Pressure Injuries: Risk Assessment and Diagnosis

Description/Etiology
Pressure injuries (PIs)—referred to as “pressure ulcers” until the recent change in terminology by the National Pressure Ulcer Advisory Panel (NPUAP; 2016) and also referred to as decubitus ulcers, pressure sores, or bedsores—are localized, oftentimes painful, areas of damaged skin and/or underlying soft tissue resulting from prolonged or intense pressure or a combination of pressure and shear. The skin at the site of a PI can be intact or the injury can appear as an open wound. PIs usually occur over bony prominences or in areas where medical or other devices or surfaces exert prolonged pressure against the skin. Factors that can potentiate the injurious effects of pressure and shear include prolonged skin moisture, poor nutrition, and poor perfusion. PIs are more common in patients who are older, are critically ill, are immobilized, or have neurologic dysfunction. PIs can develop quickly (e.g., after 2–6 hours of compromised blood flow) and can lead to severe complications, including infection, sepsis, osteomyelitis, and death. Prevention of PIs is based on risk assessment and reduction of risk factors. Diagnosis of PIs is made based on visual inspection and staging (for details, see Signs and Symptoms/Clinical Presentation, below).

PIs are associated with significant healthcare costs due to the increased staffing that is necessary to provide care for patients with PIs, extended duration of patient stay in acute care or an extended care facility, materials and supplies needed for PI treatment, and changes in Medicare and Medicaid reimbursement (see Food for Thought, below) in the United States. It is important to conduct frequent risk assessment to identify the most susceptible individuals and initiate PI prevention strategies. (For information on risk factors and risk assessment, see Risk Factors and Other Diagnostic Tests/Studies, below; for information about prevention and treatment of PIs, see the other Quick Lessons in the series on PIs).

Facts and Figures
About 2.5 million PIs are treated in acute care facilities in the U.S. each year. PIs affect up to 38% of patients in acute care, up to 24% of patients in long-term care, and up to 17% of patients in the home care setting. PIs develop in 35% of patients with hip fracture and 50% of patients who are treated in intensive care settings. Eighty-three percent of PIs that occur during hospitalization develop during the first 5 days of admission. The average length of PI-related hospitalization is 13.4 days, at an average cost of $20,000 per patient. Up to 95% of PIs are thought to be preventable.

Risk Factors
Although more than 100 risk factors for PIs are identified in the literature, the primary risk factor is immobility. Other leading risk factors are decreased activity level, changes in sensory perception, frailty, extreme overweight or underweight, malnutrition, previous diagnosis of a PI, and increased friction and shear on the skin, particularly over bony prominences. An extended stay in a healthcare facility, age-related skin changes, immunocompromise, decreased awareness (e.g., due to dementia or use of sedatives), urinary or fecal incontinence, poor skin perfusion, edema, and smoking are also risk factors. PIs often occur secondary to other medical conditions, and prevalence is higher among older adults and individuals with spinal cord injuries, hip fractures, stroke, cancer,
diabetes mellitus, cardiac disease, or other conditions that can result in immobility, reduced perfusion, or prolonged inpatient stays. Certain medications (e.g., sedatives, psychotropic drugs, steroids, and nonsteroidal anti-inflammatory drugs [NSAIDs]) may contribute to the development of PIs. Extrinsic (i.e., environmental) risk factors include infrequent position changes, lack of using pressure-relieving devices (e.g., special mattresses, heel protectors), increased wait times for procedures and transfers (e.g., in emergency departments and surgical areas), use of certain devices (e.g., casts, traction, restraints, catheters, oxygen tubing), lack of access to health care (e.g., among older adults, disabled prisoners, patients with less financial resources), and lower nurse/patient staffing ratios.

Signs and Symptoms/Clinical Presentation

Early signs and symptoms of PIs include persistent erythema, blisters, localized heat or cold and/or edema, localized hardening of the skin, and purplish or bluish areas on the skin.

The NPUAP uses the following PI classification system:

› **Stage 1** PIs are characterized by a localized area of nonblanchable erythema and intact skin. The area may be painful, firm, soft, or different in temperature from nearby skin. Color changes vary depending on skin pigmentation, but do not include purple or maroon as this may indicate deep tissue injury.

› **Stage 2** PIs are characterized by an area of partial-thickness loss of the dermal layer that appears as a red or pink, shallow, intact or open serum-filled blister without the presence of slough (i.e., dead tissue that is variably green, yellow, grey, or brown) or eschar (i.e., black, brown, or tan crusty or scabbed dead matter that must be debrided to promote healing).

› **Stage 3** PIs are characterized by an area of full-thickness skin loss in which fat may be visible but bone, tendon, and muscle are not. Rolled wound edges (i.e., epibole) might be present. Slough, eschar, or tunneling may be present. If slough or eschar prevent visualization of PI depth, the injury is classified as an Unstageable PI.

› **Stage 4** PIs are characterized by an area of full-thickness skin loss with exposed and/or palpable bone, tendon, or muscle. Slough, eschar, epibole, and tunneling may be present. If slough or eschar prevent visualization of PI depth, the injury is classified as an Unstageable PI.

