R05: Assessment & Treatment of Lower Extremity Ulcers

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Lower Extremity Wounds

- Arterial Insufficiency
- Venous Insufficiency
- Peripheral Neuropathy/Diabetic

Arterial Insufficiency
Arterial Insufficiency

• Atherosclerosis is the most common cause of lower extremity arterial disease
• Diabetes
• Tobacco Products
• Hyperlipidemia
• Advanced Age
• Obesity
• A Family History of Cardiovascular Disease

Arterial Insufficiency

• Anemia
• Arthritis
• CVA
• Intermittent Claudication
• Traumatic Injury to Extremity
• Vascular Procedures/Surgeries
• Hypertension
• Arterial Disease

Arterial Insufficiency

• Characteristics of Arterial Insufficiency:\n  • Extremity becomes pale/pallor with elevation and has dependent rubor
Arterial Insufficiency

- Characteristics of Arterial Insufficiency¹:
  - Atrophy of skin, subcutaneous tissue and muscle
  - Shiny, taut, thin, dry skin
  - Hair loss
  - Dystrophic nails

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Arterial Insufficiency

- Characteristics of Arterial Insufficiency¹:
  - Increased pain with activity and/or elevation (intermittent claudication, resting, nocturnal and positional)

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Arterial Insufficiency

- Characteristics of Arterial Insufficiency¹:
  - Purpura
Arterial Insufficiency

Characteristics of Arterial Insufficiency:

- Perfusion
  - Skin Temperature:
    - Cold/decreased
  - Capillary Refill
    - Delayed – more than 3 seconds
  - Peripheral Pulses
    - Absent or Diminished

Arterial Insufficiency Tests

Testing for Arterial Insufficiency:

- Ankle Brachial Index (ABI)
  - ≤ 0.9: Arterial Insufficiency
  - ≤ 0.6 to 0.8: Borderline Perfusion
  - ≤ 0.5: Severe Ischemia
  - ≤ 0.4: Critical Ischemia, Limb Threatened

- Systolic Toe Pressure
  - TP < 30 mmHg

- Transcutaneous Oxygen Pressure Measurements (TcPO2)
  - TcPO2 < 30 mm Hg
Arterial Insufficiency Ulcers

- Location of Arterial Ulcers
- Toe tips and/or web spaces
- Phalangeal heads
- Over lateral malleolus
- Areas exposed to pressure or repetitive trauma (shoe, cast, brace, etc.)
- Mid-tibia (shin)

Arterial Insufficiency Ulcers

- Typical Wound Appearance
  - “Punched out” appearance
  - Dry, pale or necrotic wound base
  - Minimal or absent granulation tissue
  - Wound size usually small & may be deep
  - Minimal exudate
  - Gangrene (wet or dry), necrosis common
  - Localized edema (may indicate infection)

Arterial Insufficiency Ulcers

- Possible complications
  - Cellulitis
  - Gangrene
  - Osteomyelitis
**Arterial Insufficiency**

- **Management of arterial wounds**
  - Revascularization if possible
  - **Dry, stable** black eschar should not be debrided: KEEP DRY
  - Consider “painting” dry stable eschar with povidone iodine – ONLY on stable arterial eschar, no other wounds
  - **Dry INFECTED** wound: Immediate referral for surgical debridement/aggressive antibiotic therapy (Topical antibiotics are typically in-effective for arterial wounds)

- **Topical Therapy**
  - **Open Wounds**
    - Moist wound healing, for dry open wound beds
    - Non-occlusive dressings (e.g. hydrogel)
    - Aggressive treatment of any infection

- **Pain Management**
  - Neutral or dependent position for legs may relieve pain
  - Walking 30-60 minutes 3x/week of sufficient intensity to bring on claudication and then followed by rest
  - Pain medication as indicated
  - Consider Spinal Cord Stimulation (SCS) for patients in intractable pain
  - For some cases of intractable pain, referral for surgical evaluation maybe indicated.
Arterial Insufficiency

**Nutrition**

- A small study indicated that L-Arginine (vasodilator properties) oral intake of 6.6 g/day for 2 weeks improved symptoms of intermittent claudication
- However, the effectiveness of nutritional supplementation with L-Arginine has not been well established.

