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A Clinical Guide to Wound Assessment

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Overview and Objectives

- Describe the importance of wound assessment
- Describe ulcer and periulcer characteristics
- Explain components of wound bed preparation
Assessment

Photodocumentation
- Informed consent/Authorization
- HIPAA compliant
- Criteria about who can take the photograph
- Method of validating individuals’ competency to do photograph
- Frequency of revalidation of competence
- Frequency (serial photographs)
- Type of equipment used
- Chain of Trust - means to assure that digital images are accurate and not modified
- Inclusion of the residents identification (PIN), ulcer location, date taken, measurement grid and visible parameters for comparison

Staff Proficiency
- Ulcer(s) etiology
- Predisposing factors
- Anatomic location
- Ulcer characteristics
- Resident assessment
- Document the clinical basis for determination that the ulcer is not pressure related

Distinguishing Arterial, Diabetic & Vascular Ulcers

<table>
<thead>
<tr>
<th>Arterial Ulcers</th>
<th>Diabetic Ulcers</th>
<th>Vascular Ulcers</th>
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<tr>
<td>Circulation</td>
<td>Diabetes</td>
<td>Value incompetence to perforating veins</td>
</tr>
<tr>
<td>Perfusion Factors:</td>
<td>Diabetes history of ulcers</td>
<td>History of deep vein thrombosis and myocardials</td>
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<tr>
<td>Peripheral vascular</td>
<td>Presence of ulcers</td>
<td>Presence of ulcers</td>
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<tr>
<td>Diabetes and history</td>
<td>Vascular history</td>
<td>Vascular history</td>
</tr>
<tr>
<td>Anatomic Location</td>
<td>Obesity</td>
<td>Arterial age</td>
</tr>
<tr>
<td>Interval ulcer or type of lesion</td>
<td>Ulcer related to diabetes</td>
<td>On previous aspect of ulcer</td>
</tr>
<tr>
<td>Over palpable heads</td>
<td>Underfoot head</td>
<td>On anterior heel and area</td>
</tr>
<tr>
<td>Amounts location</td>
<td>On plantar aspect of foot</td>
<td>On medial boney and area</td>
</tr>
<tr>
<td>Presence of edema</td>
<td>On diabetic foot</td>
<td>On medial area</td>
</tr>
<tr>
<td>Presence of gangrene</td>
<td>Diabetic foot</td>
<td>On medial area</td>
</tr>
<tr>
<td>Deep ulcer wounds</td>
<td>Deep ulcer wounds</td>
<td>On previous ulcer (PV) is present</td>
</tr>
<tr>
<td>Extensive necrosis</td>
<td>On previous area</td>
<td>With reduced area</td>
</tr>
<tr>
<td>Ulcers in plantar</td>
<td>Ulcers in plantar</td>
<td>Ulcers in plantar</td>
</tr>
<tr>
<td>Extensive edema</td>
<td>Ulcers in plantar</td>
<td>Ulcers in plantar</td>
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<td>Presence of edema</td>
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Assessment

- Evaluation includes verification and interpretation of the observations made
- Complement the clinical judgment in resident management
- Use of standardized risk assessment tool
- Assessment tools do not supplant regular staging, measurement, and a narrative description of the ulcer
Assessment

Comprehensive Assessment

✔ Consider all recumbent dependant or seated dependant residents or those whose inability to reposition to be at-risk
  - Multi-system organ failure or an end-of-life condition
  - Residents refusing care and treatment (why/alternatives notification, documentation)
  ✔ Address those factors having an impact on the development, treatment and/or healing of ulcers
  - Reduce the degree and/or duration of pressure to which a resident is exposed
  - Tissue damage due to immobility or illness prior to admission
  - Skin condition on admission
  ✔ Identify pre-existing signs (Deep Tissue Injury)
  - Wound characteristics at the time of admission (if present)
  - Previous history of ulcers measures
Assessment

