

PRESSURE SORE MANAGEMENT FOR THE PRIMARY CARE PHYSICIAN

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INTRODUCTION

A pressure ulcer is defined as an area of localized damage to the skin and underlying tissues caused by pressure, shear, friction, and/or combination of these². In Singapore the prevalence of pressure ulcers was 18.1%, while the incidence was 8.1% in a tertiary hospital in Singapore in 2002³.

Pressure ulcers place major social, clinical and economic burdens on society. They are the source of numerous complications, which result in long term, frequent, and/or multiple hospital admissions. A new pressure ulcer is estimated to increase a patient's hospital stay by nearly a factor of five⁴. Patients with pressure ulcers generally have significant poorer physical function, are less able to perform self care, and are less mobile⁵. More than half (51%) of the long term care-facility patients with pressure ulcers have methicillin-resistant *Staphylococcus aureus* (MRSA) infection⁶. Furthermore, pressure ulcers are correlated with more than two fold rates of increased mortality^{7,8} independent of the source of the ulcer.

METHODOLOGY

We used several search strategies to obtain a comprehensive set of relevant articles. A Pub Med search was made with Search Topic on "Pressure Sore/ or Pressure Wound" Selection was made with limits to those with practice guidelines, randomized controlled trial, reviews, journal article published in core clinical journals and all adults 19 years and above. The search obtained 68 articles, of which 11 were used in this review. A Cochrane Review search on pressure ulcers obtained 14 articles of which 3 were used. Reviews on "Pressure Ulcers" on UpToDate dot.com, e-Medicine search and were SIGN (Scottish Intercollegiate Guidelines Network) were screened and 5 relevant articles chosen for the review. Hand searching of the relevant referenced articles obtained another 5 articles A total of 24 articles were obtained and reviewed for this review article.

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RESULTS

(1) CAUSES

Pressure sore are caused by unrelieved pressure, applied with great force over a short period or with less force over a longer period and disrupts the blood supply to the capillary network, impeding blood flow and depriving tissues of oxygen and nutrients. This external pressure must be greater than arterial capillary pressure to lead to inflow impairment with resultant local ischaemia and tissue damage.

Although these ulcers can occur anywhere on the body, the common sites for pressure ulcers are the sacrum, heels, ischial tuberosities, greater trochanters, and lateral malleoli¹. They can be further subdivided into pressure ulcers of the trunk and pressure ulcers of the extremities, and this distinction will allow for more appropriate treatment. For example, because lower extremity lesions may develop from pressure alone, but often have a venous stasis, arterial ischaemia, or neuropathic component. They would therefore require different management algorithm. Truncal pressure ulcers are defined as wounds caused by ischemic tissue necrosis that result from pressure between a hard surface and a bony prominence⁹.

The role of skin perfusion in the development of pressure ulcers has been increasingly recognized. Contributing factors to the development of tissue ischemia have been postulated to include hypotension, dehydration, vasomotor failure, and vasoconstriction secondary to shock, heart failure, or medications. When such factors increase the likelihood of decreased blood flow to the skin, it correspondingly increases the risk for the development of pressure ulcers¹⁰.

(2) PRESSURE ULCER STAGING

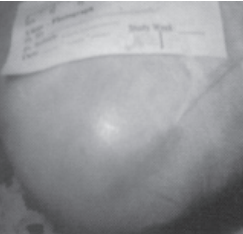
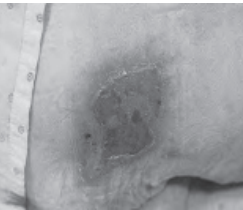
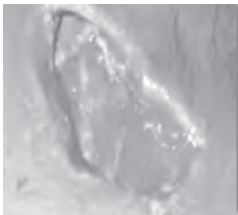
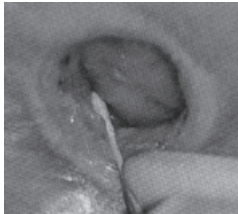
When describing a pressure ulcer, one must include the classification of the ulcer, the size of the wound bed in three dimensions, the location, and a detailed description of the surrounding tissues⁹. The Pressure Ulcer Scale for Healing tool can be used for healing progress. This scale categorizes the ulcer with respect to surface area, exudates, and type of wound tissue. The sub- score for each of the ulcer characteristics are added up to obtain the total score. A comparison of the total scores measured over time provides an indication of the improvement or deterioration in pressure ulcer healing¹¹.

Pressure ulcers are generally classified according to the degree of tissue damage involved. Accurate initial assessment of a patient's wound is crucial for comprehensive treatment. The pressure ulcer is graded based on the National Pressure Ulcer Advisory Panel staging definitions^{12,13}

The staging systems are also commonly used to monitor and describe the healing of pressure ulcers. However, the practice

of reverse staging is not recommended¹⁴. Healing ulcers do not progress serially from one stage to the next lowest. Instead, they heal through a process that includes granulation, wound contraction, re-epithelization, and scar formation. Thus, a stage IV ulcer remains stage IV throughout the healing process. Figure 1.

