Pressure Ulcer Overview: Team Approach

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Participants will:
• Define components of a comprehensive pressure ulcer risk assessment
• Describe wound assessment parameters to consider when selecting treatment modalities
• Discuss pressure ulcer prevention and treatment modalities
• Identify opportunities and barriers for the Interprofessional team in prevention and treatment of pressure ulcers

The Interprofessional Team

Pink Several (multifaceted) interventions
White Sitting in a formal conference
Blue Audit with feedback
Yellow Clinical reminders
Green Patient mediated interventions
Red Opinion leader training

What strategy is most likely to change physician performance?

Impact of Formal Continuing Medical Education

14 studies/17 interventions
9/17 changes in practice
3/4 altered health care outcomes

* Only interactive and mixed educational sessions (practice skills) can effect change in practice and on occasion health care outcomes

Didactic sessions do not appear to be effective in changing physician performance

Changing Physician Performance

Study Selection
Random-controlled trials
1. Assess physician performance
2. and/or health care outcomes (HCO)
3. 50% or more physicians/residents

Synthesis
99 trials/160 interventions
101/160 improvement
70% change physician performance
48% HCO positive change

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### Educational Strategies

<table>
<thead>
<tr>
<th>Effective</th>
<th>Less Effective</th>
<th>Little Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reminders</td>
<td>Audit with feedback</td>
<td>Formal conferences without enabling/reinforcing strategies</td>
</tr>
<tr>
<td>Patient-mediated interventions</td>
<td>Educational materials</td>
<td></td>
</tr>
<tr>
<td>Outreach visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opinion leaders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>***Multi-faceted activities</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Davis, et al JAMA '95**

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### Patient Centered Interprofessional Coordinated Care

**How can they work together if they don’t learn together?**

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### Institute of Medicine (IOM) report (2003)

- All health professionals should be educated to deliver patient-centered care as members of an interprofessional team, emphasizing evidence-based practice, quality improvement approaches, and informatics.

- **Interprofessional team (Challenges)**
  - Not educated together
  - Not trained in team-based skills.

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### Pressure ulcer knowledge

**Used the Pieper Tool**

<table>
<thead>
<tr>
<th>Physician*</th>
<th>Nurse**</th>
</tr>
</thead>
<tbody>
<tr>
<td>69%</td>
<td>76%</td>
</tr>
</tbody>
</table>


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### Value is the Goal

**Value = Health Outcomes / Costs of Delivering Outcomes**

- Better health is cheaper
- Aim should be better health; not more treatment
- Value unites all stakeholders

**Source:** Value-Based Health Care: Delivery, Professor Michael Porter. 2012

‘Stakeholders’: The 5Ps

- **Patient**, including family, friends, circle of care
- **Professionals**: nurses, physicians, allied health researchers (generating evidence)
- **Providers (Payers)**: analysts, CCAC care coordinators, administration
- **Policy Makers**: CCAC, LHIN, MOHLTC
- **Politicians, MPPs ministers etc.**

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**The Interprofessional Team**

**Each Member:**

- brings unique expertise adding strength to the teams
- helps fill knowledge gaps
- helps broaden perspectives thus optimizing patient care delivery
- knows each others role, can do each other’s role

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**Wound Bed Preparation 2015**

- **Identify & Treat the cause**
- **Determine Healability for patient outcomes & local wound care**
- **Debridement**
- **Inflammation/Infection**
- **Moisture Balance**
- **Edge Effect**

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**International NPUAP-EPUAP Pressure Ulcer Definition**

“A pressure ulcer is a **localized injury** to the skin and/or underlying tissue *usually* over a **bony prominence**, as a result of pressure, or pressure in combination with shear.”

“A number of contributing or **confounding factors** are also associated with pressure ulcers, the **significance of these factors has yet to be elucidated**.”

