

Treatment Strategies for Pressure Ulcers

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Introduction

Pressure ulcers are areas of localized damage to the skin and underlying tissue caused by pressure, shear, friction, excess moisture, incontinence or abrasion. They usually occur over bony prominences such as the sacrum, heels, hips and elbows (Figure 1).

Pressure ulcers are associated with a significant burden of illness in the elderly and a significant financial burden to the health care system. In a recent study of a geriatric unit in Glasgow, the prevalence of pressure ulcers was 41%.¹ The incidence in acute care² has been estimated at 10%, and up to 60% of patients develop ulcers while in acute care hospitals.³ In one study, the prevalence of stage I-IV pressure ulcers in 1,960 acute care facilities in Canada from 1995–1998 was 11.2%.⁴ The incidence rate for home care is 15.4%.⁵ Approximately 45% of all pressure ulcers are probably preventable.

Annually, 1.7 million patients in the U.S. develop pressure ulcers, and the resultant costs to the health care system exceed \$8.5 billion US/year.³ Databases describing almost 20,000 long-term care (LTC) residents show an increased risk of death from ulcer complications, even controlling for other conditions.⁷ Several studies have shown that prevention programs in LTC are cost effective¹ and may reduce the burden of pain and significantly improve patient quality of life.

Collecting data on pressure ulcers in and of itself helps to increase health care provider awareness and reduce the prevalence of pressure ulcers in LTC facilities. In The Netherlands, where prevalence studies on pressure ulcers had been conducted previously, eighty-nine health care facilities were surveyed. Almost all facilities were persuaded that their prevalence rate had to be changed and were planning activities to change pressure ulcer management. Fifty percent had already implemented some actions.⁷

The objectives of this article are: to identify the impact of pressure ulcers (mortality, morbidity and cost); to outline the risk factors for developing pressure ulcers; to develop an approach to pressure ulcer treatment; and to aid health care professionals in selecting appropriate surfaces and prevention based on the best evidence.

Pathophysiology

When pressure applied to a body surface exceeds pressures

within the capillary (Capillary Closing Pressure, CCP), blood flow is reduced. The average value for the CCP is 32 mmHg in the fingertips of healthy males, but ranges from 20–40 mmHg. Prolonged decrease in blood flow can result in microvascular vessel occlusion and hypoxia, which leads to localized tissue ischemia, causing inflammation, increased vascular permeability and protein accumulation in the local interstitium. The result is increased tissue edema and the worsening of perfusion. Staging of pressure ulcers is outlined in Figure 2.

Maintenance of interface pressures below capillary closing pressure is often cited as the gold standard in pressure reduction/relief.⁸ Pressure Reduction is defined as reduction of interface pressure, but not necessarily below CCP. Pressure Relief is defined as reduction of interface pressure below CCP.

Figure 1: Common areas for pressure ulcers

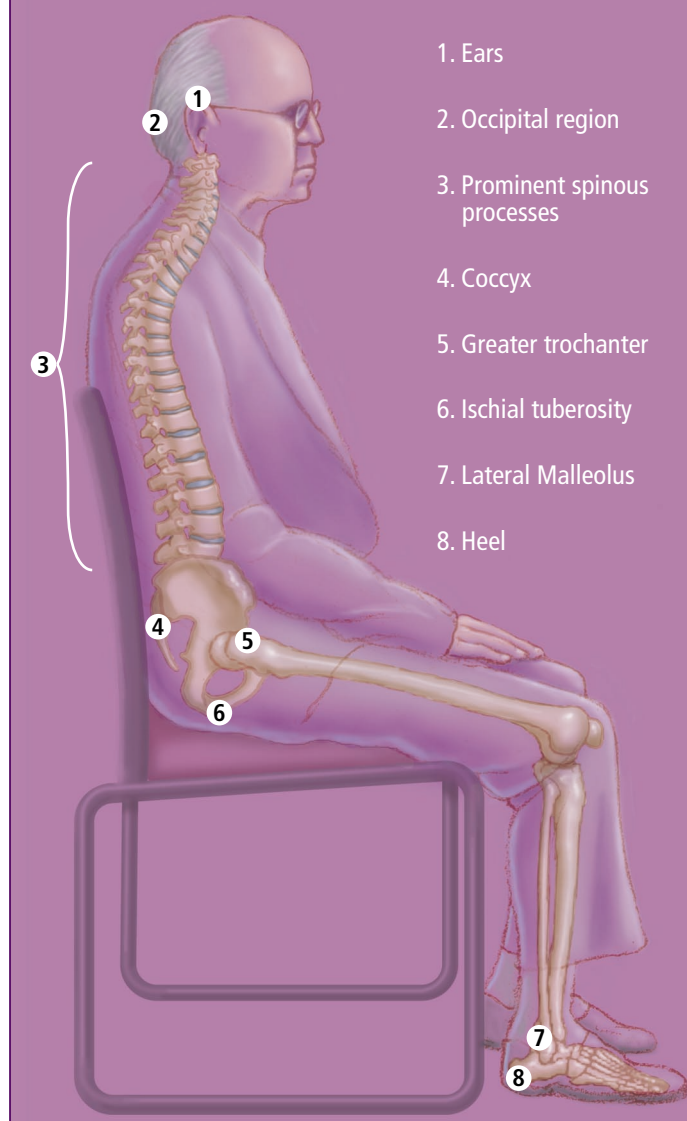


Figure 2:
Staging of Pressure Ulcers

- | | |
|-----|-------------------------------|
| I | skin still intact |
| II | partial-thickness tissue loss |
| III | full-thickness tissue loss |
| IV | |

Risk Assessment Tools

Of those patients admitted to nursing homes (NH) who developed pressure ulcers, 80% developed within two weeks of admission, and 96% within three weeks of admission.⁹ Fortunately, risk assessment in institutions can decrease the incidence of pressure

ulcers by about 60% and reduce the cost of prevention.⁹

There are two risk rating scales recommended by the Agency for Health Policy and Research (AHCPR),^{6,9} the Norton Scale and the Braden Scale, each with its own advantages (Table 1). It is recommended that risk assessment should take place:

- In long-term care facilities: weekly for four weeks, then Q3 monthly
- Acute care: daily in ICUs, Q2 days on wards
- Homecare: every RN visit⁹

Preventing Pressure Ulcers

A number of techniques can be used to prevent the development of pressure ulcers (Table 2).

