Pressure Ulcers
Diagnosis and Management

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Adapted from a Slide Series from the American Geriatrics Society
Objectives

- Discuss how pressure ulcers occur
- Stage Pressure Ulcers according to the National Pressure Ulcer Advisory Panel guidelines
- Explain how pressure ulcers can be prevented
- Discuss the care of pressure ulcers
Pressure Ulcer Definition

Any lesion caused by unrelieved pressure that results in damage to underlying soft tissue when the tissue is compressed between a bony prominence and external surface over a prolonged period of time
Pressure Ulcers
A Major Issue

- Affect 1 million adults annually
- Higher risk in older persons because
  - Local blood supply to skin decreases
  - Epithelial layers flatten and thin
  - Subcutaneous fat decreases
  - Collagen fibers lose elasticity
  - Tolerance to hypoxia decreases
Prevalence

- **Varies by setting**
  - Hospital = 1% to 30%
  - Home care = 5% to 15%
  - Nursing home = 3% to 30%

- **Varies by stage of ulcer**
  - Stage I = 47%
  - Stage II = 33%
  - Stages III & IV = 20%
Risk Factors

- **Intrinsic:** physiologic factors or disease states that increase the risk for pressure ulcer development
  - Age
  - Nutritional status
  - Decreased arteriolar blood pressure

- **Extrinsic:** external factors that damage skin
  - Pressure, friction, shear
  - Moisture, urinary or fecal incontinence
Bony Prominences
Pressure Ulcer Staging

- **Stage I**: Persistent erythema of intact skin

- **Stage II**: Partial-thickness skin loss involving epidermis or dermis, or both. Ulcer is superficial and presents as an abrasion, blister, or shallow crater

- **Stage III**: Full-thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia

- **Stage IV**: Full-thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structure
Wound Staging

- Stage I: Non-blanchable erythema of intact skin, the heralding lesion of skin ulceration
Nonblanchable erythema
Wound Staging

- **Stage II**: Partial thickness skin loss involving epidermis, dermis, or both
Stage III: Full thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.
Wound Staging

- Stage IV: Full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures
Wound Staging

- Non-observable: Wound is unable to be visualized

- A pressure ulcer cannot be adequately staged until the deepest viable tissue layer is visible; this means that wounds covered with eschar and/or slough cannot be staged, and should be documented as non-observable
Fully Granulating

- Wound bed filled with granulation tissue to the level of the surrounding skin or new epithelium
Non-Healing

Wound with > 25% avascular tissue

OR

Signs/symptoms of infection

OR

Clean but non-granulating wound bed

OR

Closed/hyperkeratotic wound edges

OR

Persistent failure to improve despite appropriate comprehensive wound management
Early/Partial Granulation

- > 25% of the wound bed is covered with granulation tissue
- Minimal avascular tissue
- May have dead space
- No signs or symptoms of infection
- Wound edges open
Assessment Parameters

- Staging
- Size
- Exudate
  - Amount: Mild, moderate, heavy
  - Type
    - Serous: Clear or amber
    - Sanguinious: Bloody
    - Purulent: Thick, yellow, foul odor

- Predominant tissue
  - Epithelial
  - Granulation
  - Necrotic
  - Eschar
Measurement of Pressure Ulcers

- Measure 2 diameters of the wound
- Measures are taken at right angles
Wound with Eschar
Wound with Purulent Exudate
Possible Complications

- Sepsis
- Localized infection, cellulitis, osteomyelitis
- Pain
- Depression

Mortality rate = 60% in older persons who develop a pressure ulcer within 1 year of hospital discharge
Factors Predictive of Pressure Ulcer Development

- Age 70+
- Impaired mobility
- Current smoking
- Low body mass index
- Confusion
- Urinary and fecal incontinence
- Malnutrition
- Restraints

- Many other disorders: malignancy, diabetes, stroke, pneumonia, heart failure, fever, sepsis, hypotension, renal failure, dry skin, history of pressure ulcers, anemia, hypoalbuminemia
Risk Assessment Instruments