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**Pressure Ulcers**

**Type of Wound**

<table>
<thead>
<tr>
<th>Type of Wound</th>
<th>Treatment of the Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venous Ulcers</td>
<td>• Bandages for healing</td>
</tr>
<tr>
<td></td>
<td>• Stockings for maintenance</td>
</tr>
<tr>
<td>Pressure Ulcers</td>
<td>• Redistribute pressure (relieve heel pressure)</td>
</tr>
<tr>
<td></td>
<td>• Activity and increase mobility</td>
</tr>
<tr>
<td></td>
<td>• Incontinence and moisture management</td>
</tr>
<tr>
<td></td>
<td>• Shear reduction</td>
</tr>
<tr>
<td></td>
<td>• Enhance &amp; Optimize nutrition</td>
</tr>
<tr>
<td>Diabetic Foot Ulcer</td>
<td>• Vascular supply adequate</td>
</tr>
<tr>
<td>Other pressure</td>
<td>• Infection control</td>
</tr>
<tr>
<td>Biter friction &amp; shear</td>
<td>• Plantar Pressure redistribution</td>
</tr>
</tbody>
</table>

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**WoundPedia**
Differential Diagnosis

<table>
<thead>
<tr>
<th>Type of Wound</th>
<th>Primary Cause</th>
<th>Typical Location</th>
<th>Clinical example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Ulcer</td>
<td>Pressure with or without shear</td>
<td>Bony prominences</td>
<td></td>
</tr>
<tr>
<td>Shearing</td>
<td>Trauma or friction</td>
<td>Arms &amp; legs, Areas underneath tape</td>
<td></td>
</tr>
<tr>
<td>MASD</td>
<td>Moisture and friction</td>
<td>Buttocks, perineal area, skin folds</td>
<td></td>
</tr>
</tbody>
</table>

Pressure Ulcer Etiology

- Mechanical deformation on Internal Tissue
- Microclimate in relation to pressure ulcers
- Components of Prevention

Question:
Can this pressure ulcer be prevented?

Green  Yes
Blue   No
Pink  It depends

Team

Goal:
Prevent Pressure Ulcer
Pressure Ulcer Prevention

- **Interprofessional team**
  - Clinicians and staff that share a common goal
  - Find the champions
  - Nursing (all levels), Physicians, Dietitian, Therapists (Physical, Occupational, Respiratory, Swallow), Administrators, Purchasing, Transport Team

- **Processes**
  - Start with high risk areas/high risk populations
  - Education targeted and tailored

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Pressure Ulcer Reduction Resources

**NJHA Pressure Ulcer Collaborative**
- Achieve 95% compliance with the PU prevention Bundle
  - Skin assessment on admission
  - Risk assessment on admission
  - Reassessment of skin and PU risk
  - Prevention strategies implemented within 24 hrs

**AHRQ Tool Kit**
- Six chapters
- [http://www.ahrq.gov/research/ltc/pressureulcertoolkit/](http://www.ahrq.gov/research/ltc/pressureulcertoolkit/)

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Pressure Ulcer Risk Assessment

Conceptual Schema for the Study of the Etiology of Pressure Ulcers

![Conceptual Schema](image_url)

Braden Scale Subscale Care Planning

Patients are more than numbers!!!!

- Regardless of the total Braden Scale score, the patient may still need preventive care.
- Look at the subscale scores.
- Look at what is actually happening.
For example, a patient can walk, but is the patient actually walking in the hallway, or are they sitting in the room not walking all day?

Clinical Decision making should consider risk factors that may be scattered throughout medical record.

Extrinsic Patient Factors to Consider

- Patient age over 65
- History of pressure ulcer(s) in following location(s)*

* Location of previous pressure ulcer should result in targeted preventive care.

- Current pressure ulcer(s)

Extrinsic Factors to Consider

Medical Device in use
- Mouth
- Nose
- Face
- Ears
- Tracheostomy
- Urinary
- Rectal
- Other ________________________

Face Mask Oxygenation and Capnography for Regional Anesthesia With Sedation in Prone Position
(Note risk of mouth and nose occlusion from foam pad as well as tongue obstruction of pharynx)

Device related pressure ulcer
Mucosal Pressure Ulcers (MPrU)
An NPUAP Position Statement

- **Definition:**
  - found on mucous membranes
  - history of a medical device in use at the location of the ulcer

- **Devices** include oxygen tubing, endotracheal tubes, bite blocks, orogastric and nasogastric