Comprehensive Assessment

 Residents having no signs of progression toward healing within 2 to 4 weeks:
 - Review documentation
 - Ulcer characteristics
 - Resident’s condition
 - Complications
 - Time needed to determine the effectiveness of a treatment

 Facility’s efforts to remove, modify or stabilize the risk factors and underlying causal factors

Pain

Pain Assessment (WILDA)

- What does the pain feel like
  - When possible, allow the resident to chose their own words to describe the pain
  - Sharp/dull/stabbing/burning/crushing

- Intensity of pain using valid tool (Numeric/VAS/Verbal)
  - How severe is the pain on a scale of 0 - 10
  - How much does it hurt when it is the worst
  - How much does it hurt when it is the best

- Location of pain (all sites)
  - Is it in one place
  - Does it go anywhere else
  - Did it start elsewhere and has it now moved to one spot
Pain

Pain Assessment (WILDA)

- Duration and frequency of pain (constant/intermittent)
  - When did the pain start
  - How often does it occur
  - Has its intensity changed
  - How long does it last

- Aggravating and alleviating factors (better or worse)
  - What causes the pain
  - What makes it better
  - What makes it worse
  - What has been effective in reducing the pain in the past

- Aphasic
- Language barrier

Define specific treatment goals and risks

- Optimal pain control with minimal side effects
- Assessment of benefits and risks of pain medications resident-centered
- Determine the best combination of pain assessment tools to use
### Pain

#### Observation
- **Vocalization of pain**
  - Constant muttering
  - Moaning/groaning
- **Breathing**
  - Strenuous
  - Labored
  - Negative noise on inhalation or expiration
- **Pained facial expression**
  - Clenched jaw
  - Troubled or distorted face
  - Crying
- **Body language**
  - Clenched fist
  - Wringing of the hands
  - Strained and inflexible position
  - Rocking
- **Movement**
  - Restless
  - Altered gait
  - Forceful touching
  - Rubbing of body parts

#### Develop quantifiable objectives for the highest level of functioning the resident may be expected to attain, based on the comprehensive assessment:
- **Type/quantity of pain**
- **Consequences of unrelieved pain**
- **Pharmaceuticals**
- **Dosing**
- **Understanding addiction and tolerance**

#### Control measures
- **Effective medication**
- **Therapeutic positioning**
- **Support surfaces**
- **Non-pharmacological interventions (comfort touch, active listening/distraction, relaxation, imagery, music)**
Ulcer Cleansing

Cleansing

- Completed at each dressing change
- Clean with non-cytotoxic non-irritating cleanser
  - Normal saline is considered the most appropriate solution
- Do not use skin cleansers or antiseptics
- Use appropriate irrigation pressure between 4 - 15 psi
  - 35 cc syringe with 19-gauge soft tipped catheter (delivers 8 psi) >15 psi may drive wound fluid & debris into wound
- Ulcer bed pH 5.6-6.8

Area Measurements

Length/Width/Depth

- Must be taken in a consistent manner to be accurate and repeatable
- Multiple measurements
  - Averaged to determine the length/width/depth
- Depth cannot be measured if debris or necrotic material cover the ulcer
- Use centimeters, millimeters (cm²/cm³)
**Staging**

**Category/Stage I PrU**
- Intact skin with non-blanchable redness of a localized area, usually over a bony prominence

**Category/Stage II PrU**
- Partial-thickness loss of dermis presenting as a shallow open ulcer with a red-pink wound bed without slough
- May present as an intact or open/ruptured serum-filled blister
- A Stage II ulcer also may present as a shiny or dry shallow ulcer without slough or bruising.* This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration, or excoriation.

