PRESSURE INDUCED SKIN AND SOFT TISSUE INJURIES

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Some of the following images are graphic
Pressure Induced Skin and Soft Tissue Injuries

**Definition:** Localized areas of skin damage and/or underlying tissue due to pressure or pressure + shear.

**Additional Details:**
- Injury results from prolonged soft tissue compression between a bony prominence and an external surface.
- Often, external appearance may underestimate extent of damage because skin is less susceptible to pressure than the underlying tissues.
PATHOGENESIS
Among the most common reported conditions in patients who are acutely hospitalized or in long-term care facilities.

About 2.5 million pressure injuries are treated in acute care facilities per year.

About 24% of nursing home residents develop pressure injuries after their admission.

In the outpatient setting, up to 9% of patients receiving home care develop ulcers.

Most common among people age >65
<table>
<thead>
<tr>
<th><strong>RISK FACTORS</strong></th>
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<table>
<thead>
<tr>
<th><strong>Age</strong></th>
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<tbody>
<tr>
<td>• &gt;65 (likely due to reduced subcutaneous fat and impaired blood flow)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Immobility</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bed bound or chair bound</td>
</tr>
<tr>
<td>• <strong>Most important host factor that contributes to pressure injury</strong></td>
</tr>
<tr>
<td>• Poorly Fitting Casts or other medical equipment/devices</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Malnutrition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Possibly best to see if patient is ingesting appropriate nutrition</td>
</tr>
<tr>
<td>• Nursing home residents with lower BMI, have higher risk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Reduced Perfusion</strong></th>
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<tbody>
<tr>
<td>• Factors contributing to reduced perfusion: volume depletion, hypotension, vasomotor failure, vasoconstriction</td>
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<table>
<thead>
<tr>
<th><strong>Sensory Loss</strong></th>
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<tbody>
<tr>
<td>• Patients may not perceive pain or discomfort arising from prolonged pressure</td>
</tr>
<tr>
<td>• Common in diseases such as dementia, delirium, spinal cord injury and peripheral neuropathy</td>
</tr>
</tbody>
</table>
Several Risk Prediction Scales are available

Most Common are the Norton and Braden Scales
### Norton Scale

#### Five categories:
- Physical condition
- Mental condition
- Activity
- Mobility
- Incontinence

**Score <14 is high risk**

<table>
<thead>
<tr>
<th>Physical condition</th>
<th>Mental condition</th>
<th>Activity</th>
<th>Mobility</th>
<th>Incontinent</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 = Good</td>
<td>4 = Alert</td>
<td>4 = Ambulant</td>
<td>4 = Full</td>
<td>4 = Not</td>
</tr>
<tr>
<td>3 = Fair</td>
<td>3 = Apathetic</td>
<td>3 = Walk/help</td>
<td>3 = Slightly limited</td>
<td>3 = Occasional</td>
</tr>
<tr>
<td>2 = Poor</td>
<td>2 = Confused</td>
<td>2 = Chairbound</td>
<td>2 = Very limited</td>
<td>2 = Usually/urine</td>
</tr>
<tr>
<td>1 = Very bad</td>
<td>1 = Stupor</td>
<td>1 = Bed</td>
<td>1 = Immobile</td>
<td>1 = Doubly</td>
</tr>
</tbody>
</table>

Score:

*Calculated as the sum of the scores in all five areas. A score less than 14 indicates a high risk of pressure ulcer development.*

The Braden Scale for predicting risk of pressure-induced injury is a six-category assessment tool used to evaluate the risk of pressure ulcers. The categories include:

- Sensory perception
- Moisture
- Activity
- Mobility
- Nutrition
- Friction

The scale ranges from 0 to 23, with a score of 18 or higher indicating a high risk of pressure ulcer development. Each category is rated on a scale from 1 to 6, with 6 being the highest risk and 1 being the lowest. The higher the score, the greater the risk for developing a pressure ulcer.
Superficial Lesions

Diabetes-related ulcers, Venous ulcers, Arterial Ulcers
Clinical evaluation

- Identified by its appearance and location over a bony prominence
- Sacrum and heels are most common locations
- NPIAP* staging scale: helps determine depth and extent of the injuries
- Routine wound culture not recommended

Nutritional assessment

- Should be performed especially for patients with stage 3 or 4 pressure injuries.
- Undernutrition requires further evaluation and treatment
STAGING

Based on National Pressure Injury Advisory Council (NPIAP)

Four Stages (I, II, III, IV)

Pressure ulcers don’t necessarily have to form from Stage I to Stage IV

Some injuries are unstageable
STAGE I

- Intact skin with non-blanchable erythema
- Usually over a bony prominence.
- Color changes may not be as visible in darkly pigmented skin.
- May also be warmer, cooler, firmer, softer, or more tender than other tissue.
- No actual ulcer present
STAGE II