Figure 1: Types of Pressure Ulcer

	Illustration	Characteristics
Stage I		Non-blanchable erythema of intact skin, localized usually over bony prominence. Coloration is pink, red or mottled after pressure is relieved. For patients with darker skin tone, blanching may not be visible. Color may differ from the surrounding skin. Area may be warmer or cooler than adjacent tissue, and may indicate pressure ulcer risk ¹³ .
Stage II		Partial-thickness skin loss of dermis; shallow open ulcer; red or pink wound bed without slough or bruising. May be intact or serum filled blister. Shiny or shallow ulcer; if bruised, suspect deep tissue injury; not skin tear, tape burn. Perineal dermatitis maceration or excoriation. All pressure ulcers Stage II and above should be documented as a local clinical incident. D [GPP]².
Stage III		Full thickness skin loss. Subcutaneous tissue may be visible. No tendon, muscle or bone is visible or palpable. Slough does not obscure depth of tissue loss; undermined or tunneled depth varies with location: shallow on bridge of nose, ear, occiput or malleolus or deep where fat layer is thick.
Stage IV		Full-thickness skin; exposed bone, tendon or muscle visible or palpable. Slough or eschar may be present on parts of ulcer. Often includes tunneling or undermining. Depth varies with location: Shallow on bridge of nose, ear, occiput or malleolus; may extend into muscle and/or supporting structure; osteomyelitis possible.
Unclassified		Full thickness tissue loss. Base of ulcer covered by: slough (yellow, tan grey, green) or eschar (tan, brown or black). Until enough slough or eschar is removed to expose wound base, staging cannot be determined. Do not remove stale dry black heel eschar.
Suspected deep tissue injury		Purple or maroon discolored skin or blood-filled blister, may be painful, warm or cool, boggy or firm. Difficult to detect if skin tone is dark. Evolution may include thin blister over dark wound bed; may progress to thin eschar cover; may evolve rapidly exposing additional layers of tissue, even with optimal treatment.

Classification of pressure sores has not been limited to a description of the wound; it also assesses the risk for patients to develop a pressure ulcer. In Singapore the nurses care plan uses the Braden Scale to assess the pressure ulcer status. The Braden Scale has 6 risk factor categories: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Each is accessed at 3 or 4 levels, resulting in a weighted value. The weighted values of the subscales are added to achieve a total score, which translates into a level of potential risk. Specific interventional protocols are then applied based on the level of the risk. In most tertiary hospital in Singapore, the general assessment guideline on the level of risk for pressure ulcer is at two levels at risk or high risk. Score of 6-16 is high risk and 16-24 is at risk.

A key component in the assessment of pressure ulcers involves a complete history and physical examination. The history can provide information predictive of healing potential, such as connective tissue disorders and other chronic disease states. Previous surgeries, especially in the involved areas and factors limiting mobility, recent and current medication, past therapies (e.g. chemotherapy or radiation) may influence treatment decisions. A social history assessing tobacco and alcohol use is important, as in the assessment of the patient's support system and home environment, including the availability of off loading surfaces¹⁵.

(3) MANAGEMENT OF PRESSURE ULCERS

The Physician caring for patient in the hospital, nursing home and at home must be able to identify patient at risk of developing pressures sores and initiate preventive measure to prevent their development. Knowledge on how to manage patient with existing pressure ulcers are also essential to prevent complications.

1. Identify Patient at Risk and Initiate Preventive Measures

Patients with limited mobility are at risk of developing a sacral, ischial, trochanteric or heel ulcers. The skin at these areas should be inspected daily. Wheel chair bound patients may generate considerable pressures over the ischial tuberosities, they should probably be repositioned at least every hour with wheelchair pushups or with tilting of the seat to reduce contact between the patient's buttocks and the seat¹⁸. Patients who are cognitively intact and are able to use their upper extremities can be trained to shift even more frequently, using monitoring devices as a reminder¹⁹. Patients who are bedridden should be repositioned every two hours¹⁷ although this time interval is not based on consistent trial evidence²⁰. The appropriate time interval for repositioning varies depending upon patient risk and type of mattress used. Skin erythema can occur in less than two hours on a standard mattress²¹. In addition, patients should be placed at a 30 degree angle when lying on their side to avoid direct pressure over the greater trochanter or

other bony prominences. Pillows or foam wedges should be placed between the ankles, knees and heels to avoid pressure at these sites when patients have no mobility at these areas. Physical therapy is initiated for all patients at risk to prevent contractures, deep vein thrombosis, improve mental acuity and decreased respiratory complications.

2. Initiate Treatment Immediately Upon Recognition of a Break in the Skin

Every wound should be staged and progress recorded with photographs. A wound may “look good” and nevertheless fail to contract, epithelialize, or close in a timely manner. The wound may be progressing towards osteomyelitis, and may be the source of fever or sepsis. Upon recognition of a break in the skin, blood, urine, and wound cultures should be performed on all patients with suspected osteomyelitis.

