greater than 1 hour after relief of pressure
- Stage 2: Partial-thickness loss of skin with exposed dermis
- Stage 3: Full-thickness loss of skin tissue; subcutaneous skin and muscle may be visible
- Stage 4: Full-thickness loss of skin tissue; tendons, bone, and joints may be visible
- Unstageable: Full-thickness loss of skin tissue that is obscured by eschar or slough
- Deep tissue: Skin that is persistently non-blanchable, with maroon or purple discoloration

The laboratory studies listed below can be obtained to assess for conditions that can lead to the formation of non-healing injuries, such as infection, anemia, poor nutritional status, and diabetes:

- Comprehensive metabolic panel
- Complete blood count with differential
- Albumin and pre-albumin (to assess nutrition status)
- Hemoglobin A1C

Wound cultures from superficial swabs may not be clinically useful as they usually reflect colonization rather than infection. Cultures from bone or deep tissue should not be used as a sole indicator of infection but should be interpreted in the context of the clinical setting and other histopathological data.



Treatment / Management

General Care

General care for pressure injuries includes redistribution of pressure with the use of support surfaces and changes in positioning. Redistribution of pressure and appropriate patient positioning are required to prevent the development and worsening of pressure injuries, as these methods can reduce force from friction and shear. Support surfaces can alleviate pressure in patients with a high risk of developing pressure injuries. This can include higher-speciation foam mattresses, medical-grade sheepskins, continuous low-pressure supports, alternating-pressure devices, and low-air loss therapy. However, the effectiveness of these devices compared to other surfaces in treating existing pressure injuries has not been conclusively established. Based on the American College of Physicians (ACP) clinical practice guidelines from 2015, providers should select advanced static mattresses or mattress overlays consisting of foam, sheepskin, or gel in patients at increased susceptibility to the formation of pressure injuries. The guidelines also advise against alternating-pressure mattresses or overlays in this patient population. Only moderate-quality evidence supports these 2 recommendations. Although there is inadequate evidence to assess the effectiveness of repositioning patients on the healing rates of pressure injuries, maintaining patient positioning is still good practice, which minimizes wound pressure.

Part of treatment for pressure injuries also includes pain control and nutrition optimization. Pain frequently

occurs during dressing-related procedures. Pain control can be achieved with individualized analgesic regimens and skilled wound management. Optimizing total caloric and protein intake in pressure injuries is essential, especially for patients with stages 3 and 4 injuries. ACP guidelines recommend supplementation with protein or amino acids to reduce wound size in patients with pressure injuries. The evidence to support this recommendation is of low quality.

Practical suggestion	Rationale
Avoiding pressure is the foundation	PI cannot develop in the absence of pressure. Routine monitoring by either clinical observation or continuous pressure monitoring device is the key
Regular skin assessment	Physical examination of the patient's skin is essential to PI prevention, diagnosis and treatment. Skin assessment should be performed regularly, at least once per shift, and more often as required
Skin hygiene	Use a cleansing agent that is pH neutral. Do not vigorously rub or massage the patient's skin. Keep the skin clean and dry. Apply a fragrance-free moisturiser as required
Care of devices	Devices, such as endotracheal tubes, nasogastric tubes and indwelling urinary catheters, should be sized appropriately. The skin and tissue under and around the device should be assessed regularly, at least every 4h. Reposition the device regularly. Consider applying a prophylactic dressing to the skin under the device to redistribute pressure and a barrier cream to the skin under the device to create a protective physical barrier from moisture. Regularly re-evaluate the need for the device
Repositioning	Consider the most appropriate support surface for the patient. Current evidence is conflicted regarding different repositioning frequencies. Positions and repositioning frequencies will vary dependent on the type of matters (dynamic versus static), the patient's medical condition and hemodynamic stability. Always check the positioning of the bony prominences. Heels should be suspended off the bed
Apply dressing to skin areas at risk	Consider the use of a dressing applied to skin areas at risk of increased bodyweight forces such as the sacrum and heels, or pressure from medical devices

Wound Management

Wound care, including maintaining a clean environment, debridement, application of dressings, monitoring, and various adjunctive therapies, is generally advised to facilitate the healing of pressure injuries. The stage of the pressure injury can guide options for treatment. Stage 1 pressure injuries can be covered with transparent film dressings as needed. Stage 2 pressure injuries benefit from a moist wound environment. Occlusive dressings



(foam, hydrogels, and hydrocolloids) and non-occlusive dressings (transparent films) can achieve this. Treatment of stage 3 and 4 injuries is based on the presence of necrotic tissue. Pressure injury treatment also involves preventing wound contamination and maintaining a clean environment. Wounds with necrotic tissue or eschar require debridement, whether by sharp, mechanical, autolytic, or bio-surgical method, to expose granulation tissue, facilitate healing, and reduce the risk of infection before moist placement of absorbent dressing.

Dressings and topical agents are commonly used to treat pressure injuries, but it is unclear whether one dressing or topical agent is superior to another. Appropriate selection of dressings may be based on wound characteristics, cost, or patient preference and includes hydrocolloids, hydrogels, transparent films, foams, and alginates. ACP clinical practice guidelines from 2015 recommend using foam or hydrocolloid dressings to reduce the size of pressure injuries. Additional therapies such as negative-pressure wound therapy, electromagnetic therapy, phototherapy, therapeutic ultrasound, and reconstructive surgery treat pressure injuries. Still, there is limited data regarding their efficacy in wound healing. Based on moderate-quality evidence, ACP guidelines recommend using electrical stimulation as a supplemental therapy to accelerate wound healing in patients with pressure injuries. In addition to the above treatments, monitoring to assess the healing of pressure injuries should be implemented, which can be done using healing scales. The most common instruments include the Pressure Ulcer Scale for Healing and the Pressure Sore Status Tool.

