



Getting a Leg Up on Your Patient's Lower Extremity Wounds

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Disclosure

- Hollister Incorporated

Objectives

- Define the phases of wound healing and at least three factors that delay the wound healing process
- Differentiate between commonly seen chronic lower extremity wounds (venous, arterial, neuropathic ulcers, and atypical wounds)
- Incorporate wound management principles in a treatment plan to optimize wound healing



Wound care at a glance



An injury causing a break in the normal anatomic structure and function of the skin



Approximately 6.5 million individuals in the U.S. are affected by chronic wounds



Annual cost to treat over \$28 billion

Acute vs Chronic Wounds

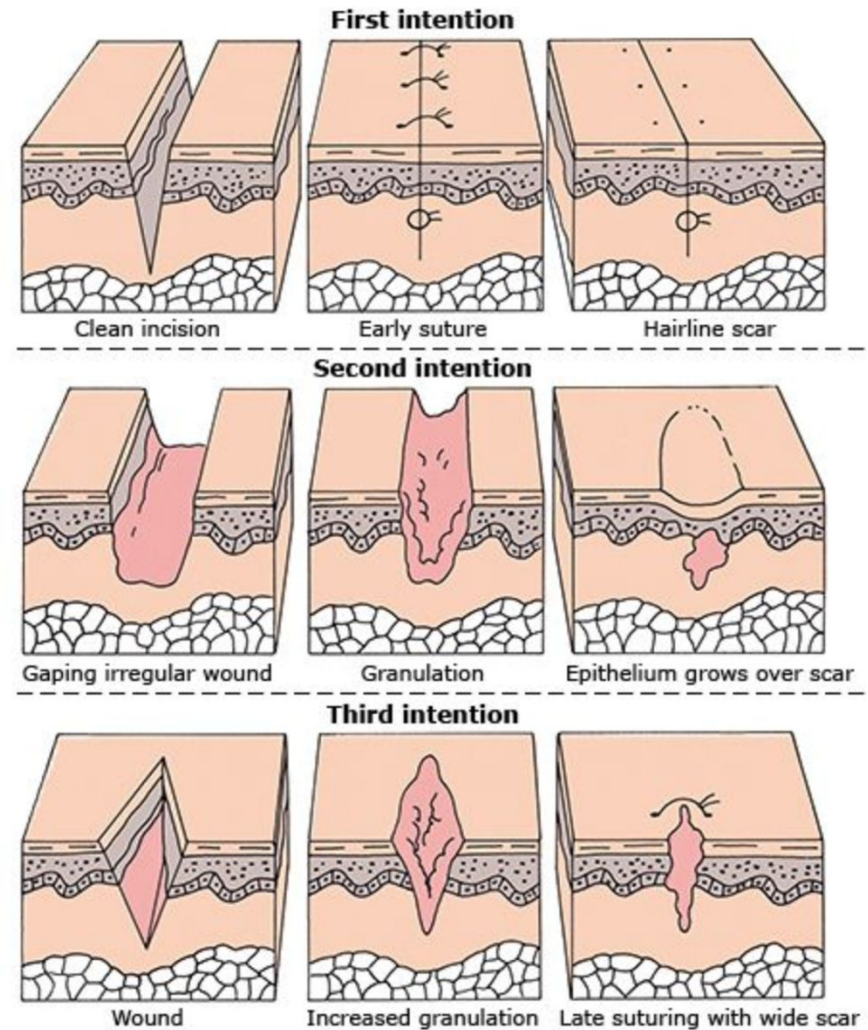


- Acute wounds heal rapidly
 - Organized and predictable manner
 - Common etiologies: surgical and trauma
- Chronic wounds fail to complete all necessary steps toward healing
 - Inflammation, vascular compromise, repetitive insults to healing tissue contribute to developing into a chronic wound
 - Common etiologies: venous ulcers, arterial ulcers, pressure injuries, malignant ulcers, and neuropathic ulcers