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Arterial Insufficiency

**Nutrition**

- Aggressive management of diabetes
- Control hyperlipidemia
- Hydration

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Arterial Insufficiency

**Nutrition**

- Provide nutritional support with 2,000 or more calories 11 days preoperatively and postoperatively, if possible
Arterial Insufficiency

- **Adjunctive Therapies**
  - Hyperbaric oxygen therapy (HBOT)
  - Intermittent Pneumatic Compression with resident seated and legs in neutral position 3-4x/day for 45-60 minutes
  - High-voltage pulsed current (HVPC) electrotherapy
  - Low frequency ultrasound

- **Patient Education & Risk Reduction Strategies**
  - Smoking/tobacco cessation
  - Manage diabetes – glucose control hemoglobin A1c < 7%
  - Control hyperlipidemia
  - Control hypertension
  - Adherence to medication regimen
  - Increased physical activity

- **Patient Education & Risk Reduction Strategies**
  - Avoid chemical, thermal and mechanical trauma to lower extremities and feet
    - Do not expose to extremes of temperature (hot soaks, heating pads)
    - Do not use aggressive tapes/adhesives or medicated corn pads
    - No moisture between toes
    - Avoid friction and constrictive clothing
    - Do not go bare foot
    - Do not cross legs
Arterial Insufficiency

- Patient Education & Risk Reduction Strategies³
  - Perform proper foot care
  - Examine feet daily for blisters, wounds and skin/nail changes. Report any findings immediately
  - Professional care for toenails, corns and calluses
  - Proper fitting footwear and wear socks or stockings with shoes
  - Use heel lift devices if immobile
  - Use neutral or dependent position for legs
  - Maintain adequate nutrition
  - Visit healthcare provider on a regular basis

Venous Insufficiency

- History
  - Previous DVT & Varicosities
  - Reduced Mobility
  - Obesity
  - Vascular Ulcers
  - Phlebitis
  - Traumatic Injury
  - CHF
  - Orthopedic Procedures
  - Pain Reduced by Elevation
  - History of Cellulitis
Venous Insufficiency

- Lower Leg characteristics
  - Edema
    Pitting or non-pitting

Venous Insufficiency

- Lower Leg characteristics
  - Venous Dermatitis (erythema, scaling, edema and weeping)

Venous Insufficiency

- Lower Leg characteristics
  - Hemosiderin Staining
    Brown staining (hyperpigmentation)
Venous Insufficiency

- Lower Leg characteristics
  - Active Cellulitis

Venous Insufficiency

- Characteristics of Venous Insufficiency
  - Pain
    - Minimal unless infected or desiccated
  - Peripheral Pulses
    - Present/palpable
  - Capillary Refill
    - Normal-less than 3 seconds

Venous Insufficiency Ulcers

- Location of Venous Ulcer
  - Medial aspect of the lower leg and ankle
  - Superior to medial malleolus
Venous Insufficiency Ulcers

- Typical Wound Appearance\(^3\)
  - Wound edges: irregular
  - Wound bed: ruddy red, yellow adherent of loose slough, granulation tissue, undermining or tunneling are uncommon, wounds are shallow
  - Amount of exudate: mild, moderate to heavy
  - Peri-wound skin: macerated, crusty, scaling, hyper-pigmented

Venous Insufficiency

- Treatment of Venous Insufficiency\(^3\)
  - Elevation of legs – above the heart at least 30 minutes, 3-4x/day
  - Compression therapy to provide at least 30mm Hg compression at the ankle
  - T.E.D. hose or anti-embolism stockings and Ace wraps are not effective compression
Venous Insufficiency

**Before Treating Venous Insufficiency**
Recommend to get a Baseline ABI\(^3\)
- If ABI is >.8 use compression at ankle at 30-40 mm/HG or 20-30 mm/HG depending severity
- If ABI is .8 to .6 use reduced compression up to 23mm/HG
- If ABI is .5, resident has a DVT or exacerbated CHF compression is contraindicated

**Venous Insufficiency**

**Treatment of Venous Insufficiency**\(^3\)
- Compression wraps to get edema under control or while wounds are healing:
  - Inelastic bandages or short stretch wraps require ambulation – Unna boots
  - Elastic bandages or long stretch wraps are not dependent upon ambulation
  - In severe cases compression pumps
  - Manufactures instructions must be followed when applying

**Examples of elastic bandages/long stretch**

- Single Layer
- 2 Layer
- 4 Layer

Farrow Wrap

FOLLOW MANUFACTURE’ S INSTRUCTIONS
Venous Insufficiency

- Rated compression stockings once edema is under control and ulcers healed
  - Need to be fitted
  - Monitor for loss of elasticity and fit, change 3-6 months