* Bruising indicates susp

**Category/Stage III PrU**
- Full-thickness tissue loss
- Subcutaneous fat may be visible (fascia)
- No visible muscle/tendon/bone
- Necrotic tissue may be present but does not obscure the depth of tissue loss
- Undermining and tunneling

**Category/Stage IV PrU**
- Full-thickness tissue loss
- Exposed muscle/tendon/bone
- Slough or eschar may be present on some parts of the ulcer bed
- Undermining and tunneling
NPUAP Definitions

Unstageable Necrotic Tissue

- Eschar tissue
  - Thick leathery type of tissue ranging in color from brown to black
- Slough
  - Devitalized tissue in the process of separating from the viable portions of the tissue
  - Stringy, moist, light-colored
  - Confused with fibrin
  - Stage II PrUs do not have necrotic tissue
- Devise or dressing
- DTI

Venous Insufficiency Classification

- Clinical signs: (0-6), supplemented by (A) for asymptomatic and (S) for symptomatic patients
  - Class 0 No visible or palpable signs of venous disease
  - Class 1 Telangiectasias or reticular veins
  - Class 2 Truncal varicose veins and their branches
  - Class 3 Edema
  - Class 4 Skin changes ascribed to venous disease (e.g., pigmentation, stasis eczema, dermatoliposclerosis)
  - Class 5 Skin changes as defined above with healed ulceration
  - Class 6 Skin changes as defined above with active ulceration
- Etiology classification: congenital, primary, secondary
- Anatomic distribution: superficial (S)/deep (D)/perforating veins (P)/combinations
- Pathophysiologic dysfunction: reflux or obstruction, alone or in combination
Venous Insufficiency Classification

Diabetic Ulcers Classification

<table>
<thead>
<tr>
<th>Table 3. Wagner Classification System</th>
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<tbody>
<tr>
<td>Grade</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Adapted from Wagner FW. The dysvascular foot: a system for diagnosis and treatment. Foot Ankle. 1981;2:64-122.

Treatment

- **0** - antibiotic, prophylactic surgery
- **1** - antibiotic, soft tissue and bone evaluation, debridement
- **2** - antibiotic, soft tissue and bone evaluation, debridement
- **3** - antibiotic, soft tissue and bone evaluation, debridement, resection, amputation
- **4** - amputation
- **5** - high amputation

Wagner and Meggitt 1970
Ulcer Characteristics

A precise description of the ulcer
Location - anatomical terms
Area - L x W x D
Odor - type/amount
Sinus Tract - blind bursa sac
Tunneling - small tissue loss and possible deep
Undermining - large tissue loss extending laterally
Exudate - Type/amount
Necrotic Tissue - Eschar/slough tissue (type/amount)
Granulation Tissue - healthy ground matrix
Epithelialization - resurfacing of a denuded area

Periulcer Characteristics

➡️ Ulcer Edge - color, thickness, attachment and rolling of the edges
➡️ Edema - amount of fluid in the interstitial space, associated with venous disease
➡️ Erythema - diffuse redness of the skin due to vasodilatation
➡️ Induration - abnormal firmness of tissue with a definite border
➡️ Maceration - softening of tissue due to abundance of fluid in the tissue
➡️ Desiccation - drying of the skin
➡️ Callous Formation - thickening of the skin edge, typically seen with arterial disease
➡️ Hair Distribution - promotes epithelialization in partial-thickness ulcers
**Ulcer Characteristics**

**Venous Insufficiency Ulcer**

- Lipodermatosclerosis
- Deposition of hemosiderin in the skin
- Discoloration of the skin (brownish color)
- Conversion to scar tissue
- Induration due to fibrosis of the subcutaneous fat
- May be confused with cellulitis/dermatitis
- Severe pain above the malleolus
- Warmth/tender/ hot/painful

**Diabetic Foot Ulcer**

- Pressure build up: a callus is usually present
- Black, intact, stable heel
- Pad and protect
- Thickening of the skin results in cracking of the skin
- Atrophy of the subcutaneous fatty tissue
- Infection/gangrene
“Suspected” Deep Tissue Injury

- Pressure-related injury to the subcutaneous tissues under intact skin
- Initially the area may appear as a white waxy area
- Deep bruise
- Demarcation
- 7 days from the early signs of redness
- Spontaneous “skin slippage” occurs on days 9-11
- Mature brown/black eschar forms on days 14-15
- Red - ischemia
- Purple - infarction
- Black - necrotic

