Wounds in Older Adults

Lisa J. Gould, MD, PhD, FACS
Medical Director
Wound Recovery and Hyperbaric Medical Center, Kent Hospital
USF Affiliate Professor
Department of Molecular Pharmacology and Physiology
What is the Impact of Chronic Wounds?

- **Venous Leg Ulcers (VLUs)**
  - Most frequently occurring chronic leg wound
  - 2.5 million patients per year in US
  - **ANNUAL PAYOR BURDEN UP TO $18 BILLION**
    
    *International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 18th Annual Meeting, May 2013, New Orleans, LA*

- **Diabetic Foot Ulcers (DFUs)**
  - Est. 1.3 million patients per year in US\(^1\)
  - Higher comorbidities and utilized more medical resources than matched non-DFU Diabetic patients and 2X the costs\(^2\)
  - **ANNUAL PAYOR BURDEN UP TO $13 BILLION\(^2\)**
    

- **Pressure Ulcers (PrUs)**
  - 2.5 million patients per year in US
  - Average cost of Stage I Pressure Ulcer is $2,557\(^1\) versus $129,547 for Stage IV\(^2\)
  - Adds $43K in costs to a hospital stay
  - Pressure Ulcer prevalence as high as **26%** among hospital patients\(^2\)
  - Current literature suggests that Deep Tissue Injuries represent the early pathogenesis of a Stage III/IV Pressure Ulcer
  - **ANNUAL PAYOR BURDEN UP TO $11.6 BILLION**
    
World-Wide: Projected Rise in Older Adults

Chronic leg wounds affect 3.6% of people older than 65 years

Agale: http://dx.doi.org/10.1155/2013/413604
Conclusion?

- You **will** see chronic wounds in your practice
- You **will** see acute wounds in your practice
  - Need to know what is reasonable to treat
  - Need to know when to refer
  - Need to know prevention strategies
Acute Wounds

• Traumatic Injuries
  – Blunt trauma, lacerations
  – Skin tears
  – Burns
Case Example

Category 2b skin tear

1 month

STAR Classification System

- **Category 1a**: A skin tear where the edges can be realigned to the normal anatomical position (without undue stretching) and the skin or flap colour is **not** pale, dusky or darkened.
- **Category 1b**: A skin tear where the edges can be realigned to the normal anatomical position (without undue stretching) and the skin or flap colour is pale, dusky or darkened.
- **Category 2a**: A skin tear where the edges **cannot** be realigned to the normal anatomical position and the skin or flap colour is not pale, dusky or darkened.
- **Category 2b**: A skin tear where the edges **cannot** be realigned to the normal anatomical position and the skin or flap colour is pale, dusky or darkened.
- **Category 3**: A skin tear where the skin flap is completely absent.
Acute Wound Prevention

• Safe environment
  – Lighting
  – Furniture
  – Footwear
  – Avoid friction/shear when repositioning

• Good skin care
  – Avoid drying soaps
  – Use emollients
  – Hydration and good nutrition, essential fatty acid supplements
  – Manage incontinence

• Avoid adhesives

• Protect vulnerable areas and fragile skin
  – Tubular bandages
  – Long sleeved clothing
  – Skin protection devices
Identify and Treat the cause

- Global assessment of patient
  - Comprehensive H&P
    - Systemic illness known to impact wound healing
      » Optimize respiratory, cardiac status, control hypertension
      » Diabetes – optimize glycemic control
      » Autoimmune/connective tissue disorder
  - Nutritional assessment
    » Optimize glycemic control
    » Supplement calories/protein
    » Micronutrients, vitamin C
  - Evaluation of systemic medications
    » Reduce medication known to impede wound healing if possible
  - Tissue perfusion
    » Vascular status
    » Edema
    » Smoking
    » History of radiation

- Local Factors
  - Unrelieved pressure at site of wound
  - Foreign body
  - Infection
  - Malignancy
  - Incontinence
  - Topical agents
Lower Extremity Ulcers

- Arterial
- Venous
- Diabetic
- Mixed Etiology
- Other
Differential Diagnosis

- Venous
- Arterial
- Neuropathic
- Pressure
- Lymphatic
- Vasculitis
- Traumatic
- Autoimmune disease
- Sickle cell disease
- Pyoderma gangrenosum
- Hematologic disease
- Neoplastic
- Infectious
Differentiating features of leg ulcers

