Management of Wounds in the Ambulatory Care Setting

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Disclosures

I have nothing to disclose

Objectives

1. Discuss acute and chronic wound management in the ambulatory care environment
2. Identify referral criteria for chronic wound management
3. Examine resources to maximize outcomes for patients with wounds
Wound Care Paradigm

*Just because a wound is on the foot doesn’t make it a diabetic foot ulcer*

Wound care is complex
- We can no longer rely just on wound location to diagnose etiology
- Need a clear wound history before we can effectively manage the wound

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Wound Care Paradigm

Many advances in wound care these days
It is important to adhere to basic principles before embarking on expensive and complicated wound care techniques
- Etiology
- Vascular exam
- Infection control
- Off-loading / remove the offending agent
- Structure and function

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Wound History

- Onset and perceived cause
- Size (ex. changes over time)
- Duration & Treatment
- Mobilization history (ex. walking, working, ADLs)
- Former wounds
- Health history (ex. ESRD, malignancy, Crohni’s/UC, smoking, paralysis, MS, CKD)
- Surgical history (ex. fistula, CABG)
- Medications (ex. diuretic)
- Smart phone history
Assessment: Skin

- Number and location of wounds
- Diagram/Map helpful
- Measurements
  - Wound volume (L x W x D)
  - Largest measurement used
  - Monitor over time for healing/worsening
- Undermining

Assessment: Circulation

- Pulse exam
- Cap refill
- Atrophic skin
- Hypertrophic deformed nails
- Ankle-Brachial Index (ABI)

Assessment: Neurologic

- If diabetic will need neuropathy evaluation (foot exam with monofilament)
- Hx of neurologic symptoms
- Foot drop
- Numbness/tingling
Assessment: Infection

<table>
<thead>
<tr>
<th>Infection Status</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>No infection</td>
<td>Bacteria in wound, no host response</td>
</tr>
<tr>
<td>Colonization</td>
<td>Bacteria in wound, multiplying, no host response</td>
</tr>
<tr>
<td>Critical Colonization</td>
<td>Bacteria in wound, multiplying, local response - delays wound healing, increase in pain</td>
</tr>
<tr>
<td>Systemic Infection</td>
<td>Bacteria in wound, multiplying, systemic response - wound worsening, SIRS, Sepsis</td>
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Assessment: Hyperglycemia may be your only indicator of infection

Diabetic patients are often immune compromised and have a diminished host response to infections. Always look at your patient's blood glucose readings as part of evaluation for wound.
Assessment: Bioburden
Indiscriminate use of antimicrobials from across the healthcare spectrum has led to resistant organisms.
Use of systemic antibiotics is only beneficial if the patient has a systemic infection.

Drugs to the Bugs
Many wounds have poor blood flow; ergo systemic treatment doesn’t reach the wound bacteria.
Topical antiseptic/antimicrobial agents are the first line treatment for bacterial burden.

Assessment: Pain
Always ask about wound pain.
What helps and doesn’t help.
Worsening over time.
Not all wounds with neuropathy are painless.
- Infection
- Deep structures involved

Assessment: Nutrition
All patients with serious wounds need a nutrition evaluation.
Weight loss (intentional vs unintentional).
Alcohol/illicit drug abuse.
Elderly/low income.

- Prealbumin, crp, albumin, total protein
  - Tests aren’t perfect but give you an idea of healing potential.
  - Many patients with obesity are protein deficient.
  - Without protein you cannot make the amino acids necessary for reconstruction.

