HAPI MATTERS

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Learning Objectives

- Identify HAPI is a public health crisis
- Define PI staging and evaluation
- Differentiate PIs from other wound & skin injuries
- Perform risk assessment, prevention and timely management of PI

Public Health Crisis

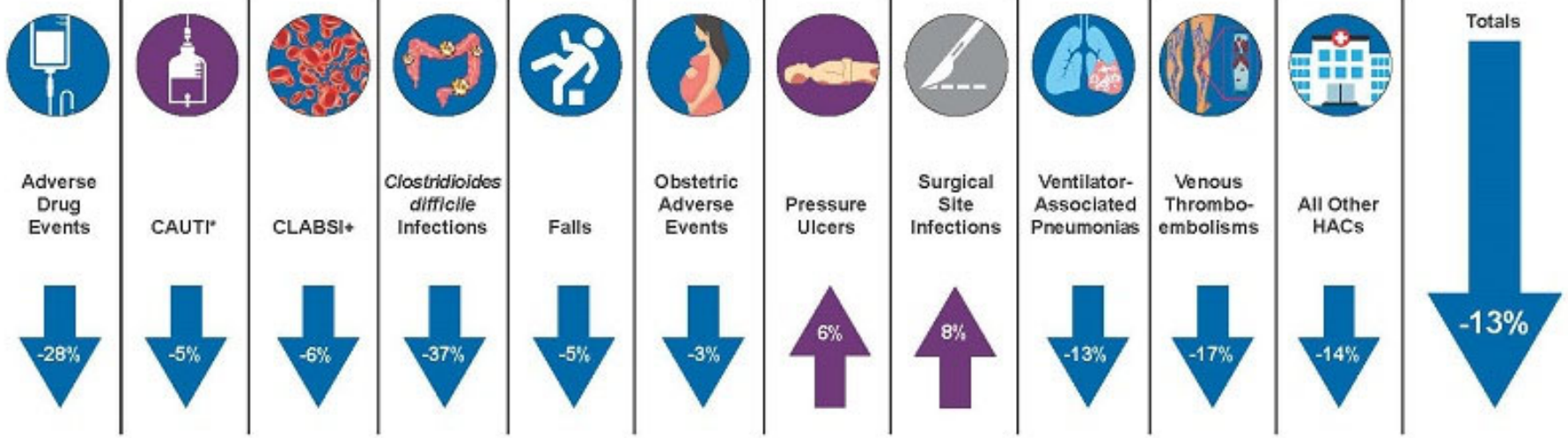
- 2.5 million individuals in US develop a pressure injury annually , 3.5 – 4.5 % occur in hospitalized patient in acute care facilities
  - 60,000 deaths annually related to PI

- Despite similar mortality to other epidemics, PI hasn't received much attention:
  - 63,600 - Drug overdose
  - 44,000 - Suicide
  - 56,000 - Influenza

Declines in Hospital-Acquired Conditions

Agency for Healthcare Research and Quality

National efforts to reduce hospital-acquired conditions such as adverse drug events and injuries from falls helped prevent 20,700 deaths and saved $7.7 billion between 2014 and 2017.



*CAUTI - Catheter-Associated Urinary Tract Infections

+CLABSI - Central Line-Associated Bloodstream Infections

**The percent change numbers are compared to the 2014 measured baseline for HACs.

Source: AHRQ National Scorecard on Hospital-Acquired Conditions Final Results for 2014-2017

National cost of HAPI

- Cost of Chronic PI from Medicare claims
  - 22 billion annually
  - Hospitals face full financial burden of these harms
  - Single HAPI cost $500 to $70,000

The national cost of hospital-acquired pressure injuries in the United States

William V. Padula, Benjo A. Delarmente**First published**: 28 January 2019

Prevalence and Incidence

- National numbers vary depending on:
  - Facility type (acute vs long term care)
  - Patient severity (critical care patient, trauma, prolonged surgery)
  - Short or long hospital stay
  - Total population assessed vs just high risk (incidence)

HAPI Problem

Risk of readmissions, mortality, and hospital-acquired conditions across HAPI stages in a US National Hospital Discharge database

Christina L. Wassel, Gary Delhougne, Julie A. Gayle, Jill Dreyfus, Barrett Larson First published: 23 August 2020

- At the index hospitalization compared with patients with no HAPI
- 1.5 to 2 times greater risk of readmissions
- Other hospital-acquired conditions, such as pneumonia, UTI, VTE

GA6

HAPI Problem

GA4
GA5

- Pressure injuries can result in extensive harm
  - Direct impact on quality of life
  - Physical and social functioning and psychological wellbeing
  - Chronic wounds leading to chronic pain

Slide 9

GA4 one small thing i noted, try to be consistent when possible throughout with format; for example, think usually smoothest to have either bullet points, dashes, or nothign for each section; but clearly spaced out points
Gray, Adam, 5/20/2022