Various adjunctive therapies, including electrical stimulation, therapeutic ultrasound, hyperbaric oxygen, and topical oxygen, with equivocal effectiveness and impact, have been introduced to manage pressure injuries. Accordingly, no specific studies have explored the details of pressure-injury management with hyperbaric oxygen therapy. However, the systematic reviews of studies evaluating the role of HBOT in wound treatment demonstrated that while hyperbaric oxygen therapy (HBOT) is beneficial in treating some types of wounds, including non-healing osteomyelitis, there is still a lack of robust evidence of sustained benefit. Moreover, some serious treatment-related adverse events

with HBOT, including seizures and pneumothorax, should not be underestimated.

Ultrasound has also been utilized as a wound therapy measure. With a limited sample size, the current trials could not clarify the benefit or harm of ultrasound therapy. However, applying high-frequency ultrasound (1 MHz), with penetration to greater tissue depths, resulted in significant reductions in wound surface area. A limited number of studies have verified enhanced healing of wounds with adequate granulation tissue with peri-wound electrical stimulation.

Differential Diagnosis

The differential diagnosis for pressure injuries is important to consider to treat this condition appropriately. This differential can include but is not limited to:

- Venous insufficiency ulcers
- Diabetic neuropathic ulcers
- Arterial/ischemic ulcers
- Ulcers associated with malignancy
- Hypertensive ulcers

Staging

The following are the various levels of staging for pressure injuries:

Stage 1: The skin is intact. However, non-blanchable erythema lasting more than an hour following pressure relief is predicted.

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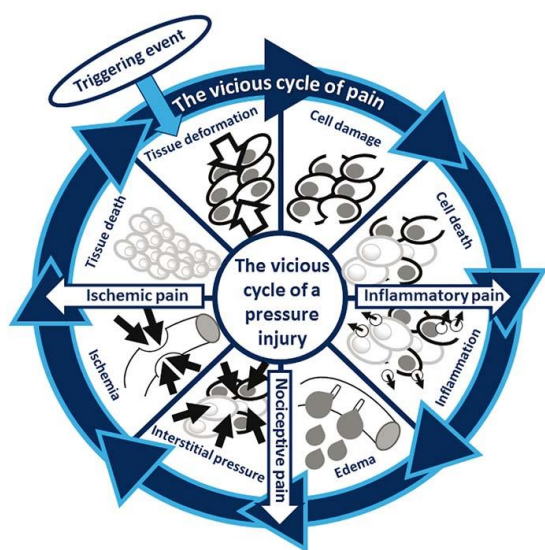
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Deep tissue pressure injury: There is presence of a localized purple or maroon discoloration due to either a pressure or a shear injury and a blister full of blood.

Prognosis

The presence of a pressure injury can be indicative of a poor overall prognosis for a patient. An increased risk of death in both elderly and intensive care patients has been associated with the presence of pressure injuries, which may be a sign of the underlying severity of the disease instead of an independent predictor of mortality. Additional clinical conditions that remain unmeasured may be contributing to the increased morbidity and mortality associated with pressure injuries.



Complications

Infection is a significant complication of pressure injuries, and the manifestations can be widely variable. This can include local wound infection as well as soft tissue infection, osteomyelitis, and bacteremia. Osteomyelitis can manifest as a wound with delayed healing and does not always include systemic signs such as sepsis or leukocytosis. Bacteremia is usually more apparent as signs of a systemic inflammatory response typically accompany it. Evaluation of pressure injuries for infection can require a combination of clinical assessment and judgment, microbiological and histopathological evaluation, and imaging studies. The infection control goals include preventing the spread of pathogens to other patients, staff, and the surrounding

environment and avoiding the selection of resistant microorganisms.

Deterrence and Patient Education

Deterrence of pressure injuries includes identification of patients at risk, improvement of overall health, reduction of external forces, and promotion of education about pressure injuries. ACP clinical practice guidelines from 2015 advise performing a risk assessment to recognize patients at risk of pressure injury formation. Several scales have been created to predict the risk of pressure injuries to identify patients for whom prevention measures or early treatment should be considered. The most commonly used tools for this are the Braden and Norton scales. Reducing external forces includes minimizing extrinsic risk factors, such as friction, shear, pressure, and moisture, which is important for deterring pressure injury formation. Evidence has demonstrated that educating providers and patients can lead to a decrease in the incidence of pressure injuries and an increase in the ability to manage them.

Enhancing Healthcare Team Outcomes

When pressure injuries develop, systems should be able to identify issues leading to their occurrence and implement methods for resolving these issues. There is increasing evidence that multidisciplinary interventions aimed at preventing pressure injuries in both long-term care facilities and acute care settings can have success in decreasing the prevalence or incidence rates of pressure injuries. This can include clinical staff becoming more involved at the patient care level, bundling care practices and incorporating them into routine care, making documentation of pressure injury prevention practices more visible, and educating all staff regularly. The more often new care practices are merged with usual care practices, the more likely staff will perform them consistently with better outcomes overall.

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