- Epithelium of mucosa is **not keratinized**

- "Pressure ulcers on mucosal surfaces are **not to be staged using the pressure ulcer staging system.**"

- **Not** classified as partial or full thickness
  - because the clinical assessment of the tissue does not allow the distinction

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**How often should skin beneath medical device be assessed?**

- **Blue** Daily
- **Yellow** Twice a day
- **Green** Three times a day
- **Red** I do not know

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**CARE© to Prevent Medical Device-Related Pressure Ulcers**

C
- Choose correct size of medical device(s) to fit the individual
- Cushion/ protect skin with dressings in high risk areas (e.g., nasal bridge)
- Confirm that devices are not placed directly under an individual who is bedridden or immobile

A
- Avoid placement of device(s) over sites of prior, or existing pressure ulcer
- Awareness of edema under device(s) and potential for skin breakdown

R
- Remove or move the device daily to assess skin

At least twice daily or signs of pressure related injury on surrounding tissue

More frequently (greater than twice daily) with fluid shifts or localized/generalized edema

E
- Educate staff on correct use of devices and prevention of skin breakdown

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**Medical Device Related Pressure Ulcers**

**Guideline Recommendations:**

- Consider adults with medical devices to be at risk for pressure ulcers. 
  - (Strength of Evidence = B; Strength of Recommendation = )

- Inspect the skin under and around medical devices at least twice daily for the signs of pressure related injury on the surrounding tissue. 
  - (Strength of Evidence = C; Strength of Recommendation = )

- Conduct more frequent (greater than twice daily) skin assessments at the skin-device interface in individuals vulnerable to fluid shifts and/or exhibiting signs of localized or generalized edema. 
  - (Strength of Evidence = C; Strength of Recommendation = )

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**Intrinsic Factors to Consider**

- **Patient Diagnoses**
- Diabetes mellitus
- Vascular disease
- BMI 30 or greater, 18.5 or less
- Paralysis** (include length of time________)
- Malnutrition

**Paralysis examples:** spinal cord injury, CVA, Traumatic Brain Injury (TBI) etc.

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**Patient Diagnoses: Influential Factors Associated With Heel Pressure Ulcer**

Medical records from 2009-2011 with DRG of heel pressure ulcers

- Diabetes mellitus
- Vascular disease
- Neuropathy
- Advanced age (defined as ≥ 70 y)
- Perfusions problems
- Morbid obesity (defined as BMI ≥ 40 kg/m2) or cachexia (defined as BMI < 18.5 kg/m2)
- Surgical procedure ≥ 3 h
- Braden Scale total scores ≤ 18
- Immobility
- Ventilator days > 3
- Activity status: ad lib or restrictive (bedbound, chairbound, or bathroom privileges only)
- ICU stay > 3 days


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### Risk Factors Associated with Heel Pressure Ulcers in Hospitalized Patients

Main analysis results showing significant and independent predictors of HPUs in the final logistic regression model (N=337)

<table>
<thead>
<tr>
<th>Predictor Variable</th>
<th>Regression Coefficient</th>
<th>SE</th>
<th>P</th>
<th>Odds Ratio</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>1.08</td>
<td>0.46</td>
<td>.02</td>
<td>2.9</td>
<td>1.2-7.2</td>
</tr>
<tr>
<td>Vascular Disease</td>
<td>1.35</td>
<td>0.54</td>
<td>.01</td>
<td>3.8</td>
<td>1.3-11.1</td>
</tr>
<tr>
<td>Immobility</td>
<td>1.55</td>
<td>0.51</td>
<td>.003</td>
<td>4.7</td>
<td>1.7-12.9</td>
</tr>
<tr>
<td>Braden Scale Score ≤18</td>
<td>3.08</td>
<td>0.64</td>
<td>&lt;.001</td>
<td>21.8</td>
<td>6.3-76.1</td>
</tr>
</tbody>
</table>


### More Evidence to Support Patient Diagnoses

Higher rates of Hospital Acquired Conditions (HAC) Pressure Ulcers

- Corticosteroid use
- Congestive heart failure (CHF)
- Chronic obstructive pulmonary disease (COPD)
- Cerebrovascular disease (CVD)
- Diabetes Mellitus (DM)
- Obesity