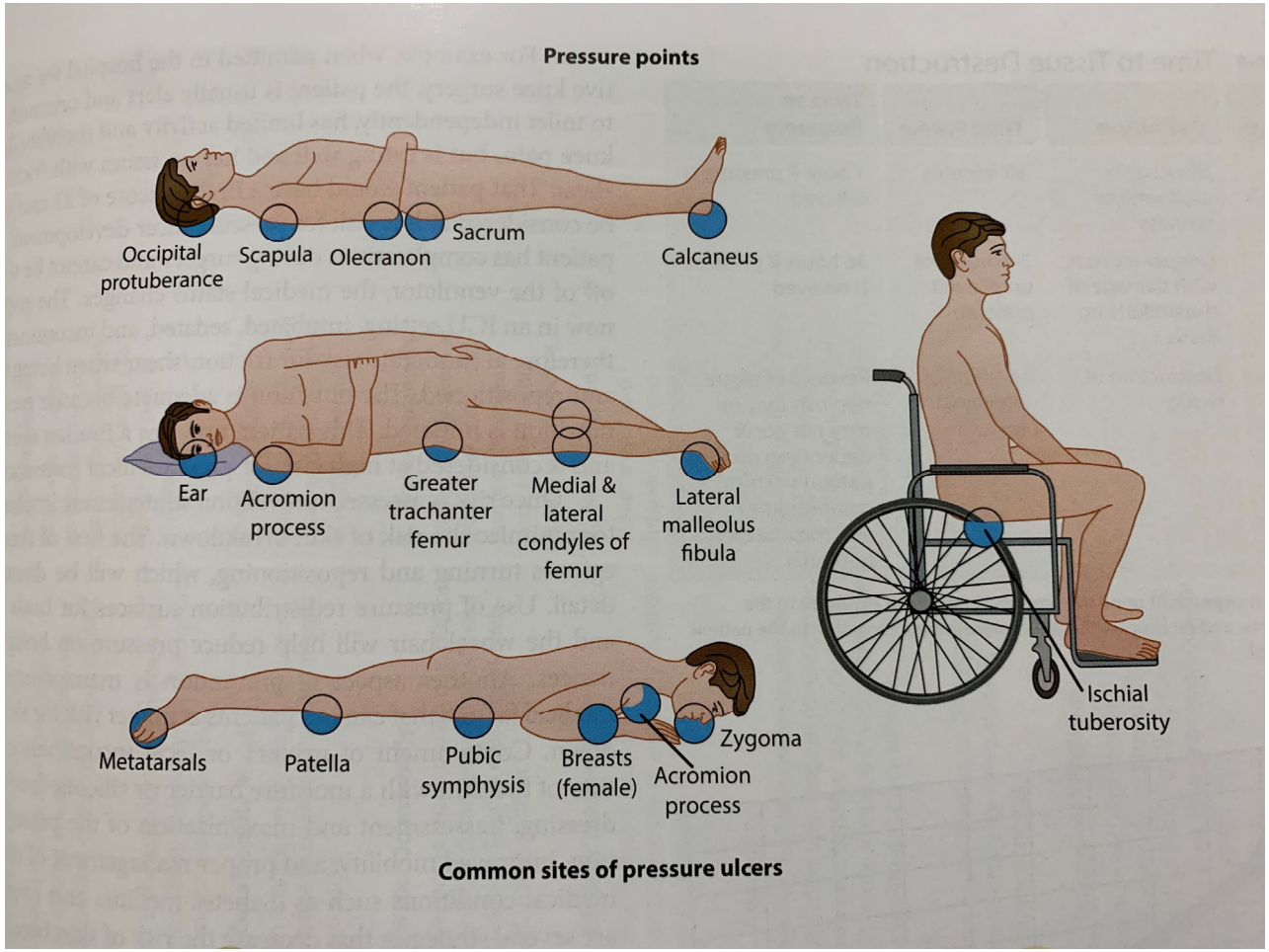
GA5 then try to either lead all sections with a period, or have no period on any of them (as I have here)
Gray, Adam, 5/20/2022

GA6 And to me, it's cleanest to have title slide at top of each slide; describing very briefly what you are covering for that slide.
Gray, Adam, 5/20/2022

Pressure Ulcer Definition

NPIAP: Localized injury to skin/underlying tissue usually over bony prominences as a result of pressure, or pressure combined with shear.