Nutrition supplementation.
Assessment:
Labs/Diagnostics
- CBC with differential
- Metabolic panel
- Liver function
- Hemoglobin A1c
- Cultures (swab vs tissue, do not culture drainage)
  - Culture after cleansing and debriding the wound
  - You want the actual bacterial growing, must get past the biofilm

Wound Characteristics:
Chronic vs Acute

<table>
<thead>
<tr>
<th>Chronic</th>
<th>Acute</th>
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<tbody>
<tr>
<td>Difficulty to identify mechanism</td>
<td>Easy to identify mechanism</td>
</tr>
<tr>
<td>Immunocompromised</td>
<td>Rapidly close (greater than 15% weekly)</td>
</tr>
<tr>
<td>Vascular compromise</td>
<td>Healthy individuals or those with very well controlled disease</td>
</tr>
<tr>
<td>Elderly</td>
<td></td>
</tr>
<tr>
<td>Comorbid conditions</td>
<td></td>
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<tr>
<td>Neuropathy</td>
<td></td>
</tr>
<tr>
<td>Spinal cord conditions</td>
<td>Slow to progress</td>
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</tbody>
</table>

Inflammation → Proliferation → Remodeling
Wound Characteristics: Contributing Factors

Moisture – prevent desiccation
- Moist environment allows epidermal migration and encourages epithelialization

Maceration
- Solid dressings or clothing, saturated old dressing in contact with the wound inhibit healing and also put periwound skin at risk for breakdown

Necrosis
- Slough – moist, loose, stringy, yellow/cream colored
- Eschar – dry, thick, leathery, black or dark
- Devitalized tissue harbors bacteria

- Decrease sensation
- Lost protective mechanism
- Unaware of injury
- Delay in re-epithelialization

Sensory Neuropathy

- Claw deformities transfer pressure to plantar metatarsal heads
- Increased pressure on bony prominence causes ulcer on plantar surface

Motor Neuropathy

- Skin becomes dry and susceptible to fissures and skin tears
- Increased risk of infection due to loss of sweat gland function

Autonomic Neuropathy

Comorbid Illness: Diabetes

Diabetes with wounds is associated with neuropathy, vasculopathy and immunopathy

Peripheral arterial disease at younger age and more distal
Neuropathy alone can lead to foot ulcers
Impaired growth factor production
Impaired angiogenesis
Decreased epidermal barrier
Decreased macrophage function
Diminished granulation tissue
Decreased migration of keratinocytes and fibroblasts
Decreased epithelial nerves
Decreased bone healing...
Comorbid Illness: Diabetes

Diabetic wound characteristics
- Located at area of repeated trauma
- Surrounding callus or corns
- Undermining common

Comorbid Illness: Diabetes

Pressure point causes callus
- Callus increases pressure further
- Central area of the callus becomes ischemic due to pressure/flow
  - Cells in center become necrotic and liquefied forming blister
  - Blister in center of the callus grows outward until ulcer surfaces
  - DFU is formed with central moist blister and callus

Comorbid Illness: Diabetes

Wound characteristics
- Infection (presence of infection on surface, tissue, or bone)
- Foot
- Ischemia (vascular assessment of the affected limb and the non-affected limb)
Comorbid Illness: Diabetes

Treatment of choice is total contact cast (TC cast)

- Apply every 5-7 days
- Offloading is the key to healing DFUs
  - Removable cast walking boot – removed 78% of the day
  - Patients perceive that because something is removable it is okay to remove it!
  - 65% of patients with removable walking boot for offloading still had a wound 3 months later
- Currently only 6% of DFUs receive TC casting (cost of care is dramatically less)
- Decreases risk of complications


Comorbid Illness: Diabetes

Must get control of blood sugars in order to get control of wound

Comorbid Illness: Venous disease

Wound characteristics:

- Location between the knee and ankle
- Most commonly at medial and lateral malleoli
- Surrounding dermatitis, eczema, scaling, or weeping
- Pruritic
- Typically minimal pain (unless severely infected or deep structures involved)
- Hemosiderin staining (hyperpigmentation)
- Granulation tissue with sometimes slimy slough over the top
Comorbid Illness: Venous disease

Damage or dysfunction of the vein valves
Blood does not move thru the system normally with the "venous pump"
Blood inappropriately transfers (backflow) thru the perforators to the superficial venous system because the deep venous system is engorged
Superficial system is not equipped to handle the volume, so it becomes congested
The engorgement causes venous hypertension leading to permanent changes in the vessels