### Intrinsic Factors to Consider

- Paralysis Related
  - Diabetes mellitus
  - Vascular disease
  - BMI 30 or greater, 18.5 or less
  - Paralysis** (include length of time_________)
  - Malnutrition

**Paralysis examples: spinal cord injury, CVA, Traumatic Brain Injury (TBI) etc.

### What anatomical and pathophysiological changes occur following spinal cord injury?

- **Yellow:** Bone shape changes
- **Green:** Ischial tips are flatter
- **Red:** I do not know


### How often should a patient be turned and repositioned?

- **Yellow:** q15 minutes
- **Pink:** q1 hour
- **Blue:** q2 hours
- **Green:** q3 hours
- **Red:** q4 hours

A comprehensive pressure ulcer risk assessment includes a skin assessment:

- Vitamin and Mineral Deficiencies

Reference: Ayello, 2014
Physiological Variables

- Number of hypotensive episodes
- Anticoagulation
- Anemia
- Hemodynamic instability

Risk Factors in Critically Ill Patients

- SKIN bundle preventive care implemented
- Reviewed 23 skin failure cases
- Mean Braden Scale 12.4 (median 13)
- 26% of patients had $O_2$ saturation of 92% or less within 48 hours of pressure ulcer
- 43% of patients had hypotensive episodes
  - Mean duration 6 hours

Other Factors That Increase Risk

- Perfusion and oxygenation
- Nutritional deficits

Higher rates of PU:

- Corticosteroid use

Extrinsic Factors

Patients in the Operating Room (OR)

Consider additional risk factors specific to individuals undergoing surgery including:

- Duration of time immobilized before surgery
- Length of surgery
- Increased hypotensive episodes during surgery
- Low core temperature during surgery and
- Reduced mobility on day one postoperatively

Extrinsic Factors

Building sDTI Evidence Base

Precipitating Events

- Transfers - 78.8%
- Tissue perfusion - 42.5%
- Surgery - 40.2%
- Mobility - 30.9%
- Falls - 16.9%

Range of days for precipitating events prior to sDTI
1 to 5 days
Average 2.41 (SD 1.04)

Meaningful physiological variables

- Anticoagulation - 61.2%
- Anemia - 67.1%
- Hemoglobin A1C less than 7.5 mmol/L - 74.4%

OR Pressure Ulcer Evidence

Pressure Redistribution During OR

Study Design

- N=20 (extended length head and neck surgery patient)
- Pre- and post-implementation of fluid pressure-reducing OR pad and mattress compared with standard foam in OR
- All patients on standard operating room table and had thermoregulation using convective warmer

Study Results

- Incidence
  - Pre-intervention 21% (4 out of 19)
  - Post intervention 0% (0 out of 20)
**Surgical Patients Pressure Ulcer Evidence**

**Initiative to Reduce OR Pressure Ulcers**

**Indications for wrist band application:**
- Patients who are positioned for 4 hours or more
- Any patient with a noted skin assessment change upon discharge from the OR

**Study Results**
- HAPU incidence decreased from 7.3 to 1.3%


**Extrinsic Factors**
- ER/transportation times > 60 minutes
- Backboard used in transportation


**Select interventions**

- **Bariatric patients**
  - Appropriate size and weight of equipment including pressure redistribution support surfaces
  - Is staff trained to care for these patients?

- **Critically ill patients**
  - Choose pressure redistribution support surfaces based on individuals perfusion and ability to be turned
  - “slow, gradual turns”; allow time for hemodynamic and oxygenation stabilization

Can Dressings Reduce Shear Forces and Prevent PrUs?

Consider applying a polyurethane foam dressing to bony prominences (e.g. heels, sacrum) for the prevention of pressure ulcers in anatomical areas frequently subjected to friction and shear.

(Strength of Evidence = B
Strength of recommendation = 1 thumb up)

Continue to use all other preventive measures necessary when using prophylactic dressings.

