Training Module 4

Wound Etiology and Management

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PN: 1547885A 06/13

Upon Completion Of This Module You Will Be Able To:

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- Describe the etiology of acute wounds
- Describe the etiology of pressure ulcers, neuropathic ulcers and vascular ulcers
- Describe how to manage two causative factors of pressure ulcers, venous ulcers and neuropathic ulcers
- Describe five clinical components to include in topical wound management

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Types Of Acute Wounds

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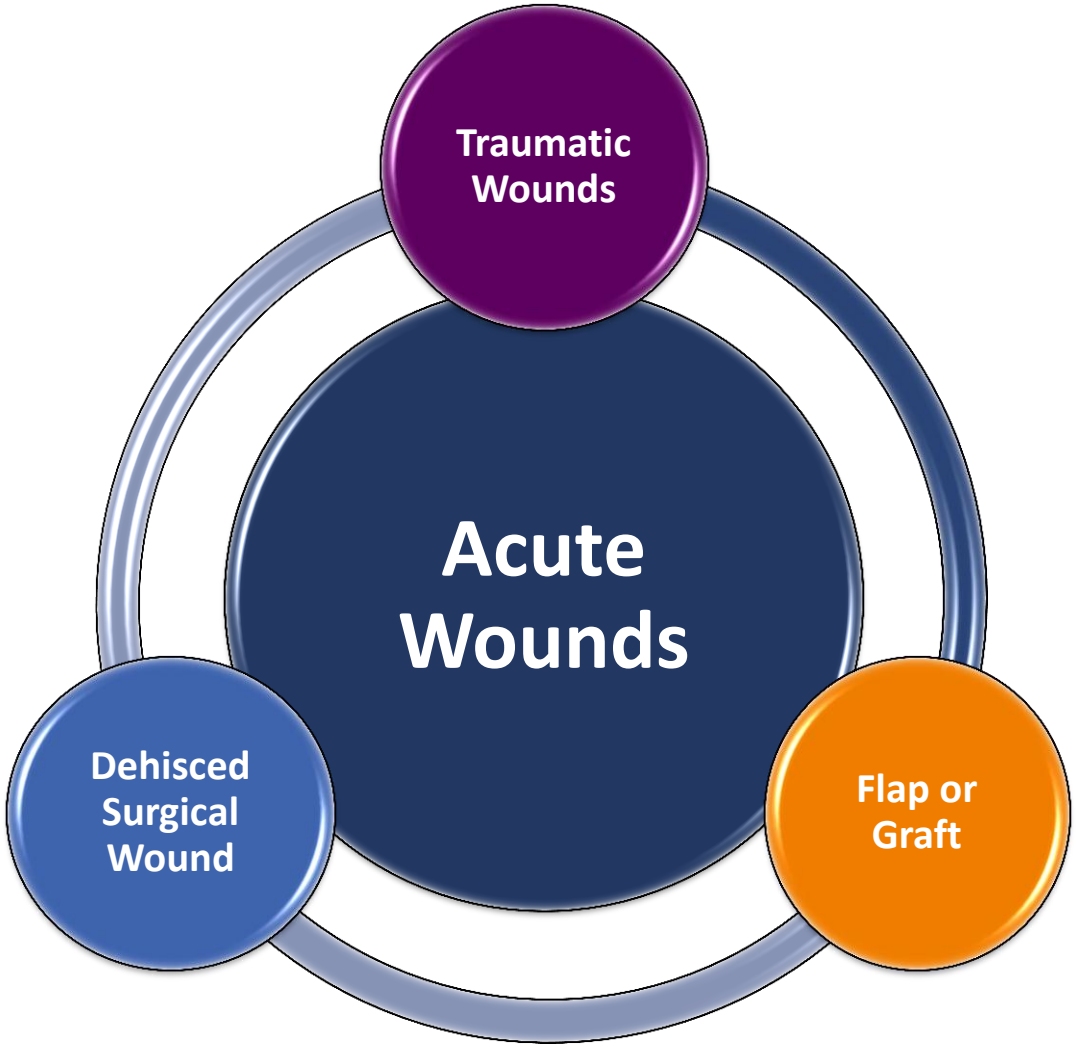