Comorbid Illness: Venous disease

Chronic Venous Insufficiency
- Venous hypertension
- Pain
- Swelling/edema
- Hemosiderin staining
- Stasis dermatitis
- Venous Stasis Ulcers (VSU)

Comorbid Illness: Venous disease

Treatment is aimed at reducing venous hypertension and edema /compression
- Reduces inflammation
- Prevents venous reflux
- Reduces capillary leakage
Comorbid Illness: Venous disease

Venous disease

- Venous duplex to eval for reflux, dysfunction, and venous dilation
- ABI or more aggressive arterial disease work up if mixed picture of wound
- Assess patient condition (walk, work, do ADLs?)
- Medical optimization of concomitant diseases (CHF, DM, HTN, etc.)
- Consider vascular surgery consult - ?
  - Surgical vein stripping is not superior to appropriate medical management
- Consider surgical consult for skin grafting if refractory or large wounds
  - Skin grafting will not be effective without appropriate medical management

**Compression, Compression, Compression!**

- Use of compression for patients with venous leg ulcers (VLUs) improves healing times to 1.5-4.5 months after compression began
- Use of compression for highly complicated patients with VLUs (diabetes, multiple ulcers, large ulcers) improves healing time to 12 months
- Wraps may be single-layer, multi-layer or store bought – just get them in compression!

**Compression Levels**

<table>
<thead>
<tr>
<th>Pressure</th>
<th>mmHg (range)</th>
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<tbody>
<tr>
<td>Very Light</td>
<td>7-15</td>
</tr>
<tr>
<td>Low</td>
<td>16-30</td>
</tr>
<tr>
<td>Moderate</td>
<td>20-30</td>
</tr>
<tr>
<td>High</td>
<td>30+</td>
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Antiembolism stockings are approximately 10mmHg

Graduated compression is tighter at the ankle and less as you move proximally

Venous disease requires at least 20-30mmHg to be effective

Insurance only reimburses 30-40 mmHg for maximum benefit
Comorbid Illness: Venous disease

Contraindications for Compression therapy
- Heart failure (uncontrolled)
- Recent DVT – rule out with venous duplex
- Instability
- Arterial disease – rule out with ABI measurement
- 0.75-0.9 – needs single layer compression with cast padding and coban spiral
- 0.9-1.25 – 4-layer compression wrap system or long stretch compression
- 0.5-0.8 – mixed arterial and venous disease – need to use light compression single layer only and monitor more frequently for complications
- Less than 0.5 – compression is contraindicated, consult vascular

Pharmacologic therapy
- Diuretics – may be Rx for other illnesses that contribute to venous stasis (like CHF) but are not primarily Rx for VSUs
- Dermatologic corticosteroids – may reduce erythema and help enormously with pruritus and inflammation of the limb, only for closed skin, not for open wounds
- Antiplatelet therapy– unless contraindicated all patients with VSUs should be on ASA therapy, has been showed to speed healing and reduce ulcer size when in combination with compression (control group was compression alone)

What do you do with the wound under the compression?
- Promote healing
- Control exudate
- Enhance comfort
- Prevent adherence to the compression bandage

Hydrolift
Aloe
Silver dressings
Calcium alginate

Treat intact skin with Vaseline or zinc oxide cream/paste to decrease pruritus and avoid irritation, no lanolin products

Comorbid Illness: Venous disease

Pharmacologic therapy, continued

**Antihypertensives** – starting with thiazides and ACEI to achieve target of 130/80, BB are not contraindicated but necessitate close monitoring

**Lipid lowering therapy** – Statin recommended to achieve LDL targets with nitrates/fibrates for those with triglycerides and HDL dyslipidemia

Patient Education

Leg elevation – above the heart, 30 minutes 3-5 times per day

- Not just mechanical edema control, also reduces intra-abdominal pressure that can cause venous stasis in the morbidly obese – some may not be able to tolerate this

Leg exercises, therapy if not independent in ADLs

Graduated compression

Minimize standing

Treat dry skin and eczematous changes

Identify and address risk factors (smoking, obesity, heart failure)