(Strength of Evidence = C
Strength of Recommendation = 1 thumb up)


How should you stage this pressure ulcer?

- **Stage I**
- **Stage II**
- **Stage III**
- **Stage IV**
- sDTI unstageable

Pressure Ulcer Staging

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Wound Survey Results 2014

- A pressure ulcer with full thickness tissue loss is staged/classified as:
  - Stage I 1%
  - Stage II 11%
  - Stage III or IV 88%

- I can identify the six stages of pressure ulcers in my patients

### Pressure Ulcer Classification at a glance

<table>
<thead>
<tr>
<th>Ulcer Characteristics</th>
<th>Category/Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact skin, non blanchable erythema</td>
<td>I</td>
</tr>
<tr>
<td>Open shallow ulcer with no slough</td>
<td>II</td>
</tr>
<tr>
<td>Serum filled or ruptured blister</td>
<td>III</td>
</tr>
<tr>
<td>Full thickness ulcer can have necrotic tissue, but can see wound bed</td>
<td>III</td>
</tr>
<tr>
<td>Bone, tendon, muscle visible</td>
<td>IV</td>
</tr>
<tr>
<td>Presence of cartilage</td>
<td></td>
</tr>
<tr>
<td>Necrotic tissue covers wound bed</td>
<td>Unstageable</td>
</tr>
<tr>
<td>Purple, maroon discoloration of intact</td>
<td>DTI</td>
</tr>
<tr>
<td>Blood filled blister</td>
<td></td>
</tr>
</tbody>
</table>

### Blister Pressure Ulcers

**Stage II**
- Partial thickness loss of dermis presenting as a shallow open ulcer with a red/pink wound bed, without slough. It may also present as an intact or open/ruptured serum-filled blister

### 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.

### Erosion versus Ulcer

**Erosion:** a loss of epidermis with an epidermal base - Intra epidermal

**Ulcer:** Loss of epidermis with a dermal or deep base

Diagram courtesy of NPUAP

How should you document this skin problem?
How should you stage this wound?

Stage I
Stage II
Stage III
Stage IV
sDTI
unstageable

How should you stage this pressure ulcer?

Stage I
Stage II
Stage III
Stage IV
sDTI
unstageable

How should you stage this pressure ulcer?

Stage I
Stage II
Stage III
Stage IV
sDTI
unstageable

According to the NPUAP, how should you classify a pressure ulcer with cartilage?

Stage I
Stage II
Stage III
Stage IV
sDTI
unstageable

Exposed Cartilage Pressure Ulcer

NPUAP Position Statement

August 27, 2012

- Pressure Ulcers with Exposed Cartilage Are Stage IV Pressure Ulcers
  - Although the presence of visible or palpable cartilage at the base of a pressure ulcer was not included in the stage IV terminology, it is the opinion of the NPUAP that cartilage serves the same anatomical function as bone. Therefore, pressure ulcers that have exposed cartilage should be classified as a Stage IV.

www.npuap.org
Components of Treatment

Asymmetrical undermining is an indicator of damage from:

- **PINK:** Pressure
- **BLUE:** Friction
- **YELLOW:** Shear
- **GREEN:** Moisture
- **RED:** Poor Dressing Technique


Manage pressure, friction, and shear, everywhere…...all the time.

Clinical Case - Who is Todd Nicholson?

Surface Surfaces


Wound Bed Preparation 2015

- Identify & Treat the cause
- Person with a Chronic Wound
- Patient/Family Centered Concerns
- Determine Healability for patient outcomes & local wound care
- Debridement
- Inflammation/Infection
- Moisture Balance
- Edge Effect

Healable: Underlying cause can be corrected + adequate blood supply to heal

Maintenance: The cause can be corrected— but lack adherence or system resources

Non-healable: Inadequate systemic or local factors for healing

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Debridement:

- *Remove senescent cells*
- *Decrease bacterial burden - biofilms?*
- *Convert to acute wound within a chronic wound*
- **Surgical**
  - Autolytic
  - Mechanical, Maggots
  - Enzyme
- **Biological**
  - Sterile Maggots
  - Accidental Larvae
- **Mechanical**
  - Wet to dry
  - Whirlpool
  - Ultrasound
  - Water stream
  - Hydrojet
- **Autolytic**
  - Sharp
  - Conservative
- **Biological**
  - Hydrogels
  - Hydrocolloids
  - Algienes