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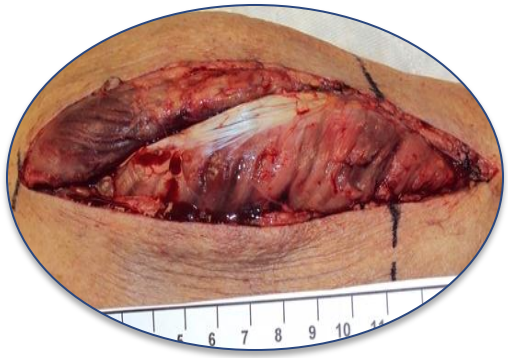
Body wound produced by sudden physical injury such as from violence or accident [1]

Partial thickness burn

Full thickness orthopedic trauma wounds

Traumatic Wounds

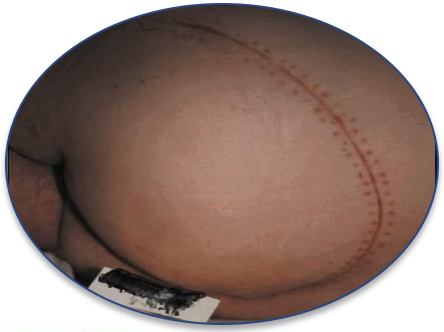


NPWT is used to prepare the wound bed prior to graft or flap or to bolster the flap or graft post operatively

Flap surgery is a technique in which any type of tissue is lifted from a donor site and moved to a recipient site with an intact blood supply. [2]

Skin grafting is a type of graft surgery involving the transplantation of skin

Flap or Graft



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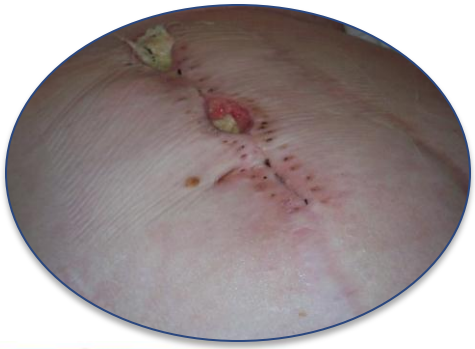
Full thickness

Wound dehiscence: the separation of a surgical incision or rupture of a wound closure [3]

NPWT is used to assist in granulation tissue formation [4]

Dehisced Surgical Wound



Types Of Chronic Wounds

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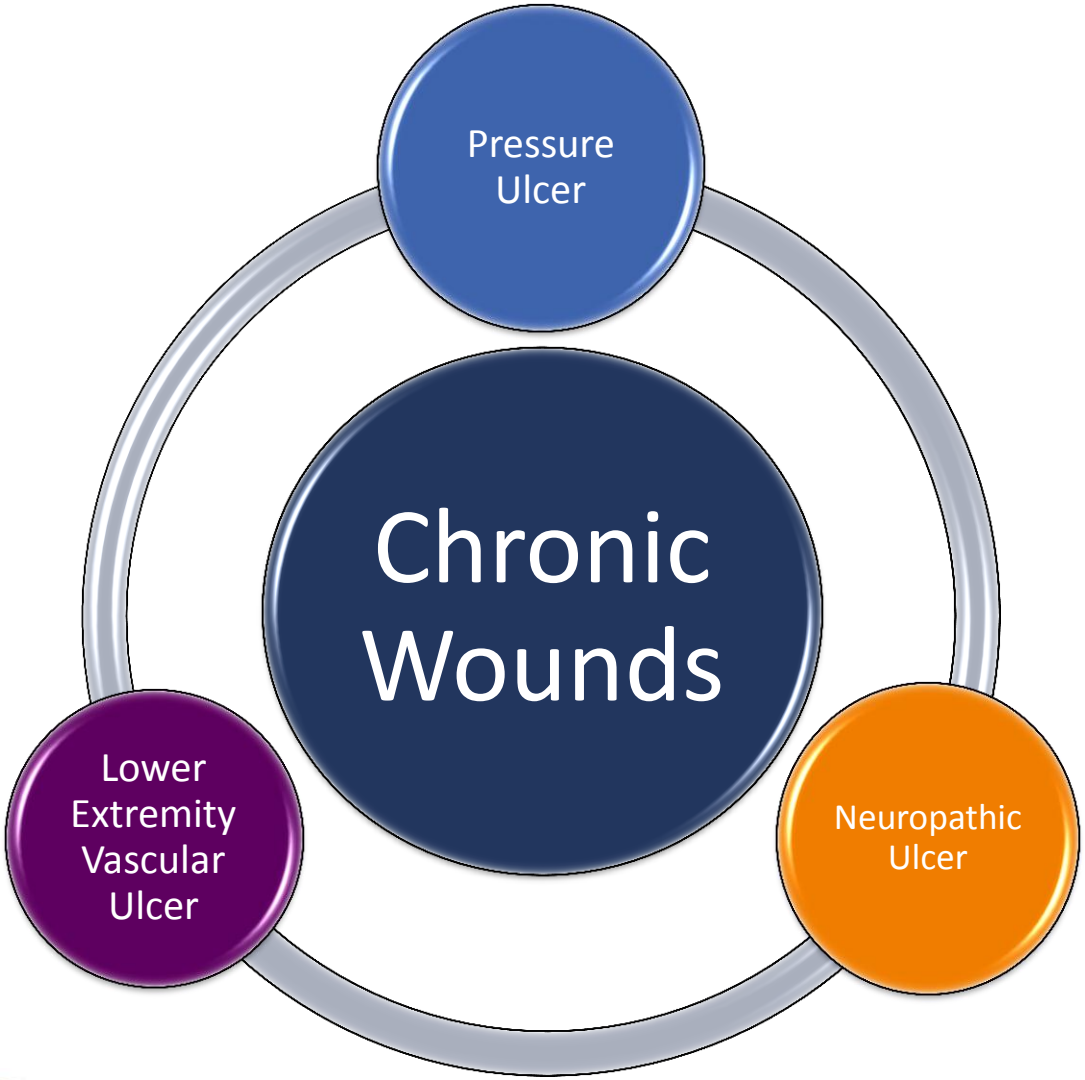