The classification **Unstageable** PI is used for PIs that have full-thickness skin and tissue injury, but a depth that is obscured by the presence of eschar or slough in the wound base.

The classification **Deep Tissue** PI is used to describe a localized area of non-blanchable, deeply discolored (e.g., maroon or purple), intact or non-intact skin caused by injury (due to pressure or shear forces) at the interface of the underlying muscle and bone; the area may be painful and can vary in temperature and consistency from nearby skin, and these manifestations often precede any changes in skin color.

› **Medical Device Related** PIs are caused by prolonged and/or intense pressure exerted against the skin by a medical device. These PIs take on the pattern/shape of the device and are staged using the staging system.

› **Mucosal Membrane** PIs result from prolonged and/or intense pressure exerted by a medical device against a mucous membrane. Because of the anatomy of this type of tissue, mucosal membrane PIs cannot be staged.

Assessment

› **Patient History**
  • Assess for factors that increase PI development risk (for details, see Risk Factors, above).

› **Laboratory Tests That Can Be Ordered**
  • Elevated serum white blood cell count may indicate infection; decreased prealbumin, albumin, zinc, vitamin C, or transferrin can indicate malnutrition.
  • Deep wound cultures or histologic examination of biopsied bone tissue can show infection. PI surface drainage cultures are not recommended because most PIs are colonized with bacteria, which does not necessarily indicate infection.

› **Other Diagnostic Tests/Studies**
  • PI risk assessment scales (e.g., Braden Scale, Norton Scale, Waterlow Scale) are administered to identify patients who are at risk of developing PIs. Based on risk assessment results and clinician judgment, a risk score is calculated and appropriate intervention and prevention strategies are initiated.
    – The Braden Scale, which uses sensory perception, moisture of the skin, activity level, mobility, nutritional status, and exposure of the skin to friction and shearing forces to assess PI risk, is commonly used in the U.S.; prevention strategies are recommended for patients with a Braden scale score of 16 or less.
  • MRI and bone scans can be performed to assess for osteomyelitis.
Treatment Goals

Promote Accurate Risk Assessment and Timely Diagnosis of PIs

- Assess skin at admission and at least twice daily (e.g., during bathing, after incontinent episodes). Focus on vulnerable areas (e.g., bony prominences, ears if oxygen tubing is used) and follow facility protocols for use of a risk assessment tool (e.g., Braden scale)
- Assess intrinsic factors (e.g., nutritional status, mobility, incontinence, neurologic impairment, overweight or underweight) and extrinsic factors (e.g., medications, surface support used) related to risk of PIs
- Assess for pain and other discomfort and provide prescribed symptomatic relief
- If skin compromise is identified, assess wound characteristics (e.g., location, stage, dimensions, color, temperature, edema, sinus tracking, cellulitis, type and consistency of exudate, odor, and moisture), identify if the PI is acute or chronic, and follow facility protocol to photograph initially and weekly
  - Assess the tissue type, which may be granulation (i.e., red and moist, indicating healing), slough, or eschar
  - Request referral for evaluation and treatment, as appropriate, to a wound care nurse/physician specialist; dermatologist; surgeon for biopsy, debridement, and/or grafting; and physical therapy for a mobility evaluation and formulation of an individualized treatment regimen of exercise to reduce PI risk
- Assess patient/family member anxiety level and coping ability; provide emotional support, educate, and encourage discussion about risk factors for PIs, risk assessment process and individualized risk status, prevention strategies, diagnostic assessment if a PI is present, treatment risks and benefits, and individualized prognosis

Food for Thought

- The empirical evidence supporting the use of assessment tools for PI risk is weak and their usefulness is controversial. Authors of a systematic review found no evidence that use of a PI risk assessment tool reduces risk of PI development compared with less standardized risk assessment based on clinical judgment of nurses (Chou et al., 2013)
- Investigators who conducted a systematic review and meta-analysis of 58 studies calculated that PI risk is increased 1.92-fold in patients with urinary incontinence and 4.99-fold in patients with both urinary and fecal incontinence (Beeckman et al., 2014)
- The current literature does not yet reflect the NPUAP’s recent change in terminology; it is expected that the term pressure injury will gradually replace pressure ulcer as acknowledgement of the change becomes widespread
- PIs are often preventable with the use of appropriate risk assessment, preventive technologies, and evidence-based nursing practice. Consequently, in 2008, the Centers for Medicare and Medicaid Services announced that it will not reimburse hospitals for patient care costs incurred by patients treated for hospital-acquired PIs (The Joint Commission, 2016)

Red Flags

- Sustained light pressure or transient intense pressure can cause a PI
- Patients with darker skin pigmentation cannot be assessed using skin color alone; other parameters (e.g., skin temperature, consistency, sensation) should also be assessed

What Do I Need to Tell the Patient/Patient’s Family?

- Educate and provide written information on PI risk factors, signs and symptoms (e.g., having a “pins and needles” sensation; the characteristic appearance of Stage 1 PIs), how to inspect skin, and the importance of long-term medical surveillance to reduce risk of recurrence

References