- Injury is shallow with a pink to red base.
- Partial-thickness skin damage, with loss of epidermis (erosion or blister) with or without true ulceration (defect beyond the level of the epidermis)
- Subcutaneous tissue is not exposed.
- No slough or necrotic tissue is present in the base.
- May also include intact or partially ruptured blisters secondary to pressure.
STAGE III

- Full-thickness skin loss with damage to subcutaneous tissue extending down to (but not including) the underlying fascia.
- Ulcers are crater-like without underlying muscle or bone exposure.
STAGE IV

- Full-thickness skin loss with extensive destruction, tissue necrosis, and damage to the underlying muscle, tendon, bone, or other exposed supporting structures.
UNSTAGEABLE INJURIES

Concealed Depth of Injury

- Sometimes full-thickness injury and tissue loss cannot be determined because of debris, slough or eschar.

Mucous Membranes

- Injuries on mucous membranes where medical devices have been placed (misfitting dentures, ET tubes) cannot be staged because of the tissue anatomy.
**Non-healing injuries**

- may be due to inadequate treatment or rise of a complication.
- Infections are the most common complication

**Local complications**

- Cellulitis, osteomyelitis, abscess, bursitis, necrotizing fasciitis
- SCC within the ulcer (Marjolin ulcer) [rare]
- Sinus tracts

**Systemic**

- Bacteremia, meningitis, endocarditis
Stage I: if treated appropriately and early, then prognosis is excellent but healing takes weeks

Expect resolution after 6 months of adequate treatment for:
- > 70% of stage 2 pressure injuries
- 50% of stage 3 injuries
- 30% of stage 4 injuries

Expect prolongation of healing or complications if care is suboptimal or patient has a disorder that impairs wound healing
TREATMENT

- Pressure Reduction
- Direct Wound Care
- Pain Management
- Infection Control
- Optimize Nutrition
- Surgery or Adjunctive Therapy
TREATMENT: PRESSURE REDUCTION

Frequent repositioning

• If confined to bed, turn every 2H

Protective Devices

• Padding: pillows, foam wedges, and protectors between the knees, ankles, and heels. Soft seat cushions such as donuts.
TREATMENT: PRESSURE REDUCTION (II)

**Support surfaces**

- **Static surfaces (no electricity)**
  - for prevention or stage I pressure ulcers
  - air, foam, gel, and water overlays and mattresses.

- **Dynamic surfaces (use electricity)**
  - alternating-air mattresses, low-air-loss mattresses, and air-fluidized mattresses.

**Friction reduction**

- barrier protectant such as petrolatum jelly reduce friction
TREATMENT: PRESSURE REDUCTION
TREATMENT: DIRECT WOUND CARE

Cleaning:
- Irrigate with normal saline with each dressing change.

Debridement:
- Remove necrotic tissue which harbors bacteria.
- Methods: Mechanical (wet to dry dressings), Sharp (surgical), Autolytic (hydrogel/hydrocoooloid), Enzymatic (collagenase), biosurgery (medical maggot)

Dressings:
- Protect wound and facilitate healing process (hydrocolloid, alginate, foam dressing)
Primary treatment of pain is to treat the injury

Use NSAID or acetaminophen (mild to moderate pain)

Avoid opioids—sedative effects promotes immobility

May need local anesthetics during dressing changes or debridement

If cognitively impaired, look at vital signs for indications of pain (tachycardia, elevated BP)
Continuous assessment to look for signs of infection

Consider infection if there is impaired wound healing

Local wound infection can be treated locally with topical agents (silver sulfadiazene, mupirocin, polymyxin B, metronidazole)

If there is cellulitis, bacteremia, osteomyelitis use narrow spectrum abx
TREATMENT: OPTIMIZE NUTRITION

Undernutrition is common among patients with pressure injuries and is a risk factor for delayed healing.

Marker of undernutrition: weight < 80% of ideal based on BMI

Protein intake of 1.25 to 1.5 g/kg/day

No need for supplemental vitamins or calories in patients who have no signs of nutritional deficiency.
Adjunctive Therapy:

- Include Negative-pressure therapy (vacuum-assisted closure), topical recombinant growth factors (platelet derived growth factor), electrical stimulation therapy, etc.

Surgery:

- Indicated for large defects with exposure to MSK structures
- Outcomes are better if undernutrition and comorbid disorders are optimized before surgery
PREVENTION

Identify high-risk patients:
- Norton Scale and Braden Scale

Repositioning:
- Mainstay of prevention—reposition at least every 2 hours and routine visual inspection

Skin care and hygiene:
- Keep body surfaces with bony prominences separated (knees)
- Prevent skin breakdown

Avoidance of immobilization:
- Minimize sedatives
- Mobilize as quickly as possible
THANK YOU!


• Berlowitz, Dan. Epidemiology, pathogenesis, and risk assessment of pressure-induced skin and soft tissue injury. UpToDate.

• Berlowitz, Dan. Clinical Staging and Management of Pressure-Induced Skin and Soft Tissue Injury. UpToDate_2