Pressure Ulcer

A pressure ulcer is localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated.[5]

The Etiology of Pressure Ulcers

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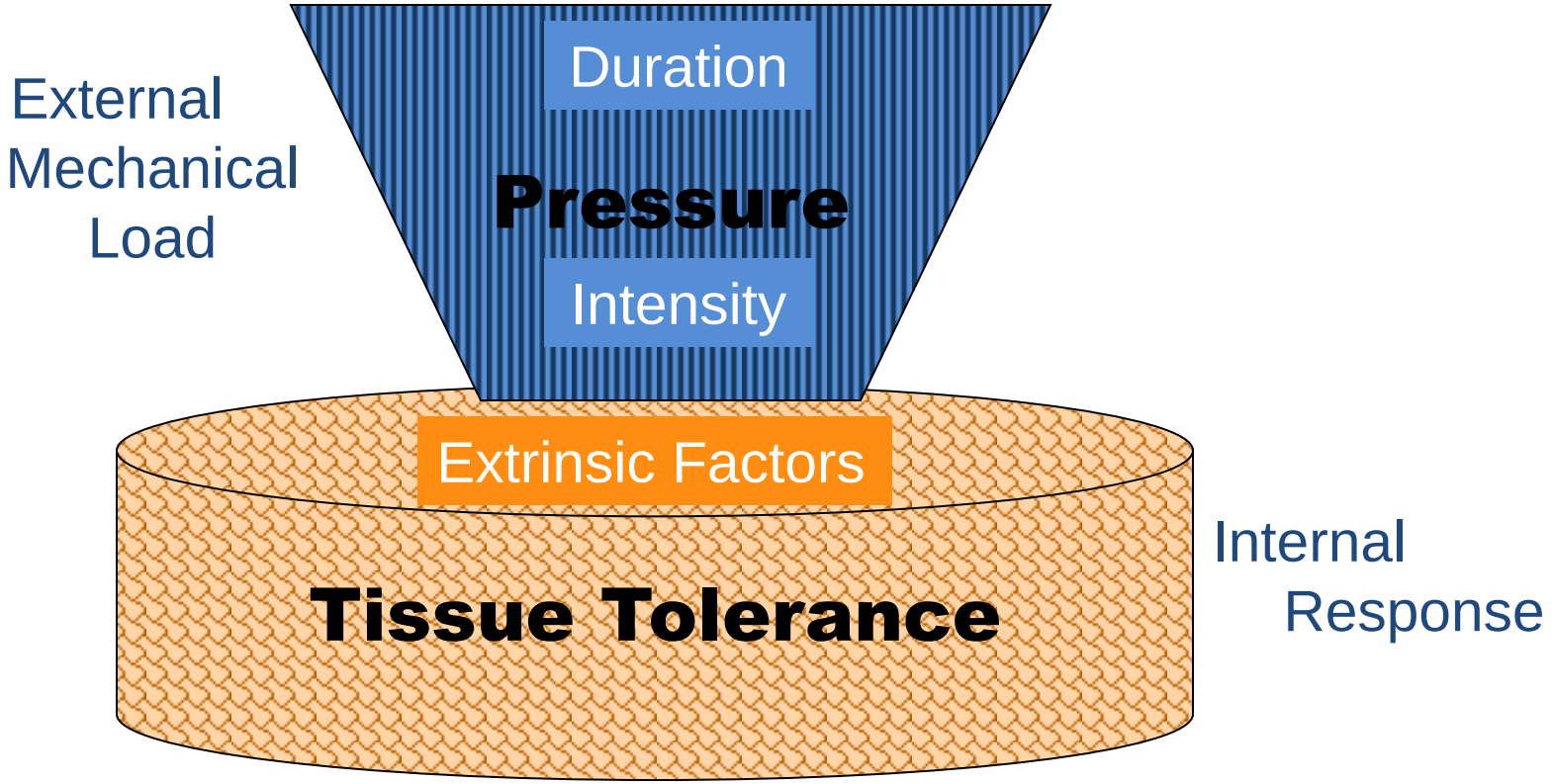
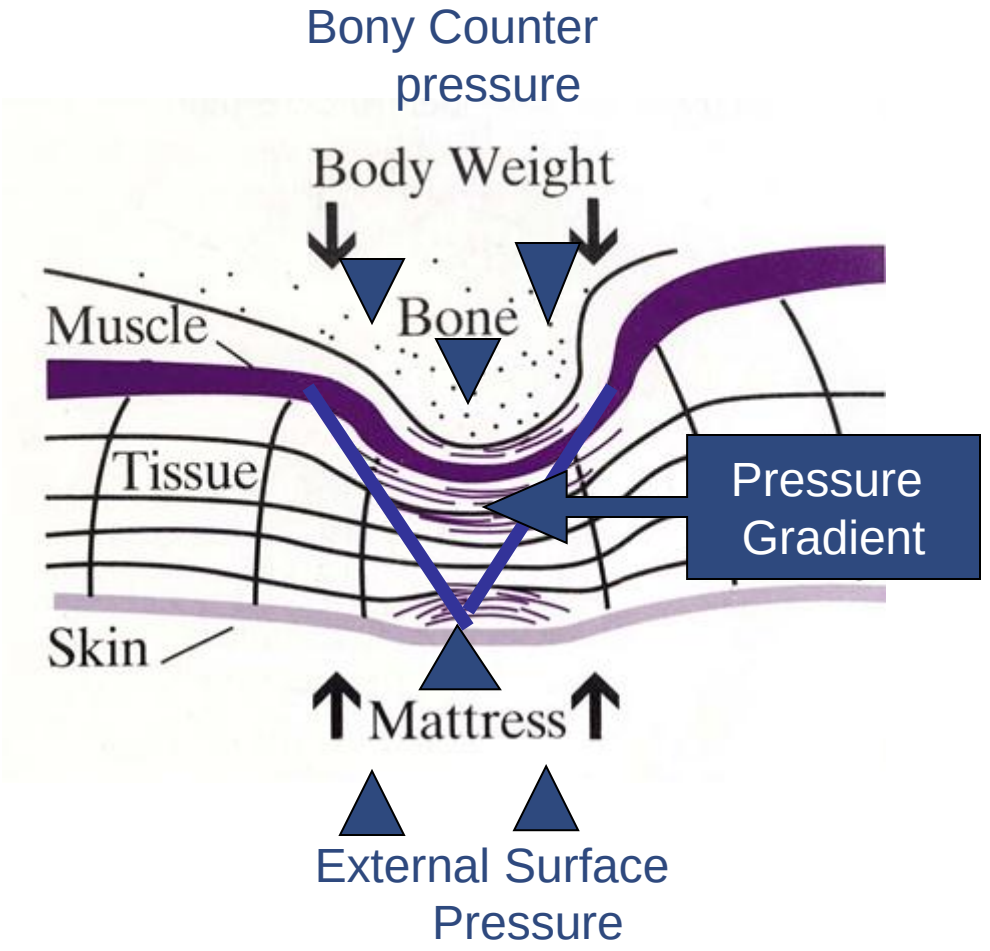