All non viable tissues should be debrided until eschar is removed and granulation tissue is present. The choice of debriding method depends on many factors, including the patient’s vascular status, the skill of clinician, patient preferences, and wound condition and treatment goal. This includes:

- **Autolytic**
This method encourages naturally occurring enzymes to debride the wound selectively. This method is slower but it is easy and painless.
- **Mechanical**
This method requires the use of physical force to remove non-viable or contaminated tissue (saline gauze and high pressure irrigation). It produces rapid debridement but is non-selective and can cause pain.
- **Sharp**
This method requires admission to surgical unit and anesthesia. The necrotic tissues are debrided surgically.
- **Enzymatic**
Manufactured enzymes are applied topically to a wound to assist the enzymes in the wound to dissolve non-viable tissue in the wound bed e.g. trypsin and collagenase.
- **Biological**
Larval therapy (laboratory culture maggots) is an old therapy that declined in popularity with the development of antibiotics; however there has been renewed interest in this form of debridement in recent year. Larval therapy debrides wounds, control odor and has antimicrobial activity.

3. Nutritional Supplementation of All Malnourished/Undernourished Patients

Inadequate nutrition is a risk factor for pressure ulcer development. Hydration through adequate fluid intake and moisturization is important for skin integrity²². Supplementation with a multiple vitamin and mineral product is recommended

for persons at risk of pressure ulcers. Total caloric intake of at least 30 kcal/kg has been shown to promote healing and decrease the size of stage 3 and 4 pressure ulcers²³. For patients who are malnourished, dietary consultation is recommended. Intervention should include encouraging adequate dietary intake using the patient’s favorite food, mealtime assistance, and snacks throughout the day. If oral dietary intake is inadequate or impractical, enteral or parenteral feeding should be considered¹.

4. Treatment of Cellulitis

Cellulitis occurs when infection from the ulcer spreads to the surrounding tissue. It is serious condition and frequently complicates pressure ulcers that are not treated effectively. All cellulitis must be eliminated by use of moist dressings, antibiotics, and surgery. Fungus may complicate the wound. If no response is present (measured by objective improvement, i.e., photographs) within five days, an oral antifungal should be added to the treatment regimen¹⁶.

5. Manage Incontinence

Excess moisture can promote breakdown of the skin, and it is necessary to protect patients who are incontinent from being exposed to urine. In general, under pads or adult briefs, combined with consistent skin cleansing are adequate for managing incontinence. An indwelling or condom catheter is sometimes needed when treating an ulcer¹⁹.

(4) TYPES OF DRESSINGS

The health practitioner needs to create an optimum wound healing environment by using modern dressings- for example hydrocolloids, hydrogels, hydrofibres, foams, films, alginates, soft silicones are preferred to basic dressing types such as gauze, paraffin gauze and simple dressing pads. Table1.

CONCLUSIONS

The full commitment of all health workers are required in order to try to prevent pressure ulcers from taking place. Family Physicians play a pivotal role in the community in ensuring that the patient and their family receive the appropriate support and care and adherence to the above schema. We owe to our patients to try our best to prevent pressure ulcers from taking place. Despite our best efforts in prevention, pressure ulcers still occur. Early intervention to the onset of pressure ulcers by adherence to management plans outline the above should result in complete healing of ulcers that have not progressed to stage IV in the absence of osteomyelitis. The consequent mortality, morbidity, and costs associated with progression of these ulcers will thus decrease¹⁶.

Table 1: Types of Dressing, Indications, and Purpose

Types of dressing	Types of wounds	Indication	Purpose
Intrasite gel Duoderm	Dry wounds	Hydration	Dry wounds (with low amounts of exudates) require a dressing that adds moisture to the wound bed. The most effective hydrating products are hydrogels. These dressing have high water content in insoluble polymers ²⁴ . In dry or low exudates wounds, hydrogels promote debridement through autolysis.
Film dressing: Tegaderm, Opsite, Duoderm thin Hydrocolloids: Duoderm wafer, paste and comfeel powder	Low to moderate exudates	Moisture retention	Wounds with low to moderate exudates requires a dressing that will not dry out. There are several types in this category: Film Dressings and hydrocolloids
Foams: Allevyn, Mepilex, Urocell Hydrofibres: Aquacel, Aquacel Ag Calcium Alginates: Kaltostat, Seasorb, Algisite Ag	Moderate to high exudates	Exudates management	Wounds with moderate to high amounts of exudates require absorbent dressings. The dressings vary according to absorptive capacity, presentation, composition and indications for use. Foams, Calcium Alginates and hydrofibres belong to this category.
Iodine based: idosorb powder, paste and sheets (needs secondary dressing) Silver based: Acticoat, Aquacel Ag	Infected wounds	Decreased bacterial loads	Antimicrobial dressings are useful for wounds with high bacterial loads. They can be used in conjunction with systemic antibiotics to treat clinical infection.

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