

PRESSURE INDUCED SKIN AND SOFT TISSUE INJURIES

Andrea Banuelos Mota, MD, MPH
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WARNING

Some of the following images
are graphic



DEFINITION

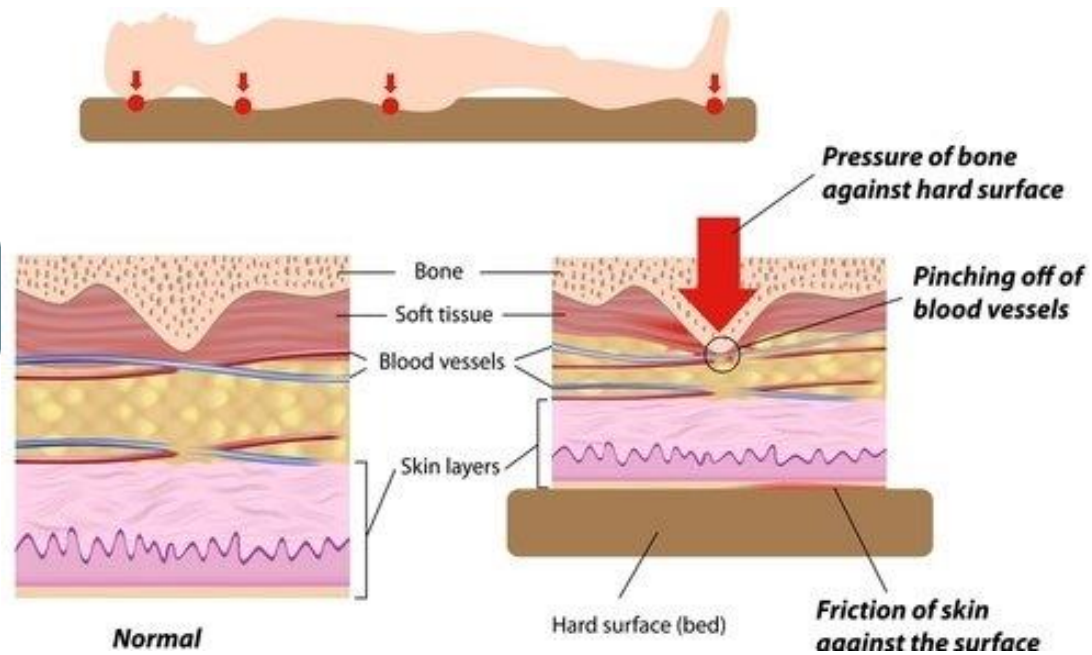
Pressure Induced Skin and Soft Tissue Injuries

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



EPIDEMIOLOGY

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

RISK FACTORS

Age

- >65 (likely due to reduced subcutaneous fat and impaired blood flow)

Immobility

- Bed bound or chair bound
- **Most important host factor that contributes to pressure injury**
- Poorly Fitting Casts or other medical equipment/devices

Malnutrition

- Possibly best to see if patient is ingesting appropriate nutrition
- Nursing home residents with lower BMI, have higher risk

Reduced Perfusion

- Factors contributing to reduced perfusion: volume depletion, hypotension, vasomotor failure, vasoconstriction

Sensory Loss

- Patients may not perceive pain or discomfort arising from prolonged pressure
- Common in diseases such as dementia, delirium, spinal cord injury and peripheral neuropathy



RISK
PREDICTION

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

Norton scale for predicting risk of pressure-induced injury*

Physical condition	Mental condition	Activity	Mobility	Incontinent
4 = Good	4 = Alert	4 = Ambulant	4 = Full	4 = Not
3 = Fair	3 = Apathetic	3 = Walk/help	3 = Slightly limited	3 = Occasional
2 = Poor	2 = Confused	2 = Chairbound	2 = Very limited	2 = Usually/urine
1 = Very bad	1 = Stupor	1 = Bed	1 = Immobile	1 = Doubly
Score: _____	Score: _____	Score: _____	Score: _____	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.

Adapted from: Norton D. Calculating the risk: reflections on the Norton Scale. Decubitus 1989; 2:24.

BRADEN SCALE

Six categories

Sensory perception

Moisture

Activity

Mobility

Nutrition

Friction

Max score 23

Score >18 is high risk

Braden scale for predicting risk of pressure-induced injury*

Sensory perception	Moisture	Activity	Mobility	Nutrition	Friction & shear
Ability to respond meaningfully to pressure-related discomfort	Degree to which skin is exposed to moisture	Degree of physical activity	Ability to change and control body position	Usual food intake pattern	
1. Completely limited Unresponsive (does not moan, flinch, or grasp) to painful stimuli due to diminished level of consciousness or sedation OR Limited ability to feel pain over most of body	1. Constantly moist Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	1. Bedfast Confined to bed	1. Completely immobile Does not make even slight changes in body or extremity position without assistance	1. Very poor Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less 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 IV's for more than 5 days	1. Problem Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.
2. Very limited Responds only to painful stimuli Cannot communicate discomfort except by moaning or restlessness OR Has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body	2. Very moist Skin is often, but not always moist. Linen must be changed at least once a shift.	2. Chairfast Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	2. Very limited Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently	2. Probably inadequate 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 optimum amount of liquid diet or tube feeding	2. Potential problem Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or good position in chair or bed most of the time but occasionally slides down.
3. Slightly limited Responds to verbal commands, but cannot always communicate discomfort or the need to be turned OR Has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities	3. Occasionally moist Skin is occasionally moist, requiring an extra linen change approximately once a day	3. Walks occasionally Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	3. Slightly limited Makes frequent though slight changes in body or extremity position independently	3. Adequate Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products) per day. Occasionally will refuse a meal, but will usually take a supplement when offered. OR Is on a tube feeding or TPN regimen which probably meets most of nutritional needs	3. No apparent problem Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Refuses a meal, but usually maintains good position in bed or chair.
4. No impairment Responds to verbal commands Has no sensory deficit which would limit ability to feel or voice pain or discomfort	4. Rarely moist Skin is usually dry, linen only requires changing at routine intervals	4. Walks frequently Walks outside room at least twice a day and inside room at least once every two hours during waking hours	4. No limitation Makes major and frequent changes in position without assistance	4. Excellent Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	
Score: _____	Score: _____	Score: _____	Score: _____	Score: _____	Score: _____

* To calculate the Braden scale score, rank the patient in each of the subscales: sensory perception, mobility, activity, moisture, nutrition and friction and shear. Add the six subscale scores to yield a total Braden scale score. Lower scores are associated with a higher risk of developing pressure sores. A score of 18 or less indicates high risk. See www.bradenscale.com.

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DIFFERENTIAL
DIAGNOSIS

Superficial Lesions



**Diabetes-related ulcers, Venous ulcers,
Arterial Ulcers**



DIAGNOSIS

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

COMPLICATIONS

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



PROGNOSIS

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/hydrocolloid), Enzymatic (collagenase), biosurgery (medical maggot)

Dressings:

- Protect wound and facilitate healing process (hydrocolloid, alginate, foam dressing)



TREATMENT:
PAIN
MANAGEMENT

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)



TREATMENT:
INFECTION
CONTROL

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.

TREATMENT: ADJUNCTIVE THERAPY OR SURGERY

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!



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QUESTIONS/COMMENTS?