<table>
<thead>
<tr>
<th></th>
<th>Site</th>
<th>Skin</th>
<th>Ulcer</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Venous</strong></td>
<td>Lower 3rd of leg; medial malleolus</td>
<td>Edema</td>
<td>‘Weepy’</td>
<td>Varicosities ‘Bottle leg’ Normal ABI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hemosiderin deposition</td>
<td>Irregular</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Weepy’</td>
<td>Painful</td>
<td></td>
</tr>
<tr>
<td><strong>Arterial</strong></td>
<td>Distal extremities (toes)</td>
<td>Thin, atrophic</td>
<td>No bleeding</td>
<td>Diminished pulses</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shiny</td>
<td>Regular</td>
<td>Low ABI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hair loss</td>
<td>Painful</td>
<td></td>
</tr>
<tr>
<td><strong>Diabetic</strong></td>
<td>Pressure sites</td>
<td>Callous</td>
<td>Round, deep</td>
<td>Lack of sensation</td>
</tr>
<tr>
<td>(neuropathic)</td>
<td></td>
<td></td>
<td>Painless</td>
<td>ABI&gt;1.3</td>
</tr>
</tbody>
</table>

Adapted from Creager et al, ed, Vascular Medicine
Lower extremity Ulcers

All patients with lower extremity ulcers should be evaluated for arterial disease

- Claudication
- Rest pain
- Dry, cool skin
- Distal Atrophy and Alopecia
- Dependent Rubor, Elevation Pallor
- Absent pedal (and proximal) pulses
PAD Risk Factors

- Smoking
- Diabetes
- Hypertension
- Hypercholesterolemia
- Obesity
- Hypothyroidism
- Age >65
Arterial Insufficiency Ulcers – Clinical Characteristics

- Deep punched out appearance
- Scant granulation
- Located between toes, on toe tips, outer ankle, or where there is trauma and/or friction from walking
- Dry gangrene vs. wet gangrene
Non-invasive Studies

- Pulse Volume Recording
- Ankle-Brachial Index (ABI)
- TBI (Toe)
- Color Doppler
- TcPO2
• ABI = 0.9 to 1.2 = normal
• ABI = 0.6 – 0.9 = PAD and possibly intermittent claudication
• ABI < 0.6 = severe disease, likely leg pain at rest
• ABI < 0.4 = limb threatening PAD / critical ischemia
• ABI > 1.2 = Calcinosis of arteries: DM, kidney disease
Referral to Vascular Surgeon

- Absent or abnormal pedal pulse
- Attenuated PVR tracing
- ABI <0.9 or > 1.2
- TBI <0.75 for diabetic non-compressible vessels
- Transcutaneous oxygen tension (TcPO2) on the periwound skin < 40 mmHg

WHS Guidelines
Venous Leg Ulcers

- Dependent edema
- Varicose veins
- Reddish-brown pigmentation
- Eczematous changes
- Atrophie blanche
- Lipodermatosclerosis
- Ulceration
  - At or above the ankle
  - irregular, shallow
  - fibrinous material at base
Risk Factors

- Deep vein thrombosis
- Family history of venous disease
- Varicose veins / phlebitis
- Previous trauma or surgery
- Prolonged immobilization
- Obesity

WHS Guidelines
Diagnosis

• Clinical History and Physical Examination
  • Ulcer location
  • Signs/symptoms of venous insufficiency
    Swelling
    Skin breakdown
    Pigmentation
    Eczema

• Diagnostic Procedures
  • Duplex ultrasound/ Valsalva maneuver (not ultrasound to r/o DVT)
  • Velocity and direction of flow

• Rule out or consider arterial component
  Mixed arterial/venous disease is common

WHS Guidelines
Treatment of Venous Ulcers

• Elevation
• Compression therapy
• Infection control – Local and Regional
  • Debridement
  • Topical antimicrobials
  • Antibiotics for invasive infection
• Dressing
  • Moisture retentive vs. Exudate control
  • Protection of peri-wound skin
  • Pain control
• Adequate nutrition
  • Protein
  • Sodium and Sugar
  • Micronutrients
• Venous ulcers that show no sign of healing after six weeks of treatment should be biopsied
Edema: Excessive Fluid in Interstitium

- Inflammatory response to injury
  - Histamine release
  - Vasodilation
  - Increased vascular permeability
- Limb dependency, venous hypertension
- Congestive heart failure
- Lymphedema
Edema Control

• Elevation
• Compression therapy
  • Compression garments
  • Pneumatic compression
  • Layered wrap systems
• Classes of compression
  • Class 1: 15 – 20 mmHg
  • Class 2: 21 – 30 mmHg
  • Class 3: 31 – 40 mmHg
  • Class 4: 41 – 50 mmHg