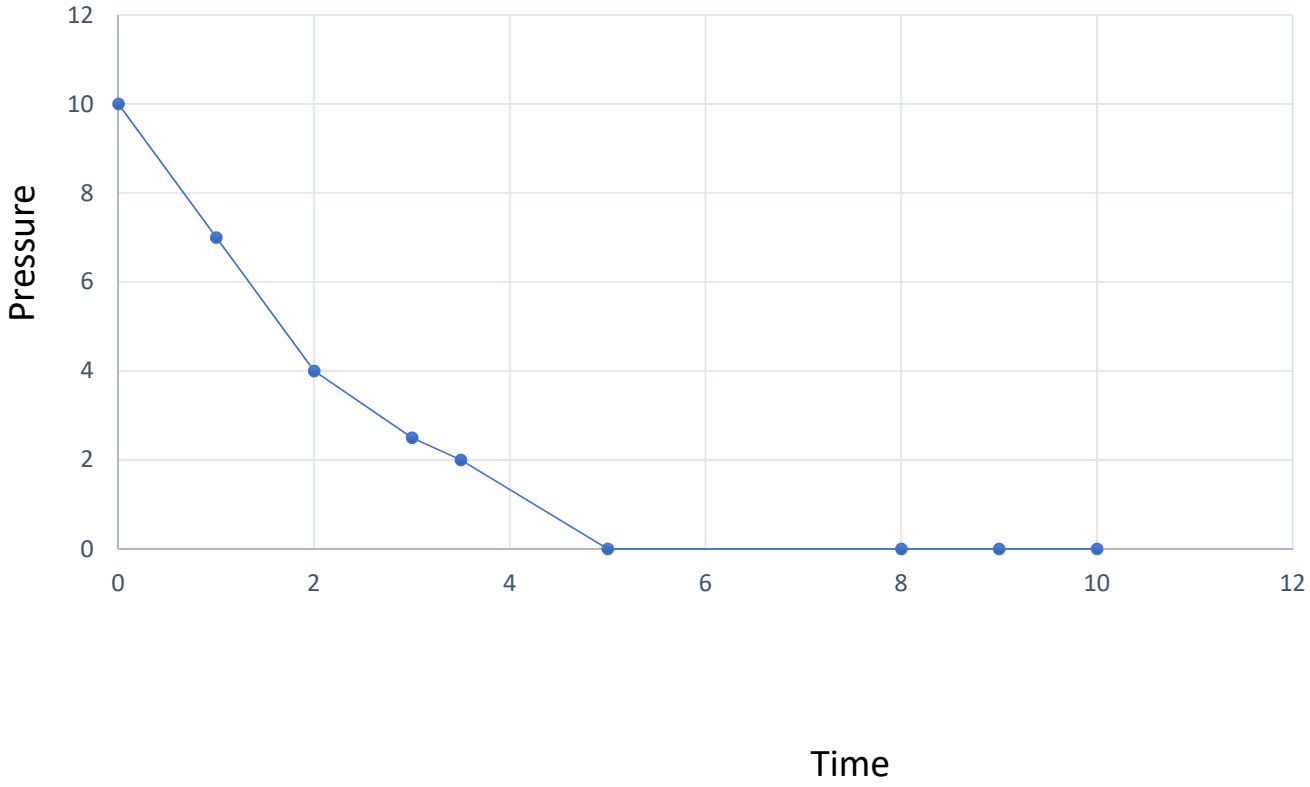
PIs are viewed as a visible sign of neglect.


Pressure points
Occipital protuberance
Scapula
Olecranon
Sacrum
Calcaneus
Ear
Acromion process
Greater trachanter femur
Medial & lateral condyles of femur
Lateral malleolus fibula
Metatarsals
Patella
Pubic symphysis
Breasts (female)
Acromion process
Zygoma
Ischial tuberosity
Common sites of pressure ulcers

Pressure Ulcer Pathophysiology

- **Pressure:** intensity, duration
- **Shear:** primarily fascial level of tissue over bony prominences
- **Friction:** alone causes damage to epidermis and upper dermis
- **Moisture:** alters resiliency of epidermis

Time / Pressure Curve



Prolonged exposure to low pressure

Short exposure to high forces

How long does it take for pressure injury to develop?

Time to Tissue Destruction

- Tissue Hyperemia – Blanchable erythema or redness
  - 30 min
- Tissue Ischemia – Deeper redness with underlying tissue damage
  - 2-6 hrs of unrelieved pressure
- Necrosis – destruction of tissue
  - > 6 hrs of unrelieved pressure

Other Contributing Factors

- Nutrition
- Decreased blood flow & poor oxygen perfusion
- Smoking
- Psychosocial status

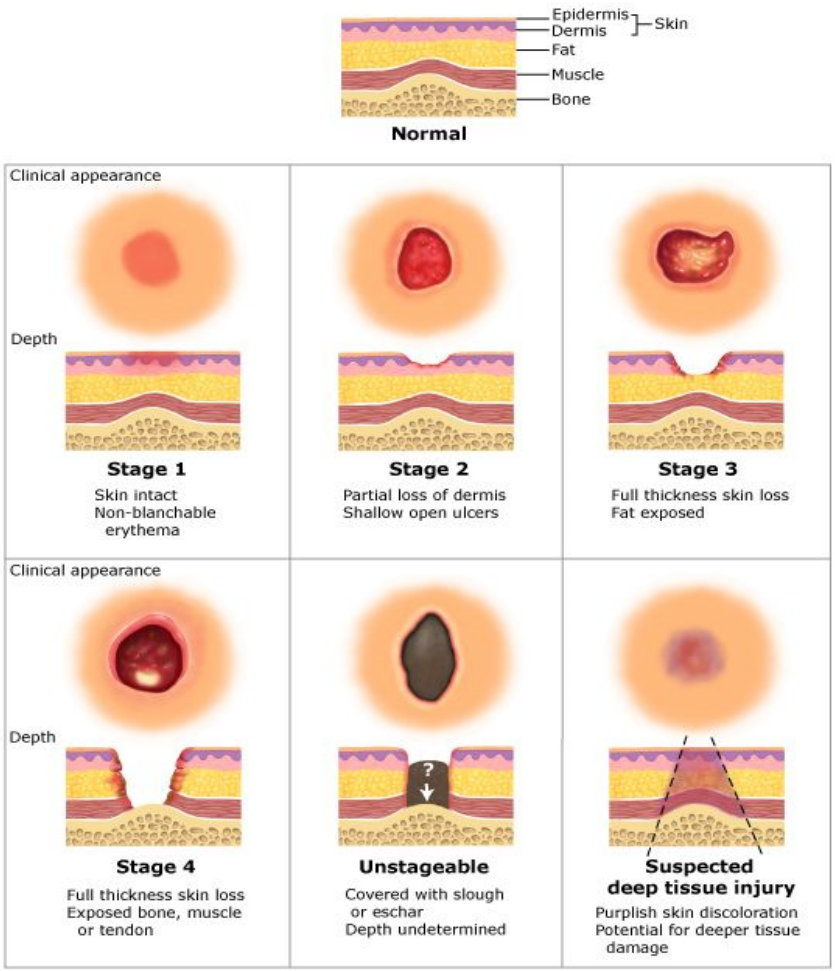
Assessment

- Identify source of pressure, contributing factors, comorbidities
- History, onset, duration, prior Rx and procedures
- Diagnosis – labs, x- ray, vascular studies
- Assess patient cognition, functional capacity, psychological health, adherence to care plan
- Evaluate values and goals of care