Deep Tissue Injury

POC of Deep Tissue Injury

- Capillary refill assessed q8h x 24 hours
- Immediate, constant pressure relief (tissue off-loading, positioning, support surface)
- If tissue is intact, protect with dressing and possible wrap
- Monitor for skin opening
- Monitor for deterioration
- Modify plan as needed
- Notification of appropriate referrals
- Documentation
Deep Tissue Injury

Documentation

- DTI is generally “unstageable” as the wound base is not visible
- NPUAP recommends:
  - “DTI under intact skin”
  - “DTI in evolution”
- Include risk factors, interventions, turning schedule, etc.

Terminal Ulcer

- Cause is unknown
- Possible the result of a perfusion deficit exacerbated by multi-system failure
- Rapid breakdown of the skin
- Palliative treatment
  - Pressure redistribution/pain relief/odor control
- Aggressive treatment
  - May be reserved in accordance with the family wishes of “aggressive or non-aggressive” intervention
**Bioburden**

**Contamination**
- Presence of non replicating bacteria at a ulcer site

**Colonization**
- Presence of replicating bacteria at a ulcer site
  - Not causing harm or injury to the host

**Critical Colonization**
- Bioburden level interferes with healing
  - Does not produce the classic signs and symptoms of infection

**Infection**
- Deposition and multiplication of bacteria in the tissue
  - Results in host response that leads to non healing or a decline in the ulcer

**Local Signs of Infection**
- Erythema
- Warmth
- Edema
- Induration
- Pain
- Purulent drainage
- Crepitation
- Foul odor
- Pocketing at the base of the wound
- Discolored/friable granulation tissue
Infection

Types of Infection
- Abscess
- Cellulites
- Osteomyelitis
- Gangrene

Abscess
- Involves the fascia or tendon tissue
- Treatment
  - Incise and drain
  - Debridement of necrotic/infected tissue
  - Tissue graft may be necessary
  - Antibiotics therapy is variable
**Infection**

### Cellulites

- **Most common soft tissue infection**
- **Signs and symptoms**
  - Warmth/swelling/tenderness/erythema/fever
- **Rule of 2 (cm)**
  - Mild/moderate/severe
- **Usually caused by Group A streptococcus**
- **Treatment**
  - Oral antibiotic for localized infection
  - Hospitalization with IV antibiotics for spreading cellulitis

### Osteomyelitis

- **Involves toes and small bones of the foot**
- **Associated with a non-healing or a recurring ulcer**
- **Local signs include swelling and erythema**
- **Severity of infection**
  - Visible or palpable bone implies an 85% chance of osteomyelitis
- **Treatment**
  - Bacterial culture
  - Debridement of necrotic tissue/bone
  - Hospitalization with IV antibiotics may be required
Infection

Gangrene

- "Dry"
  - Due to loss of arterial blood supply to the tissue or part
- "Wet"
  - Infectious component and requires surgical debridement and/or antimicrobial therapy to control the infection
- "Fetid foot"
  - Combined infection involving bone and soft tissue

Treatment

- Debridement of necrotizing fasciitis
- Vascular reconstruction if possible

Tissue biopsy

- Most definitive method of quantifying bacteria

Clinical infection

≥100,000 (10^5) cfo or bacteria/gm of tissue or ml of fluid is indicative of infection

Culture

- If changes in appearance occur resulting in local signs of infection or if systemic signs resulting in sepsis occur
- Do not be routinely culture
- Ulcers are contaminated
Levine swab culture
Infection

Infection = \textit{Dose} \times \textit{Virulence}

Host resistance

- Factors influencing host resistance
  - Age
  - Vascular disease
  - Diabetes mellitus
  - Poor nutritional status
  - Smoking
  - Immunosuppression/use of steroid medications

