Bed Sores No More!

Pressure Injuries
Risk Factors and Updated Staging Methodology

Nicolle Samuels, MSPT, CLT-LANA, CWS, CKTP
Objectives

• Understand updated definitions as well as staging and classification methodology for pressure injuries
• Describe and recognize risk factors and characteristics of pressure injuries
• Understand basic etiology and resultant tissue pathophysiology related to pressure injury development
Pressure Injuries

- **NPUAP - Pressure injury definition:** localized damage to the skin and/or underlying soft tissue usually over a *bony prominence* or related to a *medical or other device*. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or *prolonged pressure* or pressure in combination with *shear*. The tolerance of soft tissue for pressure and shear may also be affected by *microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue*.

- Greatest risk – reduced mobility
  - Individuals with spinal cord injuries
  - Hospitalized patients
  - Individuals in long-term care facilities
Statistics

• 2.5 million patients develop PIs every year
• 60,000 deaths/year
• Costs US Health System $9-11 billion/yr
  – $70-150K/pt with Stage 3 and 4 PIs
  – $250,000+/settlement
• Second most common hospital billing claim
• Prevalence:
  – LTC: 10-35%
  – Acute care: 3-17%
  – HH: 9-15%
Etiology of pressure-related cell death

- Pressure
- Ischemia
- Acidosis
- Inflammation
- Local tissue anoxia
- Necrosis
- Increased capillary permeability and edema

Meyers
Etiology of Pressure Injuries

• Result of:
  – Inverse pressure–time relationship
  – Individual hemodynamic factors
  – Body location
The pressure–time curve shifts to the left (dotted line) for individuals with lower tissue tolerance to pressure due to hemodynamic changes. (Meyers)
Pressure Distribution Cone

Meyers
4 Stages of Tissue Breakdown

• Hyperemia: <30min
• Ischemic injury: 2-6 hrs
• Necrosis: >6 hrs
• Ulceration: immediately to 2 weeks after injury
Risk Factors Contributing to Pressure Injuries

**Shear**

Shear = force parallel to soft tissue

May have teardrop appearance

Undermining common

Friction = two surfaces moving across one another
### Risk Factors Contributing to Pressure Injuries

#### Moisture

<table>
<thead>
<tr>
<th>Predisposes skin to PI by</th>
<th>Maceration by be caused by</th>
<th>Anhydrous skin also at risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Causing maceration</td>
<td>• Wound drainage</td>
<td></td>
</tr>
<tr>
<td>• Increasing shear</td>
<td>• Perspiration</td>
<td></td>
</tr>
<tr>
<td>• Increasing friction forces</td>
<td>• Incontinence</td>
<td></td>
</tr>
</tbody>
</table>

Maceration

Meyers

Avera Therapy
## Risk Factors Contributing to Pressure Injuries

### Impaired Mobility

<table>
<thead>
<tr>
<th>Factors affecting patient’s ability to move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors affecting patient’s desire to move</td>
</tr>
<tr>
<td>Factors affecting patient’s ability to perceive pain</td>
</tr>
</tbody>
</table>

### Most frequently studied causes:
- Hospitalization
- Fracture
- Spinal cord injury
- Infants/neonates
Risk Factors Contributing to Pressure Injuries

<table>
<thead>
<tr>
<th>Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second most common risk factor</td>
</tr>
<tr>
<td>Low serum albumin levels and/or hydration</td>
</tr>
<tr>
<td>Correlated with ulcer severity</td>
</tr>
<tr>
<td>Patient may be underweight, normal weight, or obese</td>
</tr>
</tbody>
</table>

Malnutrition comes in many forms.