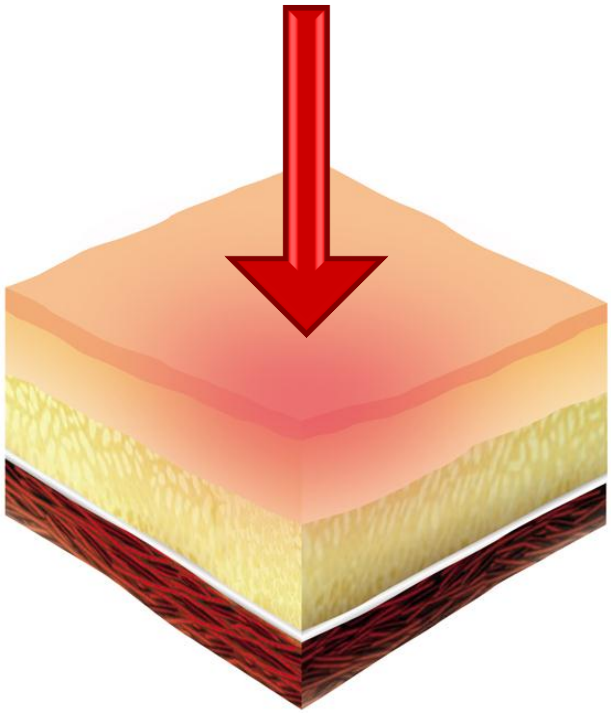
"Pressure ulcers develop as a result of the internal response to external mechanical load"[5]

Mechanical Load and Internal Response

- Pressure gradients that induce sustained deformation of skin and sub-dermal tissues must be present in order for tissue damage to occur[5]
- Pressure is highest at the apex of the pressure gradient and lessens to the right and left of this point[6]
- Internal stresses and strains on tissue adjacent to bony prominences are substantially higher than those near the surface, and have the potential to cause deep tissue injury[5]



Stage I Pressure Ulcer



- Intact skin with non-blanchable redness of a localized area usually over a bony prominence.
- Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area
- The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue
- May indicate person "at risk" of further skin breakdown [5]

Stage II Pressure Ulcer

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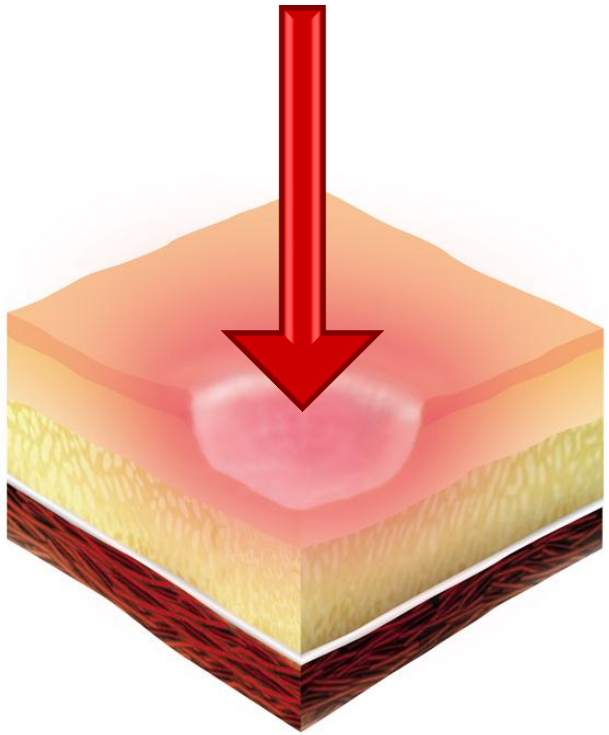
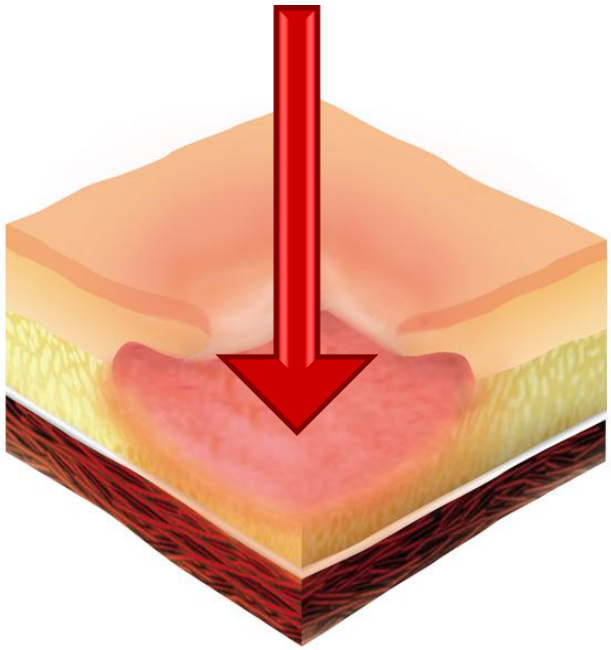
- Presents as a shiny or dry shallow open ulcer with a red pink wound bed, without slough or bruising
- May also present as an intact or open/ruptured serum-filled filled blister
- Partial thickness wound[5]