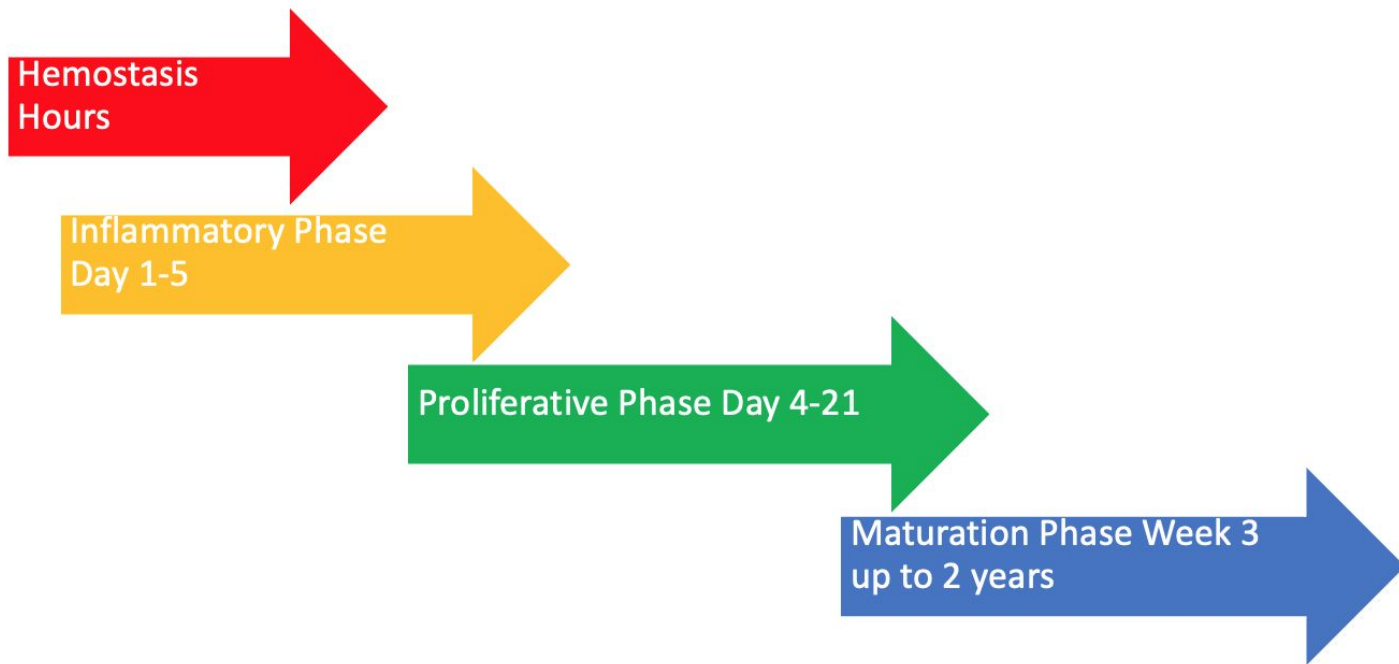
Classification of Wound Repair

- Primary
- Secondary
- Tertiary

Types of wound healing



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Stages of wound healing

- Hemostasis
- Inflammatory
- Proliferative
- Maturation

Factors that impact wound healing

- Intrinsic

- Age
- Immunosuppression
- Chronic disease
 - Peripheral vascular disease
 - COPD
 - Diabetes
 - Chronic kidney disease
 - Liver failure
- Pain

- Extrinsic

- Smoking
- Nutrition
- Immobility
- Medications

Principles of Wound Management

Correct etiologic factors

Provide systemic support

Provide an optimal wound healing environment

- Remove debris or devitalized tissue
 - Autolytic debridement
 - Ezymatic debridement
 - Biologic debridement
 - Mechanical debridement
 - Sharp debridement
- Maintain moisture balance
- Manage exudate
- Fill dead space
- Protect periwound skin
- Keep wound bed clean/free from contamination
- Manage infection
- Promote comfort & manage odor

Topical Dressing Selection

Semipermeable film dressing

- Superficial/partial thickness wounds
- Minimal to no exudate
- Minimal amount of devitalized tissue
- Can be used as a secondary dressing

Hydrocolloid dressing

- Partial thickness wounds or shallow full thickness wounds
- Minimal to moderate exudate

Foam Dressing

- Partial thickness wounds or shallow full thickness wounds; may require additional packing to fill dead space
- Light to moderate exudate