Physical Examination

- Length, width, depth of injury
- Sinus tract, tunneling, undermining
- Necrotic tissue, exudate, exposed structure, periwound appearance, signs of infection

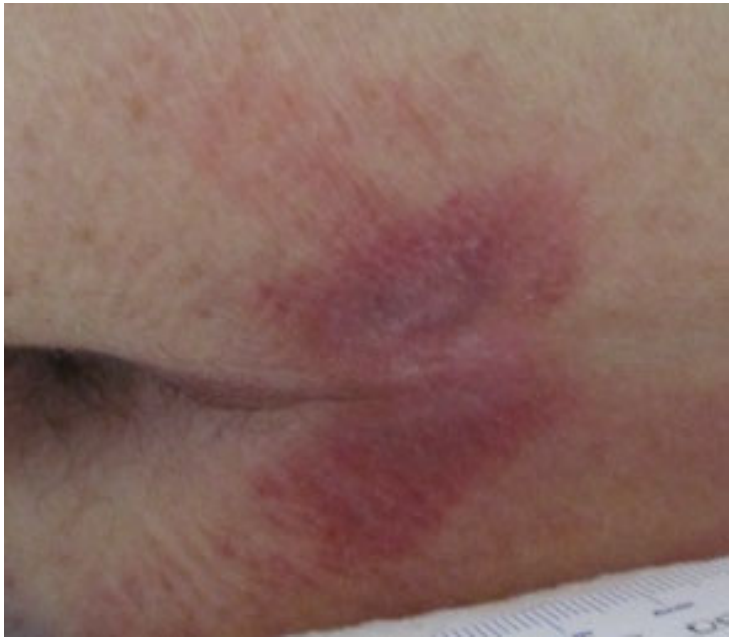
Stages of Pressure Injury



Stage 1 Pressure Injury

Intact skin with non blanchable redness of localized area

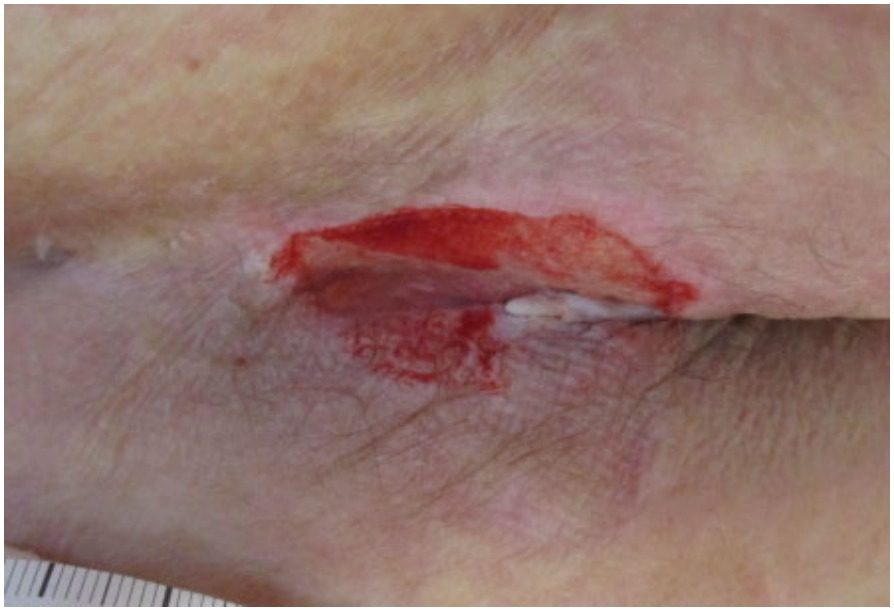
Area is painful, firm, soft, warmer or cooler