Stick to plan of care

Pharmacologic therapy

**Antibiotics** are only indicated if infection or cellulitis is present

- Oral antibiotics – mild systemic signs plus local signs (low grade fever, increased drainage)
- IV antibiotics – systemic signs plus signs outside the wound (surrounding tissue erythema and heat, increased leg swelling, increased pain, increase in wound size, lymphangitis)
- Broad-spectrum antibiotics – SIRS response plus systemic signs of sepsis (with or without organ dysfunction)
- Osteomyelitis – requires work up for arterial disease BEFORE embarking on radiologic exam for osteo
Comorbid Illness:
Ischemic disease

Critical limb ischemia is when flow doesn’t meet needs at REST
- Pain at rest
- Gangrenous ulcer development
- Tissue shrinkage

Emergent surgical consult

Comorbid Illness:
Ischemic disease

Causes:
Atherosclerosis – Macroangiopathy
- Peripheral arterial disease
- Diabetes
Small vessel diseases - Microangiopathy
- Vasculitis
- Scleroderma, etc.

Comorbid Illness:
Ischemic disease

Wound characteristics:
- Location over prominent structures (decreases blood flow to skin and repetitive trauma)
- Even, sharp demarcation of borders
- Dry, pale wound bed – no granulation tissue, no drainage
- Necrotic eschar present
- Exposed tendon bones
- Shiny, tight surrounding skin with no hair
- Pain is usually related to intermittent claudication rather than wound itself
Comorbid Illness: Malignancy

Malignant wounds

- Need to manage the wound
- Watch for new wounds
- Expect worsening as carcinoma escalates or pressure injuries develop as skin fails

Cancer of the skin creating wound
Cancer of underlying structures invading the skin
Pressure injuries

Odor

- Due to necrosis and slough in the wound
- Can worsen with time as the malignancy worsens
- Infection can contribute or worsen (in immunocompromised patients use anti-fungal agents)
- Systemic or topical metronidazole for odor
- Debridement (with good pain control) can help temporarily but will re-develop as malignancy advances
- Dakin's or acetic acid solution wet to dry or for use as a wound wash
- Use of charcoal dressings for odor absorption

Comorbid Illness: Malignancy

Treatment:

Wound care (odor, drainage, pruritis, bleeding, nonstick, infection monitoring)
Systemic chemotherapy and radiotherapy per oncology
Pain management
Nutrition support
Focus on enhancing quality of life
Palliative Care

Not all wounds are salvageable, not all patients with wounds are salvageable

Need to have a better plan of when to have conversations of changing from cure/heal to palliative care

Palliative wound care focus:
- Drainage
- Odor control
- Pain control
- Control of other symptoms

Cleansing with normal saline is recommended to decrease pain

Absolutely no rubbing or wiping

Palliative Care

Dressing selection
- Moist wound environment
- Hydrocolloids or soft silicone dressings are recommended
- Avoid unnecessary dressing changes – only when soiled or heavily saturated with exudate
- Ideal dressing should fall out when securement is removed

Wound Pain

Wound Pain
- Is a background pain, not just with wound care
- Does not correlate with wound size
- 80% of patients experience pain outside of wound care
- Neuropathic component
- Is not stagnant, can worsen over time
- Local anesthetics (lidocaine, etc.) do not address that most pain with dressing changes occurs with dressing removal, not application
- Application of local anesthetics can improve wound pain for up to 4 hours after dressing application so should be a consideration
Psychological impact

Wounds are a physical reminder of a disease process.

Disfigurement (temporary or permanent with scarring) has cosmetic and psychological impact.

Social isolation

Depression

Spiritual distress

Specialty Wound Care Centers

What do they offer that I can’t provide?

- HBO (radiation burns, nonhealing diabetic ulcers, chronic osteo)
- Ultrasound
- Electrical stimulation
- Total contact casting (Podiatry)
Referral Criteria

- Patient requests second opinion
- Full thickness requiring skin coverage
- Exposed muscles/tendon/deep structures
- Lymph drainage/leak
- Concern for fistula
- Chronicity
- Patient factors that impair wound healing

Thank You