• ANY compression is better than NO compression
Contraindications toCompression Bandages

- **Absolute** - critical limb ischemia
- Relative
  - ABI < 0.8
  - CHF - be aware of rapid fluid shifts
  - Unreliable attendance
Lymphedema

- Peau d’orange
- Involvement of toes
- Firmer than hydrostatic
- More difficult to treat
- Chronic infection
BLEE vs Cellulitis

Unilateral, acute onset
Diabetic Foot Ulcer Pathophysiology

**Somatic neuropathy**
- Reduced perception of pain
- Diminished proprioception
- Clawing of toes

**Autonomic neuropathy**
- Absent sweating
- Dry skin fissures
- Altered blood flow regulation
- Distended foot veins; warm foot
- Charcot neuroarthropathy

**Peripheral vascular disease**
- Claudication; rest pain
- Cold extremities
- Reduced foot pulses

**Increased foot pressures**

**Connective tissue changes**
- Limited joint mobility
- Orthopaedic disorders

**Callus formation**

**Foot ulceration**

**Infection**

**Gangrene**

**Foot ischaemia**

**Altered Wound Healing**

**Motor neuropathy**
DFU Risk Factors

- Abnormal ABI/TBI (vascular insufficiency)
  - Beware of ABI>1.2
- Peripheral or autonomic neuropathy (abnormal monofilament testing 10g)
- Abnormal hemoglobin A1c
- Lack of routine foot care

WHS Guidelines
Three Major Categories of Diabetic Foot Wounds

- Chronic Insensate
- Deep Space Infection
- Ischemic Infection
Ulcer Characteristics

- **Location**
  - Plantar midfoot
  - Metatarsal pads
  - Heel
  - Site of repetitive trauma

- **Wound Appearance**
  - Well defined margins, variable depth, granulation frequently present, macerated perimeter

- **Surrounding Skin**
  - Erythema (cellulitis), induration, callus
Diagnose—“I” DENTIFY

- “I”nfection
- “I”schema
- “I”nsensate Foot

90% healing or reduced level amputation if correctly identified and treated
Treatment for Neuropathic DFU: Off-loading

Reverse the detrimental effects of neuropathy and deformity to decrease morbidity

Acceptable methods of offloading:
- crutches
- wheelchairs
- custom shoes or inserts
- diabetic boots
- forefoot and heel relief shoes
- C.R.O.W.
- Removable cast walkers (RCW)
- total contact cast (TCC/iTCC)
Wound Assessment Determines Local Wound Care

- Categories
  - Surgical/non-surgical
  - Depth
  - Specific type
    - Venous insufficiency
    - Diabetic
    - Arterial
    - Pressure
Assess Drainage (wound exudate)

**AMOUNT**
None – tissue dry
Scant – tissue moist, No measurable drainage
Minimal – tissue very moist, <25% of bandage
Moderate – tissue wet, 25-75% of bandage
Copious – tissue filled with fluid, >75% of bandage
Tissue Description: Eschar

Eschar:
Dry, leathery, black

Eschar:
Soft, yellow, non-viable skin
Tissue Description: Necrotic Tissue
Tissue Description:
What is the yellow stuff?...Slough

Mature fibrin;
Traps critical
growth factors
needed for healing

Chronic Inflammation
Measure Undermining
Measure Tunneling
Tissue Description
Muscle
Tissue Description
Tendon/fascia
Tissue Description
Bone
Edge

- Hyperkeratotic
- Epibole
- Pocketing
- Maceration
- Advancing epithelium
Tissue Description
Granulation

Hypergranulation Tissue
Dressing Choices based on Wound Characteristics

- Manage Exudate
  - None
  - Scant
    - Transparent Film
    - Hydrocolloid, non-adherent gauze
  - Moderate
    - Alginate, hydrofiber
  - Heavy
    - Foam
    - NPWT

- Wound Bed
  - Shallow
  - Deep
  - Undermining or Tunneling
Undermining or Tunneling

Lightly pack with absorbent filler or gel impregnated gauze
Topical Agents That Destroy Tissue

- Betadine
- Hydrogen Peroxide
- Dakins’ Solution
- Kerosene
- Leaving open to air
Take Home Messages

• Patient is a ‘whole’ not a ‘hole’
  – Primary disease control
  – Prevention
  – Nutritional support
  – Social Support and Stress management
  – Identify and Treat Infection
  – Edema Control
  – Simple dressings to maintain moist environment

• Develop Plan of Care
  – Patient capabilities
  – Need for home health
  – Ability to comply
  – Family
  – Cost

• Timely referral