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

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

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, Crohn's/UC, smoking, paralysis, MS, CKD)

Surgical history (ex. fistula, CABG)

Medications (ex. diuretic)

Smart phone history

Assessment: Skin

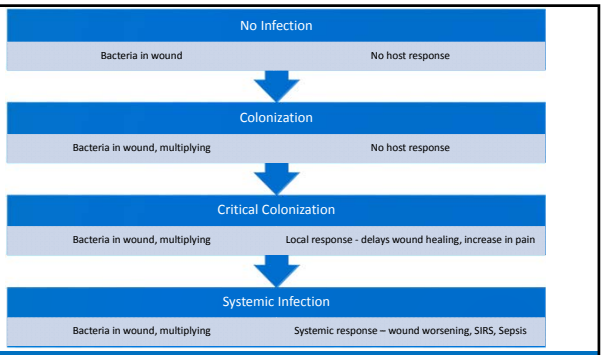
- Number and location of wounds
- Diagram/Map helpful
- Measurements
- Wound volume (L x W x D)
  - Largest measurement used
  - Monitor over time for healing/worsening
- Undermining
- Viability of tissue
- Probing

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



Wound Source. (2018). Understanding the wound infection continuum. Retrieved from https://www.woundsource.com/blog/understanding-wound-infection-continuum

Assessment: Infection

- Increasing erythema
- Cellulitis
- Induration
- Purulent discharge, increase in drainage
- Lymphadenopathy
- Increase in size
- Change in odor/color
- Fever
- Friable granulation tissue
- Increased pain and tenderness
- Bridging of epithelium or tissue to create a "pocket"

UMC HEALTH SYSTEM

Assessment: Infection

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

UMC HEALTH SYSTEM

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

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

Swezey, L. (2015). The difference between acute and chronic wounds. Retrieved from https://www.woundsource.com/blog/difference-between-acute-and-chronic-wounds

Wound Characteristics: Chronic vs Acute

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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 peri-wound skin at risk for breakdown

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

UMC HEALTH SYSTEM

Sensory Neuropathy	• Decrease sensation • Lost protective mechanism • Unaware of injury • Delay in re-epithelialization
Motor Neuropathy	• Claw deformities transfer pressure to plantar metatarsal heads • Increase pressure on bony prominence causes ulcer on plantar surface
Autonomic Neuropathy	• Skin becomes dry and susceptible to fissures and skin tears • Increased risk of infection due to loss of sweat glad function

Wound Source. (2010). Neuropathic Ulcers and wound care: Symptoms, causes and treatments. Retrieved from https://www.woundsource.com/print/blog/neuropathic-ulcers-and-wound-care-symptoms-causes-and-treatments

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
Impaired epidermal barrier
Decreased macrophage function
Diminishes granulation tissue
Decreased migration of keratinocytes and fibroblasts
Decreased epidermal nerves
Decreased bone healing ….

UMC HEALTH SYSTEM

Comorbid Illness: Diabetes

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

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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 becomes necrotic and liquified forming blister
blister in center of the callus grows outward until ulcer surfaces
DFU is formed with central moist blister and surrounding callus

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Comorbid Illness: Diabetes

WI-FI

Wound (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 76% 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

UMC HEALTH SYSTEM

Richie, D. (2012). Why are we missing the boat when offloading diabetic foot ulcers? Podiatry Today. Retrieved from https://www.podiatrytoday.com/blogged/why-are-we-missing-boat-when-offloading-diabetic-foot-ulcers

Comorbid Illness: Diabetes

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

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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

UMC HEALTH SYSTEM

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

Slone-Rivera, N. & Wu, S.C. (2012). A guide to compression dressings for venous ulcers. Podiatry Today. Retrieved from https://www.podiatrytoday.com/guide-compression-dressings-venous-ulcers

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 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

UMC HEALTH SYSTEM

Ackermann, P. W. & Hart, D. A. (2013). Influence of comorbidities: neuropathy, vasculopathy, and diabetes on helaing response quality. *Advances in Wound Care, 2*(8): pp 410-421.

Comorbid Illness: Venous disease

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!

UMC HEALTH SYSTEM

Comorbid Illness: Venous disease

Compression Levels

Pressure	mmHg (range)
Very light	7-15
Low	16-20
Moderate	20-30
High	30+

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

UMC HEALTH SYSTEM

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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

Slone-Rivera, N. & Wu, S.C. (2012). A guide to compression dressings for venous ulcers. Podiatry Today. Retrieved from https://www.podiatrytoday.com/guide-compression-dressings-venous-ulcers

Comorbid Illness: Venous disease

What do you do with the wound under the compression?

- Promote healing
- Control exudate
- Enhance comfort
- Prevent adherence to the compression bandage

Hydrofiber
Acetic acid
Silver dressings
Calcium alginate

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

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Comorbid Illness: Venous disease

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)

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

Comorbid Illness: Venous disease

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: Venous disease

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

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.

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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

BC Cancer Agency. (2015). Symptom Management Guidelines: Care of malignant wounds. Retrieved from http://www.bccancer.bc.ca/nursing-site/documents/10.%20malignant%20wounds.pdf

Comorbid Illness: Malignancy

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

BC Cancer Agency. (2015). Symptom Management Guidelines: Care of malignant wounds. Retrieved from http://www.bccancer.bc.ca/nursing-site/documents/10.%20malignant%20wounds.pdf

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

BC Cancer Agency. (2015). Symptom Management Guidelines: Care of malignant wounds. Retrieved from http://www.bccancer.bc.ca/nursing-site/documents/10.%20malignant%20wounds.pdf

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

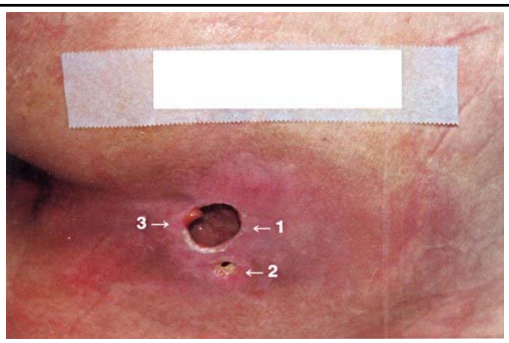
Dressing selection

- 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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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