Antimicrobial Therapy

- **Povidone - Iodine Agents**
  - Drying agent
  - Fibroblast toxicity

- **Sodium Hypochlorite Solution**
  - Dakin’s - 0.025% - 0.054%
  - Collagen degradation
  - Fibroblast toxicity

- **Acetic Acid**
  - Fibroblast toxicity

- **Hydrogen Peroxide (H_2O_2)**
  - 3% solution
  - Poor antimicrobial affect

- **Nitrofurazone**
  - Slows epithelialization
  - Propylene glycol - renal failure

- **Silver Sulfadiazine**
  - Antimicrobial affect
  - Transient leukopenia (neutropenia with white cell depression)

- **Petrolatum**
  - Slows epithelialization
Debridement

- Removal of dead or devitalized tissue
  - Sharp (surgical)
  - Mechanical (wet-to-dry/whirlpool/pulsed lavage)
  - Enzymatic (chemical/bacterial)
  - Autolytic (ulcer fluid)
  - Biodebridement (maggot therapy)
- Excessive debridement
  - Can result in a reinstitution of the inflammatory process with an influx of inflammatory cytokines

Moisture-Associated Skin Damage

MASD
- Incontinence-associated dermatitis
  - Intertriginous dermatitis
  - Periwound moisture-associated dermatitis
  - Peristomal moisture-associated dermatitis
- Bile acids and enzymes in feces
- Urea converted to ammonia

Treatment
- Use non-alcohol based moisturizers
- Establish continence training
- Bowel or bladder training programs
- Avoid skin contact with plastic surface to reduce sweating
- Maceration, friction, shear
**Skin Integrity**

**Maintenance**
- Daily skin inspections
  - Over bony prominences
  - Assess for compromised peripheral circulation
- Promote skin hygiene
  - Cleanse skin after soiling with saline and skin cleanser
  - Avoid alkaline agents which increase skin irritation
  - Reduce skin pH to avoid bioburden build up and risk of infection
  - Use skin protectants or barriers
  - Do not massage or rub over bony prominences

**Ulcer Dressing**

**Resident/Patient**
- Medical status (Immunocompromised)
- Vascular status (arterial/venous)
- Adherence (education)

**Ulcer and Periulcer Characteristics**
- Safe (hypoallergenic)
- Therapeutic benefit
  - Exudate control, decrease pain, promote granulation tissue repair and epithelialization, prevent necrotic tissue formation
- Cost-effective
  - Easy to apply and remove
  - Frequency of dressing change
**Ulcer Dressing**

**Decision Tree (MEASURES)**

- Decisions in selection should be based on the resident, the wound/ulcer characteristics, and the efficacy of the dressing
- Minimize trauma to wound bed
- Eliminate dead space
- Assess and manage exudate
- Support the body’s tissue defense system
- Use non-toxic wound cleansers
- Remove bacteria, debris, necrotic tissue
- Environment maintenance - thermal insulation and moist wound bed
- Surrounding tissue - protect from injury and bacteria

**Education for all staff involved**

**Types**
- Gauze
- Transparent films
- Hydrocolloid
- Hydrogel
- Alginites
- Foam
- Composite
- Collagen
- Debriders
- Hydrofibres
- Ionic Silver
- Biologicals

**Ulcer Dressing**

**Amount of Drainage**

- Light
  - Hydrogel
  - Thin Film
  - Gauze
- Heavy
  - Calcium Alginate
  - Foam (primary)
  - Hydrofiber
  - Collagen
  - Hydrocolloid
  - Gauze
In Closing

Ulcer care includes a variety of information that reflects the ulcer status during healing. Providing an accurate description of the skin and ulcer characteristics is critical for all residents. These findings will help the clinician devise and revise the plan of care and treatment strategies over time, based on the current status of the ulcer.

Thank you

Questions?
References


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*Posthauer, ME, Hydration: Does It Play a Role in Wound Healing? Advances in Skin & Wound Care. 2006; Mar, 19(2):74-76.