Stage 2 Pressure Injury

Partial thickness skin loss

Shallow ulcer with pink/red wound bed without slough



Stage 3 Pressure Injury

Full thickness skin loss

Visible Subcutaneous fat with slough present

Stage 4 Pressure Injury

Full thickness skin loss

Exposed bone, tendon or muscle, slough or eschar present

Deep Tissue Injury

Localized area of discolored (purple/maroon) intact skin

Painful, firm, mushy/ boggy

Unstageable Ulcer

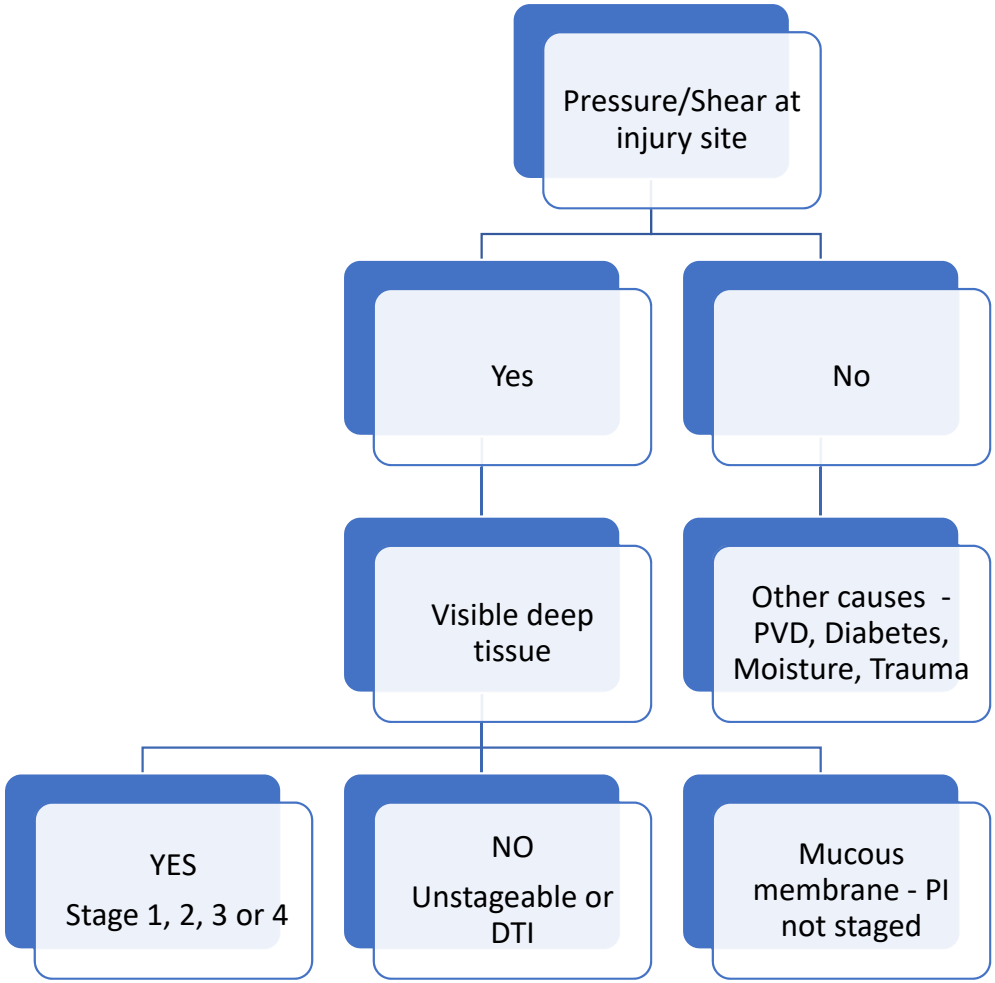
Full thickness tissue loss, actual depth of ulcer is obscured by slough/eschar

Necrotic wound cannot be staged if base not visualized

Other Wound Types & Skin Injuries

- Differentiate PI from other wound types & skin injuries

- Identify the etiology and probable cause of wound
  - Wounds of LE – PAD, venous insufficiency, neuropathic diabetic foot injury
  - Superficial friction injury
  - Excoriations / macerations
  - Vasculitis, radiation injury


Pressure/Shear at injury site
Yes
No
Visible deep tissue
Other causes - PVD, Diabetes, Moisture, Trauma
YES
Stage 1, 2, 3 or 4
NO
Unstageable or DTI
Mucous membrane - PI not staged

Moisture associated skin damage (MASD)

Prolonged exposure to moisture

- Urinary & fecal incontinence
  - Incontinence associated dermatitis
- Perspiration in skin fold
  - Intertriginous dermatitis
- Wound exudate
  - Periwound moisture associated dermatitis
- Effluent from ostomy
  - Peristomal moisture associated dermatitis

Incontinence Associated Dermatitis

Perianal Dermatitis
Diaper Rash
Irritant Dermatitis
Moisture lesions

	Incontinence associated dermatitis	Other moisture associated skin damage	Pressure Injury
Cause	Moisture from exposure to urine, stool or both	Intertriginous dermatitis – trapped moisture between skin folds	Pressure or pressure + sheer
Location	Buttocks, perineum, perianal	Gluteal fold and pannus, groin creases, periwound / periostomy skin	Bony prominences or other skin surface subject to external pressure
Depth	Partial thickness skin loss	Partial thickness skin loss	Partial to full thickness skin loss
Skin/ Wound Characteristics	Irregular and indistinct edges, diffuse erythema with or without skin loss	Linear fissure in intergluteal cleft, periwound / peristomal erosions and macerations, diffuse erythema	Single area of injury with distinct wound borders / stages
Pain	Burning, itching, tingling	Burning, itching	pain

Medical Adhesive Related Skin Injury (MARSI)

Categories of MARSI

- Mechanical
  - Skin injury by tape removal
- MARSI with dermal injury
  - Irritant dermatitis
  - Allergic dermatitis
  - Folliculitis
- Others
  - Maceration

Mechanical tension injury caused by an adhesive dressing and tape.

