

R05: Assessment & Treatment of Lower Extremity Ulcers

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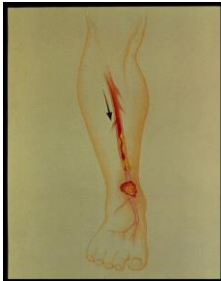


Lower Extremity Wounds

- Arterial Insufficiency
- Venous Insufficiency
- Peripheral Neuropathy/Diabetic



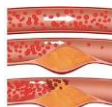
Arterial Insufficiency



Arterial Insufficiency

History

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



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Arterial Insufficiency

History continued

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



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Arterial Insufficiency

Characteristics of Arterial Insufficiency¹:

- Extremity becomes pale/pallor with elevation and has dependent rubor



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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



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Arterial Insufficiency

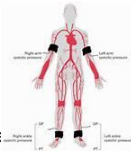
- Characteristics of Arterial Insufficiency¹:
 - Perfusion
 - Skin Temperature:
 - Cold/decreased
 - Capillary Refill
 - Delayed – more than 3 seconds
 - Peripheral Pulses
 - Absent or Diminished



Arterial Insufficiency Tests

Testing for Arterial Insufficiency¹:

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



Arterial Insufficiency Tests

Testing for Arterial Insufficiency¹:

- Systolic Toe Pressure
 - TP < 30mmHg
- Transcutaneous Oxygen Pressure Measurements (TcPO₂)
 - TcPO₂ < 30 mm Hg



Arterial Insufficiency Ulcers

Location of Arterial Ulcers¹

- 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)



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Arterial Insufficiency Ulcers

Typical Wound Appearance¹

- "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)



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Arterial Insufficiency Ulcers

Possible complications¹

Cellulitis



Gangrene



Osteomyelitis



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Arterial Insufficiency

- **Management of arterial wounds¹**
 - 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)



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Arterial Insufficiency

- **Topical Therapy¹**
 - **Open Wounds**
 - Moist wound healing, for dry open wound beds
 - Non-occlusive dressings (e.g. hydrogel)
 - Aggressive treatment of any infection



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Arterial Insufficiency

- **Pain Management¹**
 - 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.



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Arterial Insufficiency

Nutrition¹

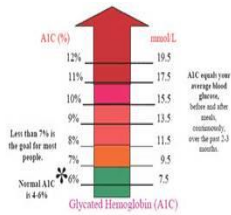
- A small study indicated that **L-Arginine** (vasodilator properties) oral intake of 6.6 g/day for 2 weeks improved symptoms of intermittent claudication
- However the effectiveness of nutritional supplementation with L-Arginine has not been well established.



Arterial Insufficiency

Nutrition¹

- Aggressive management of diabetes
- Control hyperlipidemia
- Hydration



Arterial Insufficiency

Nutrition¹

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



Arterial Insufficiency

Adjunctive Therapies¹

- 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



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Arterial Insufficiency

Patient Education & Risk Reduction Strategies¹

- Smoking/tobacco cessation
- Manage diabetes – glucose control hemoglobin A1c < 7%
- Control hyperlipidemia
- Control hypertension
- Adherence to medication regimen
- Increased physical activity



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Arterial Insufficiency

Patient Education & Risk Reduction Strategies¹

- 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



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Arterial Insufficiency

▪ Patient Education & Risk Reduction Strategies¹

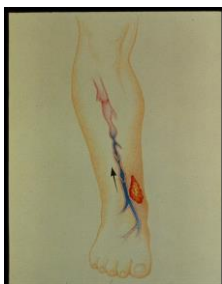
- Perform proper foot care
- Examine feet daily for blisters, wounds and skin/nail changes. Report any findings immediately
- Professional care for toenails, corns and calluses
- Proper fitting footwear and wear socks or stockings with shoes
- Use heel lift devices if immobile
- Use neutral or dependent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



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Venous Insufficiency



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Venous Insufficiency

▪ History

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



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Venous Insufficiency

- Lower Leg characteristics³
 - Edema
 - Pitting or non-pitting



Venous Insufficiency

- Lower Leg characteristics³
 - Venous Dermatitis (erythema, scaling, edema and weeping)



Venous Insufficiency

- Lower Leg characteristics³
 - Hemosiderin Staining
 - Brown staining (hyperpigmentation)



Venous Insufficiency

- Lower Leg characteristics³
 - Active Cellulitis



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Venous Insufficiency

- Characteristics of Venous Insufficiency³
 - Pain
 - Minimal unless infected or desiccated
 - Peripheral Pulses
 - Present/palpable
 - Capillary Refill
 - Normal-less than 3 seconds



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Venous Insufficiency Ulcers

- Location of Venous Ulcer³
 - Medial aspect of the lower leg and ankle
 - Superior to medial malleolus



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Venous Insufficiency Ulcers

• Typical Wound Appearance³

- Wound edges: irregular
- Wound bed: ruddy red, yellow adherent or 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



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Venous Insufficiency



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Venous Insufficiency

▪ Treatment of Venous Insufficiency³

- 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



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Venous Insufficiency

- **Before Treating Venous Insufficiency Recommend to get a Baseline ABI³**
 - 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 Insufficiency³**
 - **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



Venous Insufficiency

- **Treatment of Venous Insufficiency³**
 - **Examples of elastic bandages/long stretch**

<p>Single Layer</p> 	<p>2 Layer</p>  <p>Farrow Wrap</p> 	<p>4 Layer</p> 
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FOLLOW MANUFACTURE'S INSTRUCTIONS



Venous Insufficiency

- **Rated compression stockings once edema is under control and ulcers healed³**

- Need to be fitted
- Monitor for loss of elasticity and fit, change 3-6 months



Venous Insufficiency

- **Topical Therapy – Venous Dermatitis³**
 - **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