Stage III Pressure Ulcer



- Full thickness tissue loss
- Subcutaneous fat may be visible but bone, tendon or muscle are *not* exposed
- Slough may be present but does not obscure the depth of tissue loss
- *May* include undermining and tunneling
- The depth of a Stage III pressure ulcer varies by anatomical location[5]

Stage IV Pressure Ulcer

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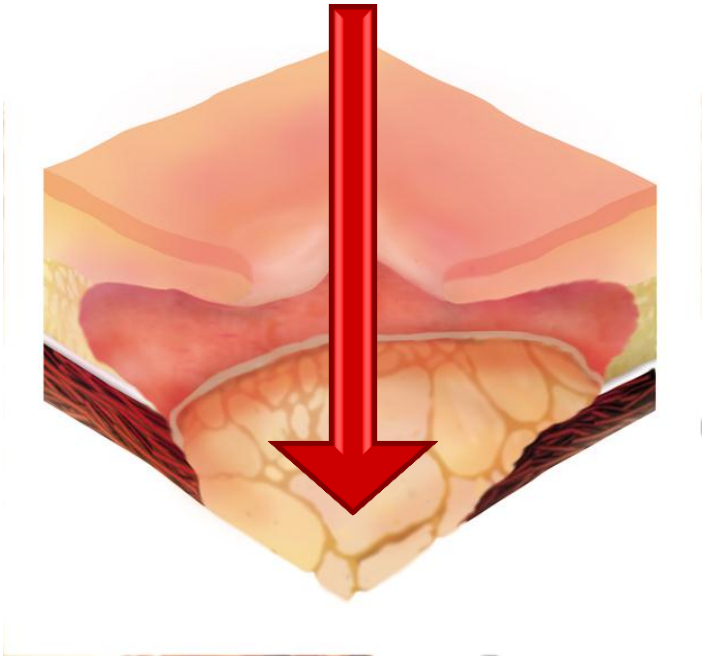
- Full thickness tissue loss with exposed bone, tendon or muscle
- Slough or eschar may be present on some parts of the wound bed
- Often include undermining and tunneling
- The depth of a Stage IV pressure ulcer varies by anatomical location[5]



Neuropathic(Diabetic) Ulcer

Ulcers occurring due to the complications of Diabetes [7]

Neuropathic(Diabetic) Foot Ulcers

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Etiology

- ❑ Peripheral vascular disease[8]
  - ✓ Inadequate blood flow caused by occlusion in the peripheral artery circulation[9]
  - ✓ Incidence of peripheral artery disease 4 x greater in patients with diabetes[9]
- ❑ Peripheral neuropathy[8]
  - ✓ Sensory neuropathy
  - ✓ Motor neuropathy
  - ✓ Autonomic neuropathy