- Stunting (people are too short for their age)
- Wasting (people are too thin for their height)
- Obesity (people are overweight)

Global Nutrition Report 2015
#NutritionReport
Risk Factors Contributing to Pressure Injuries

### Impaired Sensation

Unable to detect pain of ischemic tissue damage caused by pressure

**Examples:**
- Spinal cord injury
- Spina bifida
- Stroke
- Diabetes mellitus
- Full-thickness burns
- Peripheral neuropathy
Risk Factors Contributing to Pressure Injuries

**Advanced Age**

More than half of patients with pressure injuries are over 70 years old

Age-related skin changes

Increased rate of comorbidities
Risk Factors Contributing to Pressure Injuries

<table>
<thead>
<tr>
<th>Previous Pressure Injury</th>
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</thead>
<tbody>
<tr>
<td>Scar tissue only attains up to 80% strength of the original tissue</td>
</tr>
<tr>
<td>Scar tissue alters tolerance to pressure and externally applied loads</td>
</tr>
</tbody>
</table>
## Risk Factors Contributing to Pressure Injuries

<table>
<thead>
<tr>
<th>Additional Risk Factors</th>
<th>Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemia-reperfusion injuries</td>
<td>Polypharmacy</td>
</tr>
<tr>
<td>Low diastolic pressure</td>
<td>Psychosocial factors</td>
</tr>
<tr>
<td>Smoking</td>
<td>Increased skin temperature</td>
</tr>
<tr>
<td>Diabetes-related microvascular changes</td>
<td>Alzheimer’s disease, Parkinson’s disease, RA</td>
</tr>
</tbody>
</table>
Characteristics of Pressure Injuries

<table>
<thead>
<tr>
<th>Wound Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranges from closed to full thickness</td>
</tr>
<tr>
<td>May reach depths of visible structures - bone, tendon, fascia, ligament, muscle</td>
</tr>
<tr>
<td>Granular or necrotic</td>
</tr>
<tr>
<td>Drainage amounts vary</td>
</tr>
</tbody>
</table>
Characteristics of Pressure Injuries

## Periwound and Structural Changes

<table>
<thead>
<tr>
<th>Condition</th>
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</thead>
<tbody>
<tr>
<td>Nonblanchable erythema</td>
</tr>
<tr>
<td>Mottled</td>
</tr>
<tr>
<td>Ring of inflammation around ulcer</td>
</tr>
<tr>
<td>Dermatitis</td>
</tr>
</tbody>
</table>

Meyers
Characteristics of Pressure Injuries

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td></td>
</tr>
<tr>
<td>McGill Pain Questionnaire, Visual Analog Scale, Faces Pain Scale</td>
<td></td>
</tr>
<tr>
<td>Stage 1 pressure injuries may be tender instead of painful</td>
<td></td>
</tr>
<tr>
<td>Neurological deficits - may not perceive pain</td>
<td></td>
</tr>
<tr>
<td>Patients who are unable to communicate may demonstrate pain by grimacing, withdrawal, or moaning</td>
<td></td>
</tr>
</tbody>
</table>
## Characteristics of Pressure Injuries

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<th>Position</th>
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<tr>
<td>Majority on lower half of body over bony prominence</td>
</tr>
<tr>
<td>95% of pressure injuries located over: sacrum, greater trochanter, ischial tuberosity, posterior calcaneous, lateral malleolus</td>
</tr>
<tr>
<td>Externally applied pressure: casts, tubing, shoes</td>
</tr>
</tbody>
</table>
Pressure Injury Risk Assessment

Instruments

Norton:
- Sum scores
- Range from 5-20
- <14 risk
- <12 high risk
Pressure Injury Risk Assessment

Instruments

Braden:

- Score of 6-23
- Lower the score, higher the risk
- 19-23=no risk

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Evaluator’s Name</th>
<th>Date of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ability to respond meaningfully to pressure-related discomfort</td>
<td>Unresponsive (does not moan, finch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.</td>
<td>Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.</td>
</tr>
<tr>
<td>MOISTURE</td>
<td>1. Constantly Moist</td>
<td>2. Very Moist</td>
</tr>
<tr>
<td>degree to which skin is exposed to moisture</td>
<td>Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.</td>
<td>Skin is often, but not always moist. Linen must be changed at least once a shift.</td>
</tr>
<tr>
<td>ACTIVITY</td>
<td>1. Bedfast</td>
<td>2. Chairfast</td>
</tr>
<tr>
<td>degree of physical activity</td>
<td>Confined to bed.</td>
<td>Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.</td>
</tr>
<tr>
<td>MOBILITY</td>
<td>1. Completely Immobile</td>
<td>2. Very Limited</td>
</tr>
<tr>
<td>ability to change and control body position</td>
<td>Does not make even slight changes in body or extremity position without assistance.</td>
<td>Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.</td>
</tr>
<tr>
<td>NUTRITION</td>
<td>1. Very Poor</td>
<td>2. Probably Inadequate</td>
</tr>
<tr>
<td>usual food intake pattern</td>
<td>Never eats a complete meal. Rarely eats more than 1/2 of any food offered. Eats 2 servings of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IVs for more than 5 days.</td>
<td>Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimal amount of liquid diet or tube feeding.</td>
</tr>
<tr>
<td>FFricion &amp; SHEAR</td>
<td>1. Problem</td>
<td>2. Potential Problem</td>
</tr>
<tr>
<td></td>
<td>Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequent sliding down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.</td>
<td>Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.</td>
</tr>
</tbody>
</table>

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NPUAP Updates - 2016

• Pressure “Ulcer” → Pressure “Injury”
• Added 2 additional definitions
  – Medical Device Related Pressure Injury
  – Mucosal Membrane Pressure Injury
• PI and PU synonyms in ICD-11 draft
  – ICD-10: L89
NPUAP pressure injury staging:

• Document what you see/feel
• Stage category may ‘worsen’ over time
• Do not ‘reverse stage’ pressure injuries as they heal
• Stage pressure injuries, NOT other wounds

Healthy Skin - Caucasian
Healthy Skin – Non Caucasian
Stage 1

Stage 1:
Intact skin with local area of non-blanchable erythema

Further description:
Presence of blanchable erythema or changes in sensation, temperature, or firmness may precede visual changes. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury.
Stage 2:
Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as an intact or ruptured serum-filled blister.

Further description:
Adipose is not visible and deeper tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel. This stage should not be used to describe moisture associated skin damage (MASD) including incontinence associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive related skin injury (MARSI), or traumatic wounds (skin tears, burns, abrasions).
Stage 3:
Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible.

Further description:
The depth of tissue damage varies by anatomical location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage and/or bone are not exposed. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.
Stage 4:
Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining and/or tunneling often occur.

Further description:
Depth varies by anatomical location. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.
Unstageable Pressure Injury

Unstageable:
Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar.

Further description:
If slough or eschar is removed, a Stage 3 or Stage 4 pressure injury will be revealed. Stable eschar (i.e. dry, adherent, intact without erythema or fluctuance) on an ischemic limb or the heel(s) should not be removed.
Deep Tissue Pressure Injury

Suspected Deep Tissue Injury:
Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

Further description:
Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.
Pressure Injury Classification

Medical Device Related Pressure Injury: This describes an etiology.
Medical device related pressure injuries result from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure injury generally conforms to the pattern or shape of the device. The injury should be staged using the staging system.

Mucosal Membrane Pressure Injury: Mucosal membrane pressure injury is found on mucous membranes with a history of a medical device in use at the location of the injury. Due to the anatomy of the tissue these ulcers cannot be staged.
Case Studies

Stage 2
Deep Pressure Injury
Deep Pressure Injury
Unstageable

Stage 3

Healing Stage 3
Questions?

Thank You!

Nicolle Samuels, MSPT, CLT-LANA, CWS, CKTP
Director of Rehabilitation and Wellness
Hegg Health Center
Rock Valley, IA 51247
712-476-8080