Calcium alginate/hydrofiber

- Moderate to heavy exudate
- Consider rope form to fill dead space

Topical Dressing Selection

Hydrogel dressing

- Minimal exudate
- Partial or full thickness
- Promotes comfort

Composite dressings

- Combination of 2 or more dressing materials

Gauze

- Light to heavy exudating wounds
- Fills dead space
- Mechanical debridement
- Antimicrobials
 - Come in all different categories
 - Infected or critically colonized wounds
 - High risk for infection
 - Stalled wound

Negative pressure wound therapy

- Acute, traumatic, and subacute wounds
- Grafts and flaps
- Nonhealing chronic wounds unresponsive to more conservative measures
- Promotes granulation and wound contraction
- Exudate management

Bioengineered skin substitutes

- Donates growth factors to signal wound healing

Collagen extracellular matrix

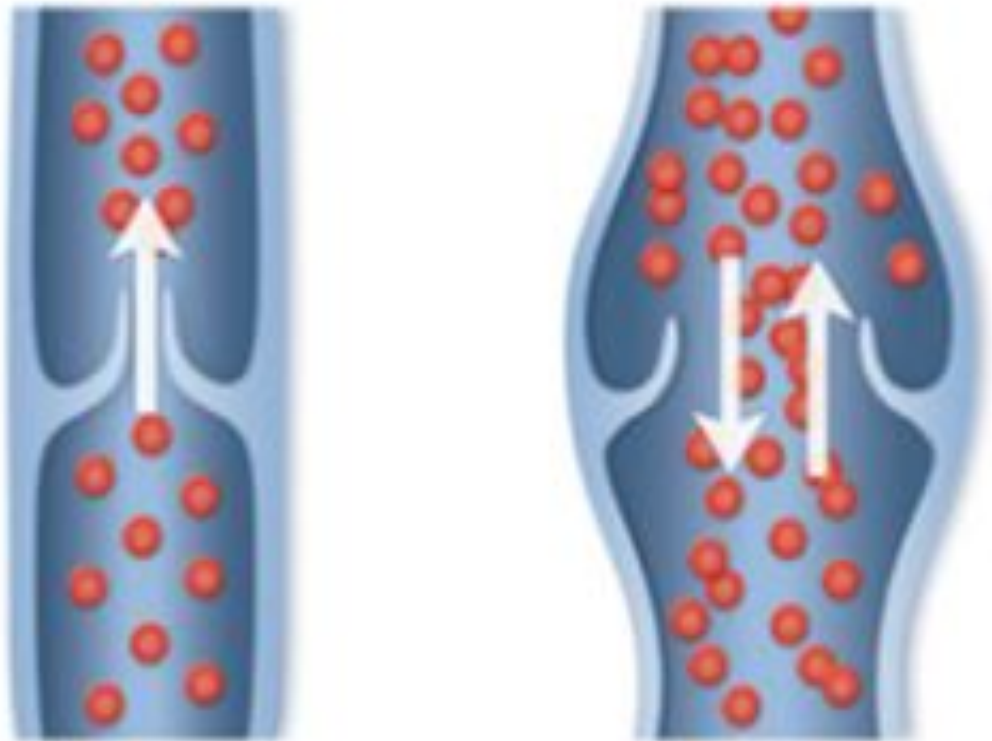
- Stimulates granulation tissue growths and balances matrix metalloproteinases (MMPs) in wound beds

Hyperbaric oxygen therapy (HBOT)

- Adjunct therapy
- Wound care indications includes: Wagner Grade 3 diabetic foot ulcer, Chronic osteomyelitis, soft tissue radiation damage

Advanced Wound Management

Venous Ulcers



Lower Extremity Venous Disease

- Impaired venous return
- Persistent high pressures within the deep venous system
 - Incompetent valves
 - Calf muscle pump dysfunction

Common triggers for Ulceration

- Cellulitis
- Trauma
- Contact Dermatitis
- Edema



Venous Ulcers

- Characteristics

- Shallow with poorly demarcated margins
- Located superior to the malleolus; may also be on the dorsum of the foot
- Heavy exudate
- Red or slough filled and may have a shiny biofilm layer
- Lower leg edema
- Surrounding maceration
- Hemosiderin staining may be present
- Palpable pulses