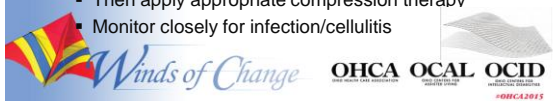
- **Topical Therapy – Venous Dermatitis³**
 - **Avoid products with the following ingredients or do a patch test to an area to rule out allergy**

- | | |
|---|--|
| <ul style="list-style-type: none"> • Lanolin • Topical antibiotics • Balsam of Peru • Bacitracin • Corticosteroid ointments • Neomycin sulfate • Chloramphenicol • Nickel sulfate • Silver nitrate • Propylene glycol | <ul style="list-style-type: none"> • Certain hydrocolloid formulations • Parabens • Benzalkonium chloride • Povidone iodine • Colophony • Rubber-related allergens • Ester gum resin • Fragrance mix |
|---|--|



Venous Insufficiency

- **Topical Therapy³**
 - 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



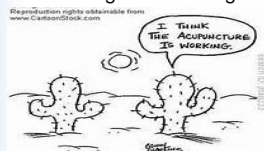
Venous Insufficiency

- **Nutrition³**
 - Referral to Dietary to ensure adequate protein and calories for healing



Venous Insufficiency

- **Pain Management³**
 - 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

• Medications³

- 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



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Venous Insufficiency

• Patient Education & Risk Reduction Strategies³

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



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Venous Insufficiency

• Patient Education & Risk Reduction Strategies³

- 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



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Peripheral Neuropathy/Diabetic



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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



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Peripheral Neuropathy/Diabetic

Characteristics of Peripheral Neuropathy²

- Relief of pain with ambulation
- Parasthesia of extremities
- Altered gait
- Orthopedic deformities
- Reflexes diminished
- Altered sensation (numbness, prickling, tingling, burning sensation)



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Peripheral Neuropathy/Diabetic

- **Characteristics of Peripheral Neuropathy²**
 - Intolerance to touch (e.g., bed sheets touching legs)
 - Presence of calluses
 - Fissures/cracks, especially the heels



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Peripheral Neuropathy/Diabetic

- **Assessing for Peripheral Neuropathy²**
 - Light pressure using a Semmes-Weinstein Monofilament Exam
 - Vibratory sense using a tuning fork
 - Deep tendon reflexes of ankle and knee



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Peripheral Neuropathy/Diabetic

- **Assessing for Peripheral Neuropathy²**
 - **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



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Peripheral Neuropathy/Diabetic

- **Location of Peripheral Neuropathy Ulcers²**
 - 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 Ulcers²**
 - Deep
 - Painless
 - Even wound margins
 - Callus surrounding the ulcer
 - Granular tissue unless arterial insufficiency



Peripheral Neuropathy/Diabetic

- **Complications of peripheral neuropathy²**
 - Cellulitis
 - Gangrene
 - Osteomyelitis



Peripheral Neuropathy/Diabetic

- Complications of peripheral neuropathy²
 - Charcot fracture
 - Edema
 - Erythema
 - Increased temperature
 - X-ray confirming fractures and dislocations



Peripheral Neuropathy/Diabetic

- Treatment/Management of Peripheral Neuropathy²
 - Pressure relief for heel ulcers
 - "Offloading" for plantar ulcers (bedrest, contact casting, or orthopedic shoes)
 - Appropriate footwear at all times



Peripheral Neuropathy/Diabetic



Peripheral Neuropathy/Diabetic

- Treatment/Management of Peripheral Neuropathy²
 - 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



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Peripheral Neuropathy/Diabetic

- Treatment/Management of Peripheral Neuropathy²
 - Chronic or non-responding wounds:
 - Growth factors
 - Skin equivalents
 - Negative Pressure Wound Therapy (NPWT)
 - Hyperbaric Oxygen
 - Nitric oxide and monochromatic infrared photo energy (MIRE)



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Peripheral Neuropathy/Diabetic

- Treatment/Management of Peripheral Neuropathy²
 - Aggressive infection control
 - Immediate Referral for:
 - Cellulitis
 - Osteomyelitis
 - Atypical ulcers
 - New onset or diagnosis of Charcot



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Peripheral Neuropathy/Diabetic

- **Nutrition²**
 - Dietary referral
 - Appropriate calories and protein for wound healing
 - Control:
 - Serum glucose
 - Hyperlipidemia
 - Hypertension
 - Consider:
 - Multivitamins
 - L-Arginine



Peripheral Neuropathy/Diabetic

- **Exercise²**
 - 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



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 Management²

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



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Peripheral Neuropathy/Diabetic

▪ Patient Education & Risk Reduction Strategies²

- 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



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Mixed Etiology



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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



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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



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Resources

Available Resources and Web Sites:

- www.wocn.org (Wound, Ostomy & Continence Nurse Society)
- www.ahrq.gov (Agency for Health Care Research and Quality, formally AHCPH)
- www.aawm.org (American Academy of Wound Management)
- www.npuap.org (National Pressure Ulcer Advisory Panel)
- www.woundsource.com (Great source to find wound care products)



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2. Wound Ostomy and Continence Nurses Society. (2012). *Guideline for Management of Wounds in Patients with Lower-Extremity Neuropathic Disease*. Glenview, IL: Wound, Ostomy, and Continence Nurses Society
3. Wound Ostomy and Continence Nurses Society. (2011). *Guideline of Wounds in Patients with Lower-Extremity Venous Disease*. Glenview, IL: Wound, Ostomy, and Continence Nurses Society



QUESTIONS?

Thanks for your participation!!!

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