Medical adhesive-related skin injury caused by the removal of an electrode

MDRPI

- Ensure devices are correctly sized and applied
- Secure device to prevent dislodgement
- Use prophylactic dressings under medical device to reduce risk of PI
- Inspect skin under device twice a day
- Keep skin clean and dry under medical devices
- Avoid positioning patient directly on medical devices

Device-Associated Pressure Injury

Device-Associated Pressure Injury

Full thickness burn injury

Skin tear involves epidermis and dermis

Secondary infection causing skin necrosis

Chronic Pressure Ulcer - Staging

Original tissue destruction cannot be determined

Scar tissue in peri wound area

Rolled contracted edges

Pink wound base

Advanced Age (Geriatric Population)

- Loss of dermal thickness and subcutaneous tissue
- Surface barrier function of skin impaired
- Decreased sensory perception
- Increased vascular fragility
- Impaired nutrition – poor intake vs impaired absorption
- Comorbid conditions alter skin microbiome and microenvironment and body's response to intervention

S C A L E: Skin Changes at End of Life

- Skin breakdown is inevitable
- Develop new pressure injuries
- Healing - not realistic goal
- Intervention individualized to patients' wishes

Kennedy Terminal Ulcer

- Developed as part of terminal illness
- Common in sacrum
- Pear shaped irregular edges

NPUAP Consensus Conference 2010 – *Avoidable and Unavoidable PIs*

- Clinical practice, expert opinions, and published literature indicates that most, but not all pressure ulcers can be prevented
- Pressure ulcers are unavoidable in certain situations
- More research needed
- Applicable for all care settings

Avoidable Pressure Injury

- Develop when **provider did not do** one of the following:

- Evaluate clinical condition and pressure ulcer risk factors
- Define and implement standard practice
- Monitor & evaluate the impact of the interventions
- Revise the interventions as appropriate

Unavoidable Pressure Injury

- Develop despite **provider did** the following:

- Evaluate clinical condition and pressure ulcer risk factors
- Define and implement standard practice
- Monitor & evaluate the impact of the interventions
- Revise the interventions as appropriate

Pressure Injury Prevention

Prevention

- First measure of prevention is risk assessment

- Two risk assessment tools available
  - Braden scale
  - Norton scale

Braden Risk Assessment Scale

Sensory perception: completely limited, very limited, slightly limited, no impairment

Moisture: constantly moist, very moist, occasionally moist, rarely moist

Activity: bedfast, chairfast, walks occasionally, walks frequently

Mobility: completely immobile, very limited, slightly limited, no limitations

Nutrition: very poor, probably inadequate, adequate, excellent

Friction and Shear: problem, potential problem, no apparent problem

Braden Scale Scores

- Mild Risk: 15-18
- Moderate Risk: 13-14
- High Risk: 10-12
- Very High Risk: 9 or below

Prevention Strategy for at Risk Patients

- Daily Skin assessment
- Routine repositioning
- Using pressure redistribution surface
- Nutritional support
- Moisture management