- Risk for Marjolin's Ulcer

- Consider biopsy if wound fails to respond to treatment



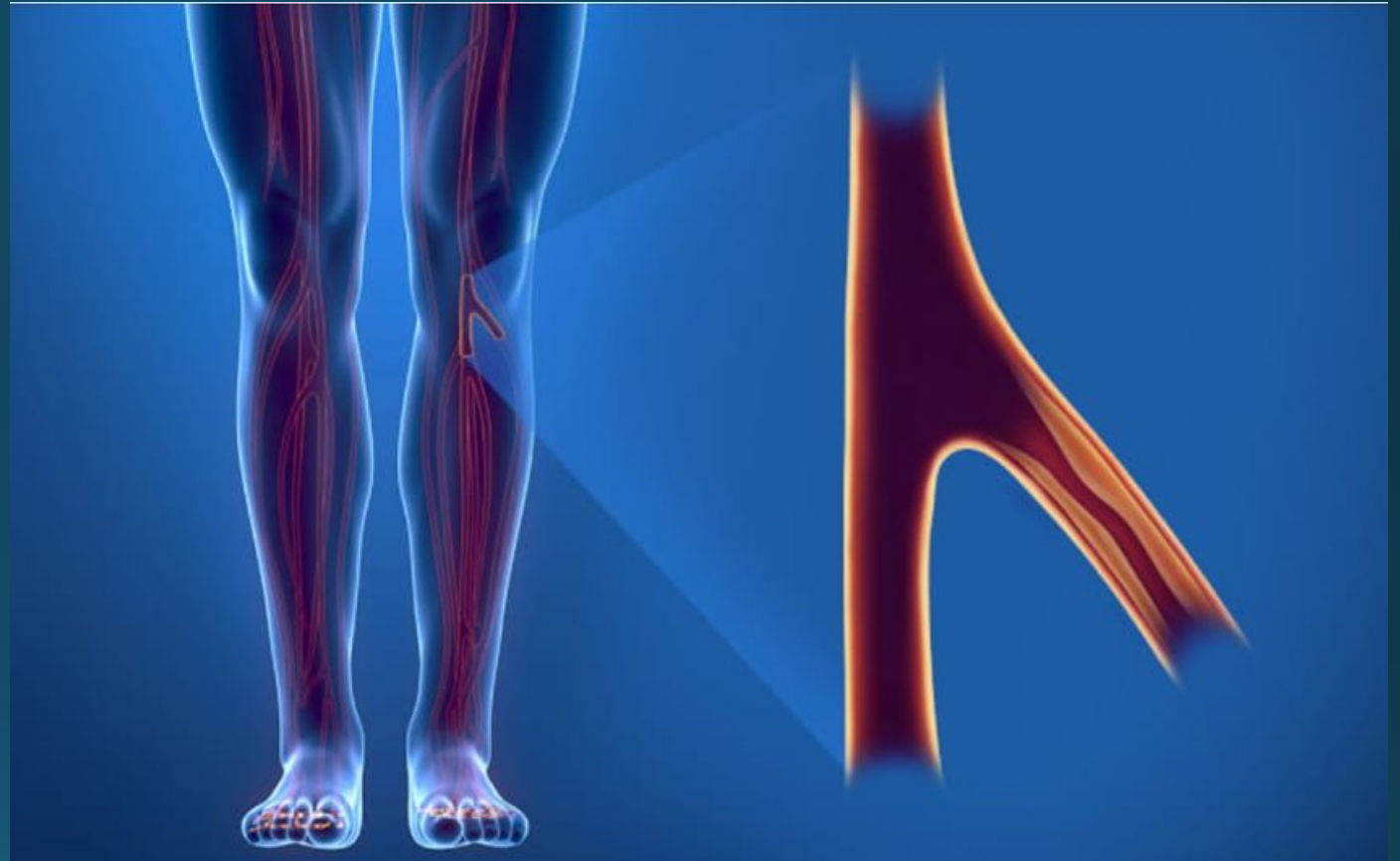
Venous Ulcers

- Diagnostic Studies
 - ABI
 - Venous Reflux
- Treatment
 - Compression
 - Contraindications to compression include uncompensated heart failure, DVT, and ABI <0.6
- Considerations for topical dressings
 - Alginate or hydrofiber for heavy exudating wounds
 - Antimicrobial for stalled wound or to reduce bioburden in wound bed
 - Consider any debridement needs
 - Protect surrounding tissue