- Norton scale
  Sensitivity = 73%-92%, Specificity = 61%-94%

- Braden scale
  Sensitivity = 83%-100%, Specificity = 64%-77%

Both recommended by Agency for Healthcare Research and Quality
Braden Scale

Provides method for assessing a patient’s pressure ulcer risk by evaluating

- **Sensory Perception**: ability to respond to pressure-related discomfort
- **Moisture**: degree to which skin is exposed to moisture
- **Activity**: degree of physical activity
- **Mobility**: ability to change and control body position
- **Nutrition**: usual food intake
Prevention

An evidence-based approach to preventing pressure ulcers focuses on:

- Skin care
- Mechanical loading
- Support surfaces
Skin Care

- Daily systematic skin inspection and cleansing
  - Especially bony prominences
  - Use warm water and mild cleanser

- ↓ factors that promote dryness
  - Avoid low humidity and exposure to cold
  - Moisturize dry skin

- Avoid massaging over bony prominences

- ↓ moisture (incontinence, perspiration, drainage)

- Minimize friction and shear
  - Use proper repositioning, turning, transferring techniques
  - Use lubricants, protective films, dressings, padding
Mechanical Loading

Pressure, Friction, Shear

- Reposition at least every 2 hours (may use pillows, foam wedges)
- Keep head of bed at lowest elevation possible
- Use lifting devices to decrease friction and shear
- Remind patients in chairs to shift weight every 15 minutes
  “Doughnut” seat cushions are CONTRAINDICATED, and may CAUSE pressure ulcers
- Pay special attention to heels
Prevention of Heel Ulcers

- Assess heels of high-risk patients every day
- Use moisturizer on heels (no massage) twice a day
- Apply dressings to heels
  - transparent film
  - single or extra-thick hydrocolloid dressing
- Have patients wear
  - socks to prevent friction (remove at bedtime)
  - properly fitting sneakers or shoes when in wheelchair
- Place pillow under legs to support heels off bed
- Place heel cushions to prevent pressure
- Turn patients every 2 hours, repositioning heels
Pressure-Reducing Support Surfaces

Use for all older persons at risk for ulcers

- **Static**
  - Foam, static air, gel, water, combination
  - Less expensive

- **Dynamic**
  - Alternating air, low-air-loss, or air-fluidized
  - Use if high-risk patient has reactive hyperemia on a bony prominence despite use of static support
  - Potential adverse effects: dehydration, sensory deprivation, loss of muscle strength, difficulty with mobilization
<table>
<thead>
<tr>
<th>Surface</th>
<th>Moist</th>
<th>Heat</th>
<th>Shear</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static: foam</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Static: flotation</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Dynamic: air-fluidized</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Dynamic: low-air-loss</td>
<td>yes</td>
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<td>yes</td>
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<tr>
<td>Dynamic: alternating air</td>
<td>no</td>
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Management: General Assessment

- Identify and effectively manage issues that have placed patient at risk for pressure ulcers
  - Medical diseases
  - Health problems
  - Nutritional status
  - Pain level
  - Psychosocial health
Management: Ulcer Assessment

Evaluate and document the following:

- Location
- Stage
- Area
- Depth
- Drainage
- Necrosis
- Granulation
- Cellulitis
Management: Monitoring Healing

- Document all observations over time
- Describe each ulcer to track progress of healing
- Do not use “reverse staging”
  - Ulcers are filled with granulation tissue (endothelial cells, fibroblasts, collagen, extracellular matrix)
  - Ulcers do not replace lost muscle, subcutaneous fat, or dermis before re-epithelializing
  - Example: stage IV cannot become stage III
- Use validated tools (PUSH)
Pressure Ulcer Scale for Healing (PUSH)

- A validated method to document healing over time
- Observe and measure the ulcer
  - Surface area: measure with centimeter ruler
  - Exudate: estimate portion of ulcer bed covered by drainage
  - Appearance: estimate portion of ulcer for each tissue type
- Assign weighted score to obtain total score; total scores over time indicate healing or deterioration
Management: Control of Infection

- Wound cleansing and dressing are the key
  - ↑ frequency when purulent or foul-smelling drainage is first observed
  - Avoid topical antiseptics because of their tissue toxicity
- With failure to heal or persistent exudate after 2 weeks of optimal cleansing, consider trial of topical antibiotics
- If still no healing, consider presence of cellulitis or osteomyelitis
  - biopsy for culture of underlying tissue, bone
  - may need systemic antibiotics
# Management: Methods of Debridement