**Questions to answer**

- Should this pressure ulcer be debrided?
- What is your rational for your answer above?
- If debridement is your answer, which method would you use and why?
**Wound Bed Preparation 2015**

- **Person with a Chronic Wound**  
  - Identify & Treat the cause  
  - Determine Heaablility for patient outcomes & local wound care

- **Patient/Family Centered Concerns**  
  - Debridement  
  - Inflammation/Infection  
  - Moisture Balance

- **Edge Effect**

**Dressing Categories & Moisture**

<table>
<thead>
<tr>
<th>Hydrogel</th>
<th>Transparent Films</th>
<th>Hydrocolloid</th>
<th>Hydrofibers/Alginates</th>
<th>Foams</th>
<th>Super-Absorbents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donates moisture</td>
<td>Neither donates or absorbs moisture</td>
<td>Donates and absorbs a small to moderate amount of moisture</td>
<td>Fluid lock</td>
<td>Absorbs moderate moisture – gives back</td>
<td>Absorbs large amount, moisture + fluid lock (diaper technology)</td>
</tr>
</tbody>
</table>

**Edge of the Wound**

- **Non-advancing**
  - Non-attached or undermined
    - Re-evaluate debridement
  - Attached but not advancing
    - Have all causes been addressed?  
    - Senescent cells  
    - Re-evaluate bacterial burden  
    - Consider adjunctive therapies
      - Skin grafts and substitutes  
      - Electrical stimulation  
      - Biologically active dressings

**Heavy exudate Maceration**

- Non-healing
- Exudate
- Red + Bleeding
- Debris
- Smell

- Size is bigger
- Temperature ↑
- Os (probes, exposed)
- New breakdown
- Exudate,
  - Erythema, Edema
  - Smell

**StoneES**

- Deep: Treat Systemically

**NERDS**

- Superficial: Treat topically

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What adjunctive therapy currently has the **best** research evidence for treatment of recalcitrant pressure ulcers?

**Yellow** – Acoustic energy (Ultrasound)

**Pink** - Laser

**Blue** - Ultraviolet Light Therapy (UVC)

**Green** – Negative Pressure Wound Therapy (NPWT)

**Red** - Electrical Stimulation (ES)

**White** – None of the Above

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**Adjunctive Therapies**

*Use when chronic ulcers do not heal despite best practice*

- Pressure ulcers modalities at **A** level of evidence:
  - Electrical stimulation (A)

- Pressure ulcer modalities at **B** or **C** evidence:
  - Negative pressure wound therapy (B)
  - Ultrasound (C)
  - Electromagnetic fields (C)
  - Laser (C)

- Pressure ulcer modalities with **insufficient evidence** to **support** or **refute** use at this time:
  - Laser (C)
  - Hyperbaric oxygen treatment (C)


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**Pressure ulcer healing**

**NPUAP/EPUAP/PPPIA 2014 PU Guideline**

- Assess progress toward healing using a valid and reliable pressure ulcer assessment scale.

  (SOE=III, SOR= 1 thumb up)

**So how long does it take for PrU to heal?**

N=270 patients with stage II PU

- 153 lesions healed (56.7%) after 10 weeks
- Average healing time 22.9 days (95% CL, 20.47-25.37 Days)
- Medium 18 days

**Size mattered**

- 3.1 cm shorter healing time (19.2 days) compared with PU greater than 3.1 cm 31.0 days (95% CL, 26.4-35.6 days, P=.000)


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**Case Management:**

**Can this Ulcer heal?**

**Can this Ulcer be prevented?**

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**Participants have:**

- Defined components of a comprehensive pressure ulcer **risk assessment**.
- Described **wound assessment parameters** to consider when selecting treatment modalities
- Discussed pressure ulcer **prevention** and **treatment modalities**
- Identified **opportunities** and **barriers** for the Interprofessional team in prevention and treatment of pressure ulcers.

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