Neuropathy

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Sensory Neuropathy

- Loss of protective sensation, temperature perception and numbness
- Paresthesia and pain
- Diabetes may make the foot insensate to forces of friction, shear, vibration and pressure
- Increased susceptibility to injury [7,10]

Sites of Repetitive Trauma

Autonomic Neuropathy

- Decreased sweating
- Loss of skin temperature regulation
- Abnormal blood flow to the soles of the feet
- May lead to dryness, cracking, callus formation and fissuring of the extremities
- Resulting ulcerations [7]

Cracks, Fissures

Motor Neuropathy

- Motor loss
- Muscle weakness and atrophy
- Diabetes may result in foot deformities such as hammer toes, claw feet, or Charcot Foot
- May result in calluses, friction (blisters), or pressure ulcer [7,10]

Charcot Foot

Lower Extremity Vascular Ulcers

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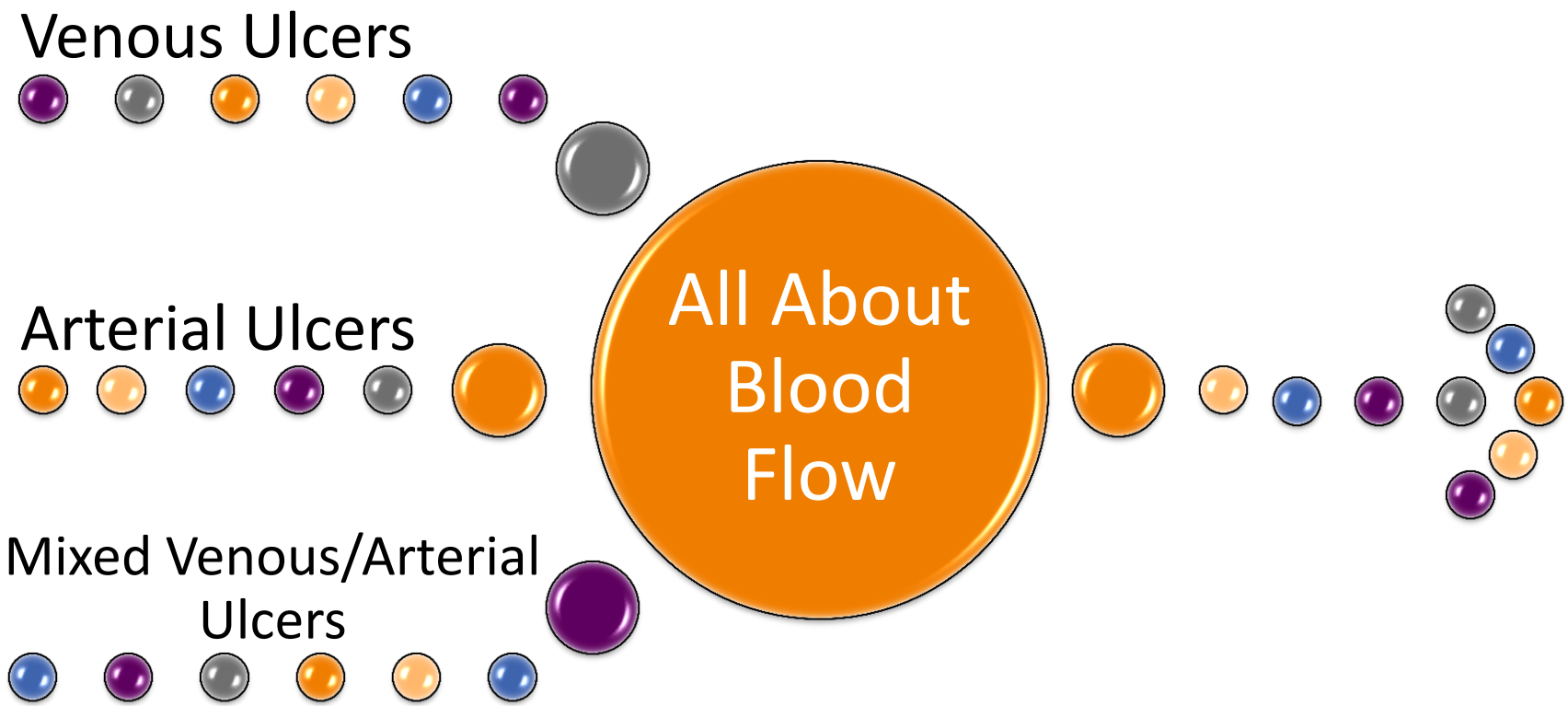