<table>
<thead>
<tr>
<th>Type</th>
<th>Methods</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical</td>
<td>Wet-to-moist irrigation, hydrotherapy</td>
<td>May remove both dead &amp; live tissue; may be painful</td>
</tr>
<tr>
<td>Surgical, sharp</td>
<td>Scalpel, scissor to remove dead tissue; laser debridement</td>
<td>Quick, effective; use for infection; pain management needed</td>
</tr>
<tr>
<td>Enzymatic</td>
<td>Topical agent to dissolve dead tissue</td>
<td>Use if no infection; may damage skin</td>
</tr>
<tr>
<td>Autolytic</td>
<td>Allows dead tissue to self-digest</td>
<td>Use if other methods not tolerated &amp; no infection; effect delayed</td>
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</table>
Management: Dressings

- **Transparent film**: stage I, protects from friction
  Contraindicated: skin tears, draining, suspected infection

- **Foam island**: stages II, III
  Contraindicated: excessive exudate; dry, crusted wound

- **Hydrocolloid**: stages II, III
  Contraindicated: poor skin integrity, infection, wound needs packing

- **Petroleum-based nonadherent**: stages II, III, graft sites
Management: Dressings

- **Alginate**: stages II, III, IV, excessive drainage
  Contraindicated: dry or superficial wound with maceration

- **Hydrogel, amorphous**: stages II, III, IV; must combine with gauze dressing
  Contraindicated: maceration, excess exudate

- **Hydrogel, sheet**: stage II, skin tears
  Contra-indicated: maceration, moderate to heavy exudate

- **Gauze packing**: stages III, IV, deep wounds
Management: Nutrition

- Ensure adequate diet; prevent malnutrition
- Weak evidence for nutritional support that achieves 30 to 35 calories/kg/day and 1.25 to 1.5 g of protein/kg/day
- Weak evidence for supplemental vitamins and minerals
Management: Surgical Repair

- May be used for stage III and IV ulcers
  - Direct closure, skin grafting, skin flaps, musculocutaneous flaps, free flaps
- Risks and benefits of surgery must be carefully weighed for each patient:
  - Many stage II and IV ulcers heal over a long time with local wound care
  - Rate of recurrence of surgically closed pressure ulcers is high
Management: Adjunctive Therapies

- Hyperbaric oxygen
- Vacuum-assisted closures
- Promising research continues:
  - Recombinant platelet-derived growth factors
  - Electrical stimulation
  - Warm-up therapy (↑ basal ulcer temperature promotes healing)
Older adults are at high risk for development of pressure ulcers

Pressure ulcers may result in serious morbidity and mortality

Techniques that reduce pressure, moisture, friction, and shear can prevent pressure ulcers

Pressure ulcers should be treated with proper daily cleansing, dressings, debridement, or surgery as indicated
Case 1

A 90-year-old woman falls at home and fractures her right hip. She is unable to rise from the floor and is not found for 24 hours.

A stage II pressure ulcer 0.5 cm deep and 3.0 × 2.0, is noted over the right greater trochanter. Assessment of the wound reveals pink tissue with scant necrotic areas at the periphery, a small amount of purulent odorous drainage, and no erythema of the surrounding skin.
Case 1

Which of the following is the most appropriate cleansing agent for this pressure ulcer?

(A) Any skin cleanser
(B) Any wound cleanser
(C) Normal saline
(D) Hydrogen peroxide
(E) 1% silver sulfadiazine
Case 1

Which of the following is the most appropriate cleansing agent for this pressure ulcer?

(A) Any skin cleanser

(B) Any wound cleanser

(C) Normal saline

(D) Hydrogen peroxide

(E) 1% silver sulfadiazine
An 82-year-old female nursing-home resident has end-stage Alzheimer’s dementia. She is mute, incontinent of urine and feces, and bedbound.

Daily skin inspection reveals nonblanching erythema of the heels.
Case 2

Which of the following will best prevent a pressure ulcer in this patient?

(A) Bladder catheterization
(B) Massaging the sacral skin daily
(C) Elevating the head of the bed to 45 degrees
(D) Elevating the heels off the bed surface
(E) Repositioning the patient every 4 hours
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