Arterial Ulcers

- Lower Extremity Arterial Disease
 - Defined by ABI 0.9 or less
 - Often asymptomatic until late in the disease process
 - Intermittent Claudication
 - Positional and rest pain
- Risk Factors
 - Smoking Tobacco
 - Diabetes
 - Dyslipidemia
 - Hypertension
 - Age
 - Chronic Kidney Disease



American heart association (2018). Obesity may increase risk for peripheral artery disease.
<https://www.heart.org/en/news/2018/08/08/obesity-may-increase-risk-for-peripheral-artery-disease>

Arterial Ulcers

- Characteristics
 - Often located on distal foot or toes
 - Has a “Punched Out” appearance with well defined edges
 - Wound bed may be pale with no granulation tissue or have necrotic tissue
 - Minimal to no exudate
 - Painful!
 - Infection, osteomyelitis, or gangrene are possible complications



Arterial Ulcers

Diagnostic Studies

- ABI (Toe Brachial Index if noncompressible; diabetics)
- Skin Perfusion Pressure
- Pulse Volume Recording
- CT Angiography

Treatment

- Reperfusion

Considerations for Topical Therapies

- Protect from infection
- Avoid debridement in noninfected wounds until vascular status determined
 - Occlusive dressings may promote autolytic debridement and should be avoided in these cases
- Offload area

Ankle Brachial Index (ABI)

*ABI= Higher of either dorsalispedis or posterior tibial systolic pressures
Higher of the brachial systolic pressures*

ABI Value	Interpretation	Recommendation
Greater than 1.4	Calcification / Vessel Hardening	Refer to vascular specialist
1.0 - 1.4	Normal	None
0.9 - 1.0	Acceptable	
0.8 - 0.9	Some Arterial Disease	Treat risk factors
0.5 - 0.8	Moderate Arterial Disease	Refer to vascular specialist
Less than 0.5	Severe Arterial Disease	Refer to vascular specialist

Neuropathic Ulcers

- Communication between the brain/spinal cord and lower legs/feet damaged
- Most often associated with diabetes
- Other causes include:
 - Trauma
 - Infections or autoimmune disorders
 - Some Chemotherapeutic drugs
 - Alcoholism
 - Inherited disorders (Charcot-Marie-Tooth disease)
- Neuropathies
 - Sensory
 - Motor



Neuropathic Ulcers

- Characteristics
 - May be covered by callus; can initially present as blister, laceration, puncture ,or trauma
 - Between toes, over pressure points and bony deformities are most often affected areas
 - Pale pink or necrotic wound bed
 - Periwound callus common; maceration may be present
 - Drainage may vary
- University of Texas Diabetic Foot Classification System
- Wagner Classification System

Grade	Lesion
0	Intact skin
1	Superficial ulcer of skin or subcutaneous tissue
2	Ulcer extend into tendon, bone, or capsule
3	Deep ulcer with osteomyelitis or abscess
4	Gangrene of toes or forefoot
5	Midfoot or hindfoot gangrene