Effectiveness of Mattresses

Mattresses can be divided into either pressure-reducing mattresses, or pressure-relief mattresses, based on their abil-

Table 2
Pressure Ulcer Prevention:
Key Points

- | |
|-----------------------------------|
| – Use of special support surfaces |
| – Turning schedules |
| – Remobilization |
| – Managing moisture |
| – Friction & Shear |
| – Nutritional replacement |

ity to reduce CPP. The Cochrane Database recently completed a review of the effectiveness of various surfaces on the prevention and treatment of pressure ulcers.¹⁰ Twenty-nine RCTs were systematically reviewed. It was found that pressure-relieving mattresses reduced the incidence of post-operative pressure ulcers. Therefore, use of pressure relief post-operatively is prudent. High specification foam mattresses were more effective in moderate-high risk patients than was standard hospital foam. It is not known whether the use of low air-loss beds reduces the incidence of pressure ulcers in ICUs.

For patients in chairs, there is a lack of data to document the reduction of pressure ulcer incidence with appropriate pressure downloading using specially designed cushions. Portable computerized pressure mapping systems have been developed that can measure over-pressure points on mattresses, wheelchairs and other surfaces. These systems are often used in specialized

Table 1
The Norton and Braden Scales Recommended for Risk Assessment for Pressure Ulcers

Risk Assessment Tool:	NORTON SCALE	BRADEN SCALE
Measures:		
Physical condition	+	–
Mental status	+	–
Activity	+	+
Mobility	+	+
Incontinence/moisture	+	+
Sensory perception	–	+
Friction/shear	–	+
Nutrition	–	+
ADVANTAGES	<ul style="list-style-type: none"> – Good sensitivity (at score of 14) – Faster to complete 	<ul style="list-style-type: none"> – Good sensitivity & specificity (at score of 16–18) – Very high inter-rater reliability
DISADVANTAGES	<ul style="list-style-type: none"> – Low to moderate specificity (at score of 14) – Poor inter-rater reliability 	<ul style="list-style-type: none"> – Takes longer to complete

Figure 3: Local treatment of pressure ulcers

- | | |
|-----|-----------------------------|
| I | film or thin hydrocolloid |
| II | cream, thicker hydrocolloid |
| III | pack wound |
| IV | |

seating clinics as part of a pressure reduction assessment.

Recommended treatment for pressure ulcers is summarized in Table 3 and local treatment is summarized in Figure 3. In a review of a number of RCTs, it was found that air-fluidized and low air-loss beds improve healing rates. The effectiveness of seat cushions is not known and the most effective surface for prevention or treatment still remains to be determined.

Effectiveness of Adjunctive Therapies

There are many studies that have been done on such interventions as therapeutic ultrasound, electromagnetic therapy, topical negative pressure (VAC) therapy and hyperbaric oxygen. However, it is difficult to translate these results into clinical practice due to lack of standardization.

Summary

Other important concepts in the treatment of pressure ulcers are debridement, infection and pain control. These concepts are crucial in the treatment of all chronic wounds and are discussed in detail in the article on Diabetic Foot Ulcers (page 8 in this volume).

Pressure ulcers are a source of both increased morbidity and mortality, and it has repeatedly been proven cost-effective to prevent them. An interdisciplinary team, including nurses, OTs, PTs and physicians, is essential for proper care of the chronic wound. ♦

Further Information

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No competing financial interests declared.

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Table 3

Strategies to Reduce Pressure and Prevent Pressure Ulcers

SUPPORT SURFACES	See effectiveness of mattresses (page 24)
TURNING SCHEDULES	<ul style="list-style-type: none"> – Individualize turning schedules – PROTECT HEELS: pillows under entire length of legs (ending at ankles), Sheepskin booties do not reduce pressure but foam or two part booties may be effective – HOB elevated ≤ 30 degrees – Foam wedges for lateral positioning (change position slightly Q30 minutes) – Add prone position to turning schedule if patient can tolerate – Chair positioning (see above)
REMOBILIZATION	<ul style="list-style-type: none"> – Return to full mobility if possible – If this is not possible, teach patient to make small shifts in body position (i.e. Shifting from one buttock to another, Q20 minutes)
MANAGING MOISTURE	<ul style="list-style-type: none"> – Treat incontinence if possible (eg. Bowel routine) – Use of (condom) catheters if possible – Change incontinence pads frequently
FRICTION & SHEAR	<p>Friction: Ankle & heel booties may reduce friction (though may not reduce pressure); hydrocolloid or adhesive film dressings over prominences</p> <p>Shear: HOB < 30 degrees to reduce shear</p>
NUTRITION	<ul style="list-style-type: none"> – No evidence that particular nutrients increase risk for pressure ulcers – Vitamins A,C & zinc important in tissue building so may be prudent – Consult dietitian, ensure adequate caloric intake