Venous Insufficiency

- Topical Therapy – Venous Dermatitis
  - Avoid the use of known skin irritants and allergens in residents with dermatitis
    - Use emollients such as petroleum to counteract dryness and scaliness
    - Avoid the use of tapes and adhesives on the skin
    - Use topical corticosteroid ointment to reduce inflammation and itching for no longer than 2 weeks
    - Venous dermatitis often are treated unsuccessfully as cellulitis

Venous Insufficiency

- Topical Therapy – Venous Dermatitis
  - Avoid products with the following ingredients or do a patch test to an area to rule out allergy
    - Lanolin
    - Topical antibiotics
    - Balsam of Peru
    - Bacitracin
    - Corticosteroid ointments
    - Neomycin sulfate
    - Chloramphenicol
    - Nickel sulfate
    - Silver nitrate
    - Propylene glycol
    - Certain hydrocolloid formulations
    - Parabens
    - Benzalkonium chloride
    - Povidone iodine
    - Colophony
    - Rubber-related allergens
    - Ester gum resin
    - Fragrance mix
Venous Insufficiency

- **Topical Therapy**
  - Protect peri-wound from maceration with barrier ointment
  - Apply a contact layer to the wound base before applying dressing to prevent from sticking
  - Debridement of black eschar (rule out arterial insufficiency first)
  - Utilize dressings to control exudate without desiccating the wound bed (i.e., foam, calcium alginate, polymers)
  - Then apply appropriate compression therapy
  - Monitor closely for infection/cellulitis

- **Nutrition**
  - Referral to Dietary to ensure adequate protein and calories for healing

- **Pain Management**
  - Provide adequate pain medication before dressing changes and scheduled as appropriate
  - Utilize contact layer dressings to wound base to prevent the dressing from sticking
Venous Insufficiency

• Medications
  - Pentoxifylline (Trental) 400mg 3x/day in conjunction with compression therapy has been shown to be effective in healing
  - DO NOT use diuretics to control edema secondary to venous insufficiency, it will lead to dehydration

Venous Insufficiency

• Patient Education & Risk Reduction Strategies
  - Commit to lifelong compression therapy
    • Apply upon rising in the morning
    • Replace stockings/wraps every 3-6 months
    • Avoid wearing high heals
  - Smoking/tobacco cessation
  - Healthy weight management & nutrition
  - Avoid trauma to legs
  - Avoid crossing legs & standing for prolonged periods of time

Venous Insufficiency

• Patient Education & Risk Reduction Strategies
  - Exercise
    • Elevate legs above the heart for 30 minutes, 3-4x/day
    • Perform ankle flexion 5-10 times every few minutes for 1-2 minutes every 30 minutes
    • Perform brisk walking
    • Perform planter flexion, tip-toe exercises, and walk on incline treadmill
    • Sit and rock in a rocker chair, using feet to push down to planter flex the ankles
Peripheral Neuropathy/Diabetic

History*
- Diabetes
- Spinal cord injury
- Hypertension
- Smoking
- Alcoholism
- Hansen's Disease
- Trauma to lower extremity
- Family history

*Please note that there are over 100 known causes

Characteristics of Peripheral Neuropathy
- Relief of pain with ambulation
- Parasthesia of extremities
- Altered gait
- Orthopedic deformities
- Reflexes diminished
- Altered sensation (numbness, pricking, tingling, burning sensation)
Peripheral Neuropathy/Diabetic

- Characteristics of Peripheral Neuropathy
  - Intolerance to touch (e.g., bed sheets touching legs)
  - Presence of calluses
  - Fissures/cracks, especially the heels

Peripheral Neuropathy/Diabetic

- Assessing for Peripheral Neuropathy
  - Light pressure using a Semmes-Weinstein Monofilament Exam
  - Vibratory sense using a tuning fork
  - Deep tendon reflexes of ankle and knee

Peripheral Neuropathy/Diabetic

- Assessing for Peripheral Neuropathy
  - Assess for arterial Insufficiency as it commonly co-exists with peripheral Neuropathy
  - Assess feet for:
    - Reduced skin temperature
    - Capillary refill of greater than 3 seconds
    - Limb color changes (pallor on elevation and dependent rubor)
    - Diminished or absence of pedal pulses
  - Recommend an ABI
Peripheral Neuropathy/Diabetic

- Location of Peripheral Neuropathy Ulcers
  - Plantar aspect of the foot
  - Metatarsal heads
  - Heels
  - Altered pressure points
  - Sites of painless trauma and/or repetitive stress

