

- Once ulceration has occurred, it is necessary to assess and document the ulcer location, area (length and width), depth, drainage, tissue type present in wound bed (necrotic, sloughed tissue, granulation tissue), and presence of cellulitis.
- serial photographs may be useful

NATIONAL PRESSURE ULCER STAGING SYSTEM

Pressure ulcer stage	Definitions
Stage I	An observable pressure-related alteration of intact skin whose indicators, as compared with the adjacent or opposite area on the body, may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel), and/or sensations (pain, itching). The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas, in darker skin tones, the ulcer may appear with persistent red, blue, or purple hues.
Stage II	Partial-thickness skin loss involving epidermis or dermis, or both. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.
Stage III	Full-thickness skin loss involving damage or necrosis of subcutaneous tissue, which may extend down to but not through underlying fascia. The ulcer presents clinically as a deep crater, with or without undermining of adjacent tissue.
Stage IV	Full-thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle bone or supporting structures (e.g., tendon, joint capsule).

assessment

- The goal of wound bed preparation is to provide the ulcer with an optimal environment for healing. The optimal wound bed is one that is highly vascularized with minimal exudate.
- The three main principles are:
 - débridement,
 - bacterial balance, and
 - control of exudates.

general considerations

- uses application of wet-to-dry gauzes.
- the gauze adheres to the necrotic tissue. On removal of the gauze dressing, necrotic tissue is removed. The problem with mechanical débridement is that healthy granulation tissue may be removed along with the devitalized tissue, thereby delaying wound healing.

(i) Mechanical débridement

- involves the use of semi-occlusive (transparent film) dressings and occlusive dressings (hydrocolloids or hydrogels) to create an environment that promotes the breakdown the necrotic tissue by the body's own enzymes.

(ii) Autolytic débridement

- uses proteolytic enzymes (i.e., papain, collagenase, and trypsin) to remove necrotic tissue. Although, enzymatic débridement is an effective method for débridement, it is slower than the other approaches and can be costly.

(iii) Enzymatic débridement

- entails the use of a scalpel or laser and is probably the most effective type.
- Sharp débridement always should be considered when the patient is suspected of having cellulitis or sepsis.

(iv) Sharp débridement

- is an effective and relatively quick method of débridement.
- This type of débridement is especially effective when sharp débridement might expose bones, joints, or tendons.

(v) biosurgery (maggot therapy)

- Managing the bacterial burden is an important consideration
- All pressure ulcers are colonized by a variety of bacteria.
- Clinical signs of infection include:
 - presence of a malodorous, purulent exudate,
 - excessive drainage,
 - bleeding in the ulcer, and
 - pain.

managing bacterial burden

- Treatment using silver-impregnated dressings or topical silver sulfadiazine will decrease the bacterial burden.
- Excessive exudate impairs ulcer healing and may damage healthy surrounding tissue.

wound bed preparation

- Exudates are best managed by selecting the appropriate dressing. Currently, more than 300 different dressings are available for treating pressure ulcers. The dressings can be classified as:

- gauze,
- petroleum-based nonadherent gauze,
- transparent films,
- hydrocolloids,
- foam islands,
- alginates,
- hydrogels,
- composites, and
- combinations

exudate management

- Regardless of the type of dressing selected, the goal should be to keep the pressure ulcer moist.

- The use of negative pressure therapy should be considered for highly exudative pressure ulcers. Negative pressure therapy removes excessive exudate from the ulcer, increases local blood flow, and promotes formation of granulation tissue.
- Negative pressure therapy should not be used if osteomyelitis is present or suspected or in the presence of eschar, exposed blood vessels, or organs.

specific treatments

- The Pressure Ulcer Scale for Healing (PUSH) and the Pressure Sore Status Tool (PSST) are both valid and reliable tools for assessing healing of pressure ulcers.

monitoring healing

- Less than 5% of pressure ulcers require surgically intervention other than simple débridement.
- However, if surgery is indicated, then the most common procedures are:

- direct closure,
- skin grafting,
- skin flaps,
- musculocutaneous flaps, and
- free flaps

surgical procedures

- Most adjunctive therapies have not been rigorously studied.
- The most promising adjunctive therapies include:

- electrical stimulation,
- topical application of growth factors,
- use of skin equivalents, and
- hyperbaric oxygen.

adjunctive therapies

general

- Pressure ulcers can develop within 2 to 6 hours.
- The anatomic areas most vulnerable for ulceration are the heels of the feet and the skin over the coccyx, sacrum, and femoral trochanter

pathogenesis

- Pressure ulcers develop when capillaries supplying the skin and subcutaneous tissues are compressed enough to impede perfusion, leading ultimately to tissue necrosis.
- Principles of prevention include risk assessment, skin care, modification of mechanical loading, nutrition, and use of proper support surfaces.

- Numerous risk factors have been identified for pressure ulcer development, including:

- age 70 years or older,
- male gender,
- white race,
- current smoking history,
- low body mass index,
- impaired mobility,
- altered mental status (i.e., confusion),
- urinary and fecal incontinence,
- malnutrition,
- physical restraints,
- malignancy, diabetes mellitus,
- cerebrovascular accident,
- pneumonia,
- heart failure,
- fever,
- sepsis,
- hypotension,
- renal failure,
- dry scaly skin,
- history of pressure ulcers,
- anemia,
- lymphopenia, and
- hypoalbuminemia.

risk factors

- Neural and endothelial control of blood flow is often impaired during acute illness, making the critically ill adult more susceptible to ischemic organ damage (e.g., pressure ulcers).

risk scales

- Given the abundant number of risk factors that are associated with pressure ulcer development, various risk scales have been developed. The two most widely used risk scales are the Norton Scale and the Braden Scale.
- neither tool has been validated in every critical care setting

- aim to mobilise (reduce / minimise any sedation) with adequate analgesia for painful ulcers
- manage urinary incontinence and diarrhoea
- avoid friction
- ensure adequate nutrition

skin care

- The skin should be assessed daily, paying particular attention to the anatomic areas most vulnerable for ulceration.
- The skin should be assessed and cleansed with warm water and a mild cleansing agent to minimize irritation and drying. Moisturizing creams should be applied if the skin appears dry.
- Excessive moisture (owing to perspiration or incontinence) should be avoided, because macerated skin is at higher risk for ulceration.

repositioning

- pressure relief through posture & regular (two hourly) turns & pressure relief devices (a range of devices are available but can include foam or gel pads & special mattresses)
- Patients unable to independently shift weight should be repositioned in bed every 2 hours and every hour while sitting in a chair.
- Ideally, the head of the bed should be at the lowest degree of elevation consistent with the patient's medical condition to decrease friction and shear forces. When a patient is on a ventilator the head of the bed should be elevated to decrease the incidence of ventilator-associated pneumonia.
- The majority of critically ill patients are placed on dynamic surfaces. Although these surfaces are more effective in redistributing pressure, some of their adverse effects include dehydration, sensory deprivation, and loss of muscle strength. Data are lacking to support the view that different support surfaces are better (or worse) for preventing or healing pressure ulcers.

minimisation of sedation

mobilisation

nutrition

continence management

- Positive nitrogen balance is essential for healing of pressure ulcers. Correcting malnutrition is important to promote healing of ulcers.
- Data are lacking to suggest that vitamins and minerals supplements help to promote healing of pressure ulcers healing or prevent their development

quality improvement issues

- a tailored team approach is required
- unit protocols should aim to reduce risk