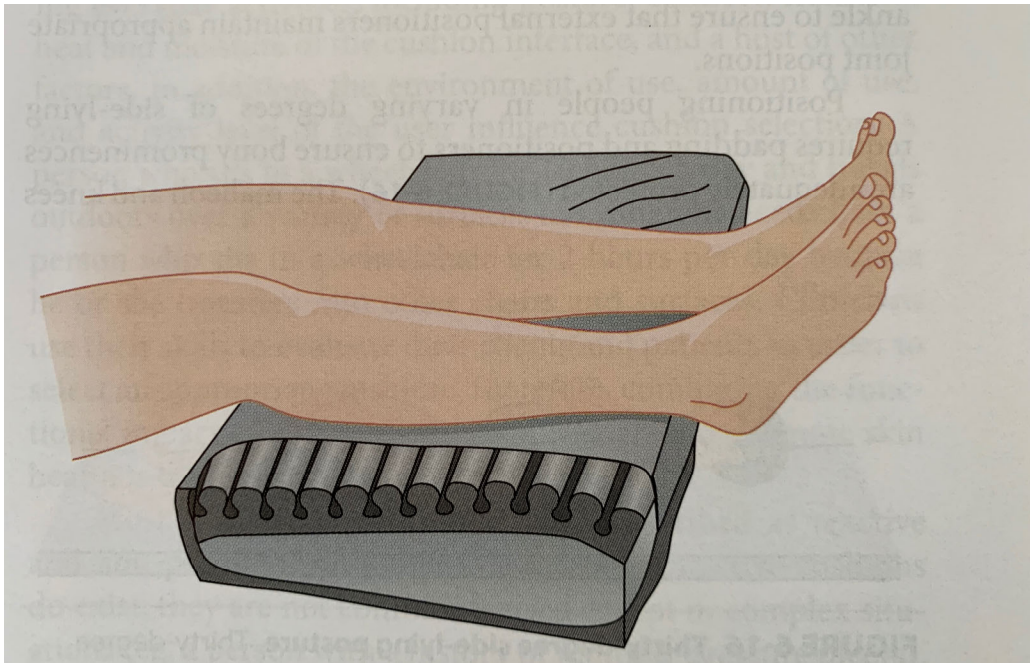
Prevention of PI

Pressure Redistribution - Dynamic or Static

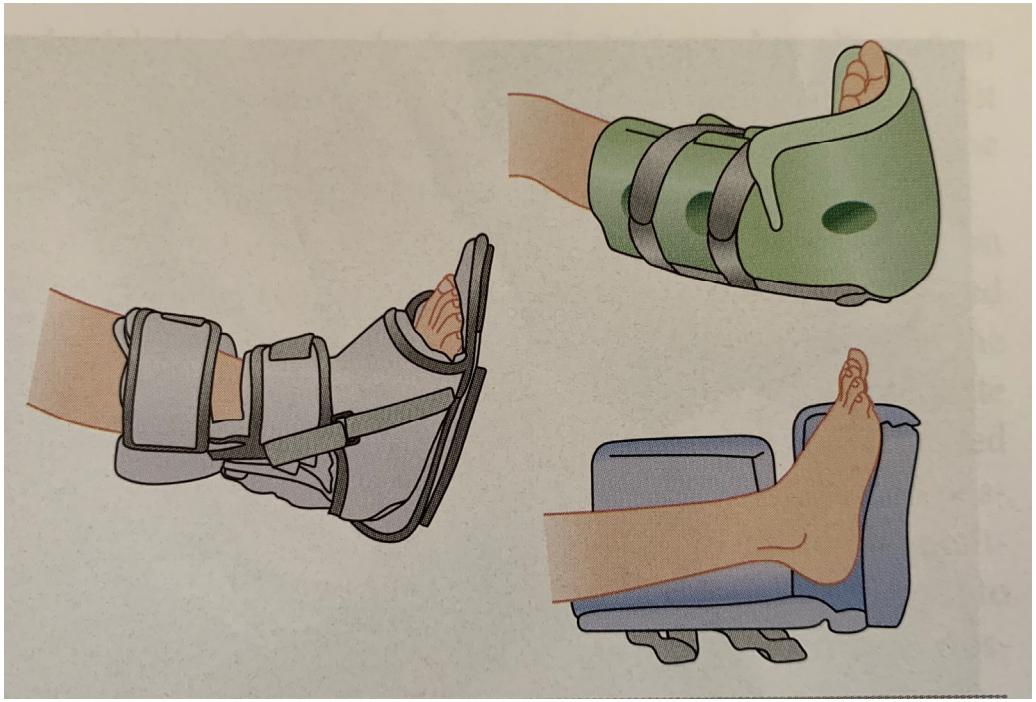
Group 1	Group 2	Group 3
• Prevention device only • At Risk and Stage 1, 2 ulcers • Non powered static overlays	• Stage 3, 4 wounds or those with flaps • Powered air-overlay for mattress, air-floatation beds, alternating pressure mattress	• Severely compromised patients • Air fluidized bed

SUPPORT SURFACES

- Air Fluidized: pressure redistribution via a fluid–like medium created by forcing air through beads
- Alternating pressure: pressure redistribution via cyclic changes in loading and unloading
- Lateral rotation: provide rotation of the longitudinal axis characterized by degree of patient turn, duration and frequency
- Low air loss: flow of air to assist in managing the heat and humidity (microclimate) of the skin



Heel and foot elevating pad



Foam Boots with Suspended Heels

Nutrition Support

- Nutritional deficiency diminished the body's ability to heal
- Stage of PI is directly proportional to degree of Malnutrition
  - Decreased calorie intake
  - Loss of lean body mass
  - Impaired collagen/protein synthesis - decreased granulation tissue formation
  - Impaired immune function

Protein Energy Malnutrition (PEM)

Depletion of muscle mass, visceral protein stores, and body fat

- Increase morbidity and mortality
- Impaired wound healing
- Increase Length of stay

Significant Malnutrition

- Albumin < 3.5 mg /dl
- Total lymphocyte count <1800/mm3
- Weight loss >15%

Current Recommendations for Caloric Needs

- Adults – 30-35 KiloCal/kg/day (non-protein calories – carb and lipids)
- Protein – 1-1.5 gm/kg/day

  Increased requirement in burns and other high metabolic state pts: 2-3 gm/kg/day
- Too may calories lead to overfeeding complications

Moisture Management

Strategies to reduce skin moisture

- Cleans skin at routine intervals
- Absorbent underpads and briefs
- Fecal containment device to mange FI
- Turn/Reposition routinely
- OR – use underpads to prevent pooling of skin prep solutions
- Support surface that help manage humidity and heat between bed and skin surface

Moisture Management

Strategies to protect skin from moisture

- Apply moisture barrier to exposed skin due to urinary & fecal incontinence
- Use of mild Ph balanced cleansing agent
- moisturize very dry skin , skin protectant cream or emollients