Peripheral Neuropathy/Diabetic

- Characteristics of Peripheral Neuropathy Ulcers
  - Deep
  - Painless
  - Even wound margins
  - Callus surrounding the ulcer
  - Granular tissue unless arterial insufficiency

Peripheral Neuropathy/Diabetic

- Complications of peripheral neuropathy
  - Cellulitis
  - Gangrene
  - Osteomyelitis
Peripheral Neuropathy/Diabetic

- Complications of peripheral neuropathy
  - Charcot fracture
  - Edema
  - Erythema
  - Increased temperature
  - X-ray confirming fractures and dislocations

Peripheral Neuropathy/Diabetic

- Treatment/Management of Peripheral Neuropathy
  - Pressure relief for heal ulcers
  - “Offloading” for plantar ulcers (bedrest, contact casting, or orthopedic shoes)
  - Appropriate footwear at all times
Peripheral Neuropathy/Diabetic

Treatment/Management of Peripheral Neuropathy

- Topical Treatment
  - Maintain dry stable eschar on non-infected, ischemic, neuropathic ulcers
  - Debridement of neuropathic wounds and calluses, by a trained professional
  - Cautious use of occlusive dressings (transparent films or hydrocolloids)
  - Dressings to absorb exudate
  - Dressings to keep dry wound moist

- Chronic or non-responding wounds
  - Growth factors
  - Skin equivalents
  - Negative Pressure Wound Therapy (NPWT)
  - Hyperbaric Oxygen
  - Nitric oxide and monochromatic infrared photo energy (MIRE)

- Aggressive infection control
  - Immediate Referral for:
    - Cellulitis
    - Osteomyelitis
    - Atypical ulcers
    - New onset or diagnosis of Charcot
Peripheral Neuropathy/Diabetic

- **Nutrition**
  - Dietary referral
  - Appropriate calories and protein for wound healing

- **Control**
  - Serum glucose
  - Hyperlipidemia
  - Hypertension

- **Consider**
  - Multivitamins
  - L-Arginine

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Peripheral Neuropathy/Diabetic

- **Exercise**
  - Regular exercise program
  - Exercise must be conducted with caution due to the insensate lower extremity
  - Institute non-weight bearing exercises such as swimming, water aerobics, bicycling, rowing and upper body exercises
  - Wear well fitting shoes and socks
  - Recommend daily range of motion to avoid loss of muscle strength and flexibility

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Peripheral Neuropathy/Diabetic

Activity is good for diabetics, if stomping on a chocolate cake makes you feel better, that’s fine.
Peripheral Neuropathy/Diabetic

**Pain Management**
- Referral to resources for pain management such as:
  - Pain clinics
  - Neurologists
  - E-stim for chronic pain

**Patient Education & Risk Reduction Strategies**
- Inspect feet daily and after removal of foot wear
- Smoking/tobacco cessation
- Weight loss
- Adequate blood pressure control
- Limit alcohol to 1-2 drinks/day
- Maintain blood glucose levels of < 7%
- Refer to and follow the recommendations listed under arterial insufficiency, as well

Mixed Etiology
Mixed Etiology

- **Management of Mixed Etiology**\(^1,2,3\)
  - Use reduced compression bandages of 23-30 mm Hg at the ankle. Compression therapy should not be used in patients with ABI < 0.5
  - Keep extremities in neutral position
  - Protect from trauma & appropriate footwear at all times
  - Referral as appropriate

Lower Extremity Wounds

- **Documentation Tips**
  - Assess wound weekly, noting location, type, size, wound base, wound edges, drainage, odor and pain
  - Do not stage lower extremity ulcers:
    - Partial: involves the skin only
    - Full thickness: deeper than the skin
  - Ensure care plan has appropriate goals
  - Physician diagnosis and prognosis

Resources

**Available Resources and Web Sites:**
- [www.wocn.org](http://www.wocn.org) (Wound, Ostomy & Continence Nurse Society)
- [www.ahrq.gov](http://www.ahrq.gov) (Agency for Health Care Research and Quality, formally AHCPR)
- [www.aawm.org](http://www.aawm.org) (American Academy of Wound Management)
- [www.npup.org](http://www.npup.org) (National Pressure Ulcer Advisory Panel)
- [www.woundsource.com](http://www.woundsource.com) (Great source to find wound care products)
References


QUESTIONS?
Thanks for your participation!!!
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