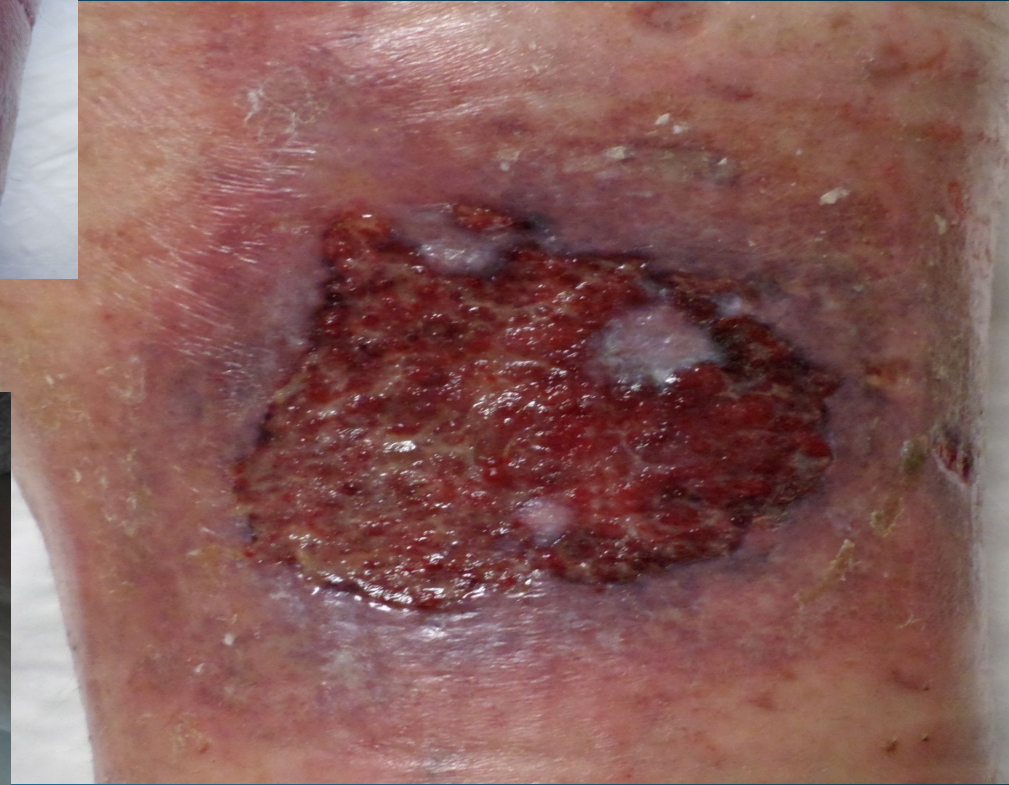
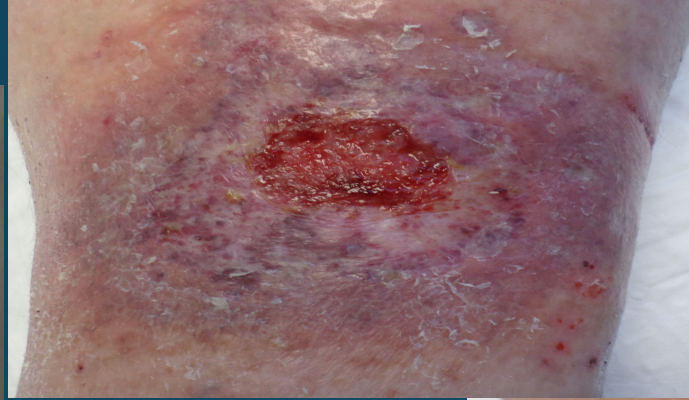
Wagner classification

Neuropathic Ulcers

- Diagnostic Studies
 - Monofilament testing
 - Vibratory Sensation
 - Check proprioception
 - Vascular status
 - Imaging; xray
- Treatment
 - Offloading
 - Total Contact Casting
 - Therapeutic Footwear
- Considerations for Topical Therapies
 - Compatible with offloading
 - Antimicrobials to manage bacterial loads
 - Allow for frequent monitoring of the wound



Atypical Wound: Pyoderma Gangrenosum



Pathogenesis

Inflammatory

Neutrophil mediated

Autoimmune

Idiopathic

Genetic factors

Pathergy

Differential Diagnosis

Venous
ulcers

Infection

Vasculitis

Malignancy

Factitial
ulcers

Necrotising
fasciitis



Diagnostics

Most of the time diagnosed by exclusion

Inflammatory markers

- CRP
- ESR
- CBC

Additional diagnostic criteria

- Painful rapidly progressing
- Presence of autoimmune diseases
- History of pathergy
- Response to systemic steroids or immunosuppression

Wound Care Management

- Provide systemic support
- Maintain physiologic local wound environment
 - Respect the margins
 - Avoid trauma to the wound bed
 - Maintain adequate moisture balance
 - Remove debris
 - Promote comfort
 - Reduce risk of infection



Thank You!



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