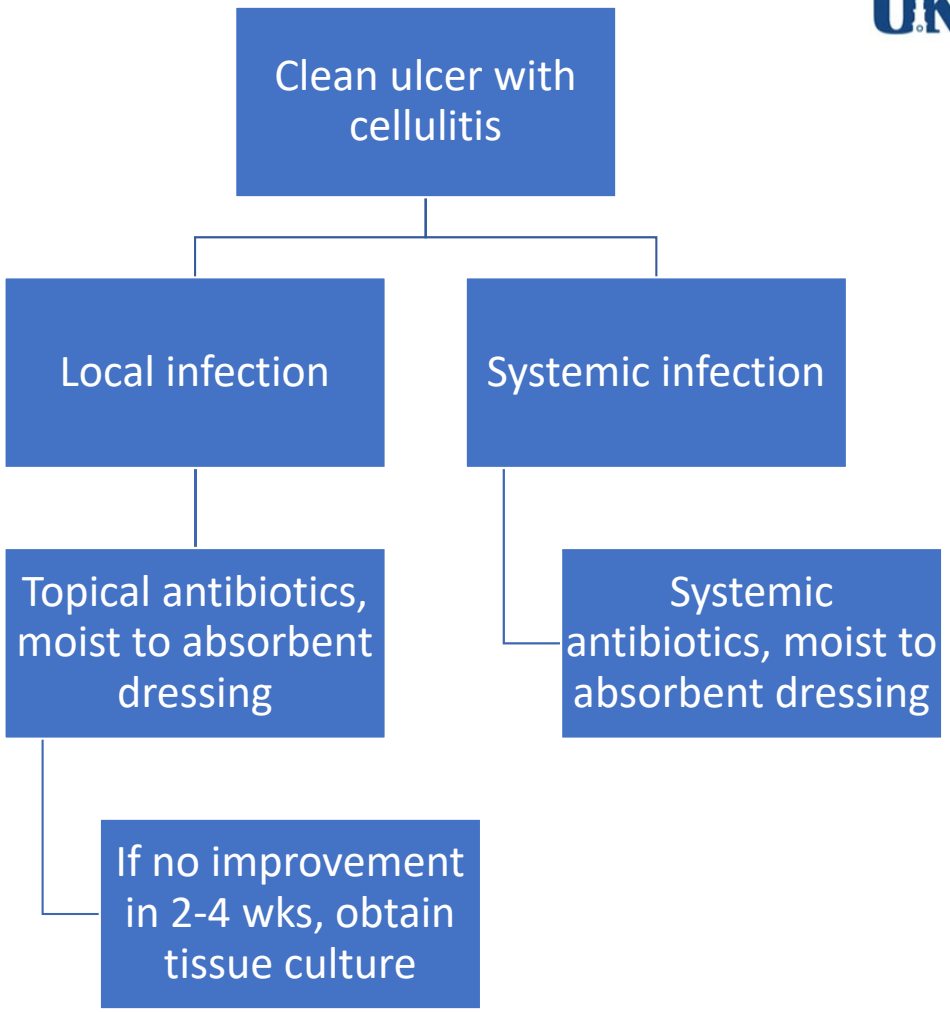
Management of PI

- Debridement of necrotic tissue
- Prevention/ treatment of infection
- Maintenance of moist environment
- Absorption of exudate
- Protection and insulation

Management of Clean Ulcer w/o Cellulitis

Stage 1	Apply protective dressing as needed
Stage 2	Apply moist dressing (transparent film) & cleanse wound
Stage 3 & 4	No Necrotic tissue – moist to absorbent dressing (Hydrogel, foam and alginate) W/ Necrotic tissue – Surgical Consult

Management of Clean Ulcer with Cellulitis



Topical Cleansing Agents

Isotonic Saline	Saline or Water has no affect on the surface microbes or biofilm
Hypochlorous acid (Antiseptic)	Antimicrobial activity
Acetic Acid – Vinegar	GP or GN esp pseudomonas, Effective for odor elimination, Use for short periods
Dakins Solution 0.125% Dilute hypochlorite solution	GP org/ anaerobes, Bactericidal / healthy cells also affected

Debridement

Sharp (selective and fast)	scalpel, scissors, dermal curette
Autolytic (painless, slower acting)	Manuka Honey, Hydrocolloid, Hydrogel
Enzymatic (selective, slow acting)	Collagenase (Santyl) require specific pH range 6-8
Mechanical (easy access)	Wet to dry, Pulsatile lavage / Whirlpool
Biological (selective, not painful)	Maggott Therapy – movement of larvae increases blood flow

Biophysical Technologies

Electrical Stimulation	Stage 2, 3, or 4 that have no improvement after 30 days of standard Rx
Negative Pressure Wound Therapy	Stage 3, 4 with debridement
Non-contact low frequency ultrasound	Deep tissue injury
Pulsed lavage with suction	Stage 3, 4 necrotic and draining + debridement
Ultraviolet	Stage 2, 3, 4 suspected to have bioburden

Adverse Outcomes

- Infection
- Malignant transformation
- Fistula/sinus tract (to nearby structure and viscera)
- Systemic amyloidosis (due to chronic inflammation)
- Rhabdomyolysis (prolonged pressure & Ischemia)

Prognosis of PI

Conventional Rx

- 70% of Stage 2 PI
- 50% of stage 3 PI
- 30% of Stage 4 PI

Heal in 6 months

Case

Mr. Joe 67 yo with COPD on O2, CAD, admitted for elective knee surgery. Toileting independently but had limited mobility due to knee pain. Eating well. Braden score of 21 on admission.

Patient operative complications and cannot be weaned off ventilator, now in ICU sedated, intubated, and incontinent. Moderate risk for friction/shear when turned and repositioned. Has BS of 12 – very high risk for PU formation.

Recommendations for low Braden Score:

- Nutrition consult
- Early mobilization
- Prophylactic foam dressing to the the early stages of wound
- Wound care consult if there is progression of injury
- Patient education

Barriers in Implementing PI Prevention

Identifying Gaps, Barriers, and Solutions in Implementing Pressure Ulcer Prevention Programs

M.JankowskiR.N., M.S.N., A.P.R.N., B.C., C.W.O.C.N.Deborah MorrisNadzamPh.D., R.N., F.A.A.N.(Project Director) 2016

- Limitations in staff education and training
- Lack of physician involvement
- Lack of plan for communicating at-risk status
- Limited quality improvement evaluations of bedside practices

Summary

- Pressure injury staging

  Stage 1, 2, 3, 4 & DTI
- Early risk assessment - Braden score
- Implement preventive strategies – support surface, moisture management, nutrition support & mobility
- Timely management of PI – Debridement, wound consult

Acknowledgment

Wound care department & Julie Elder in providing the images

Q&A