Circulatory System

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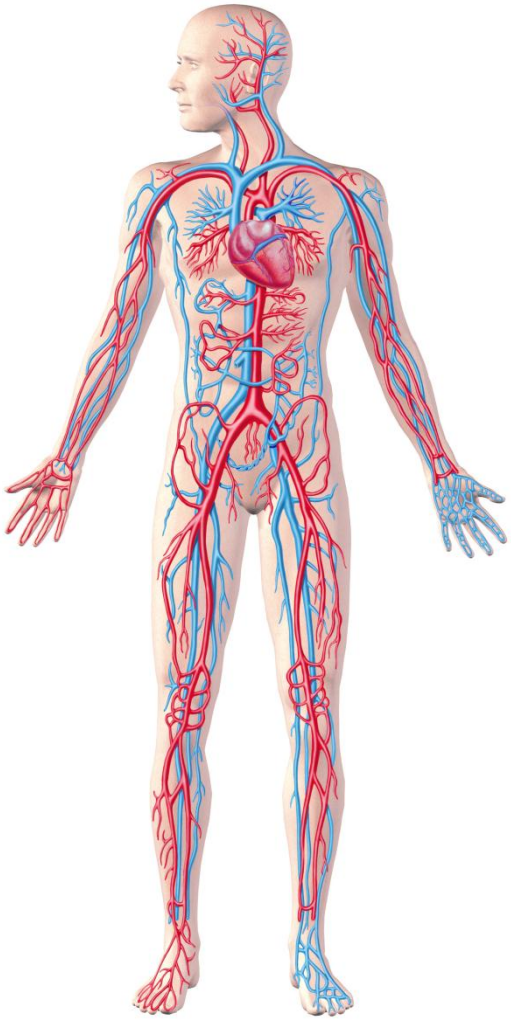

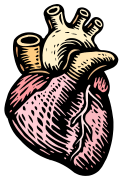

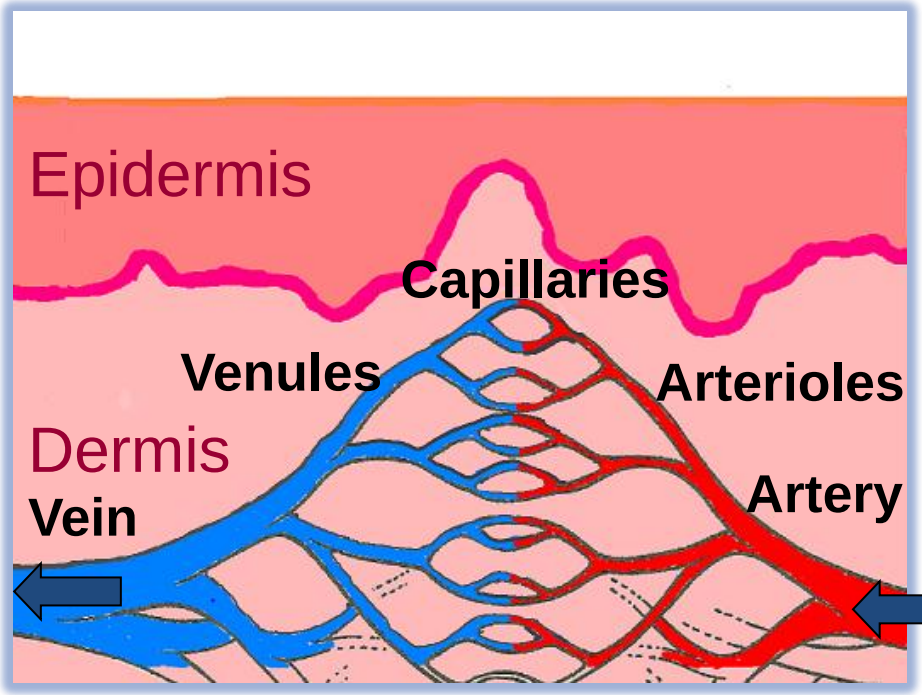

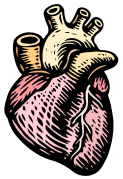

Venous Ulcer

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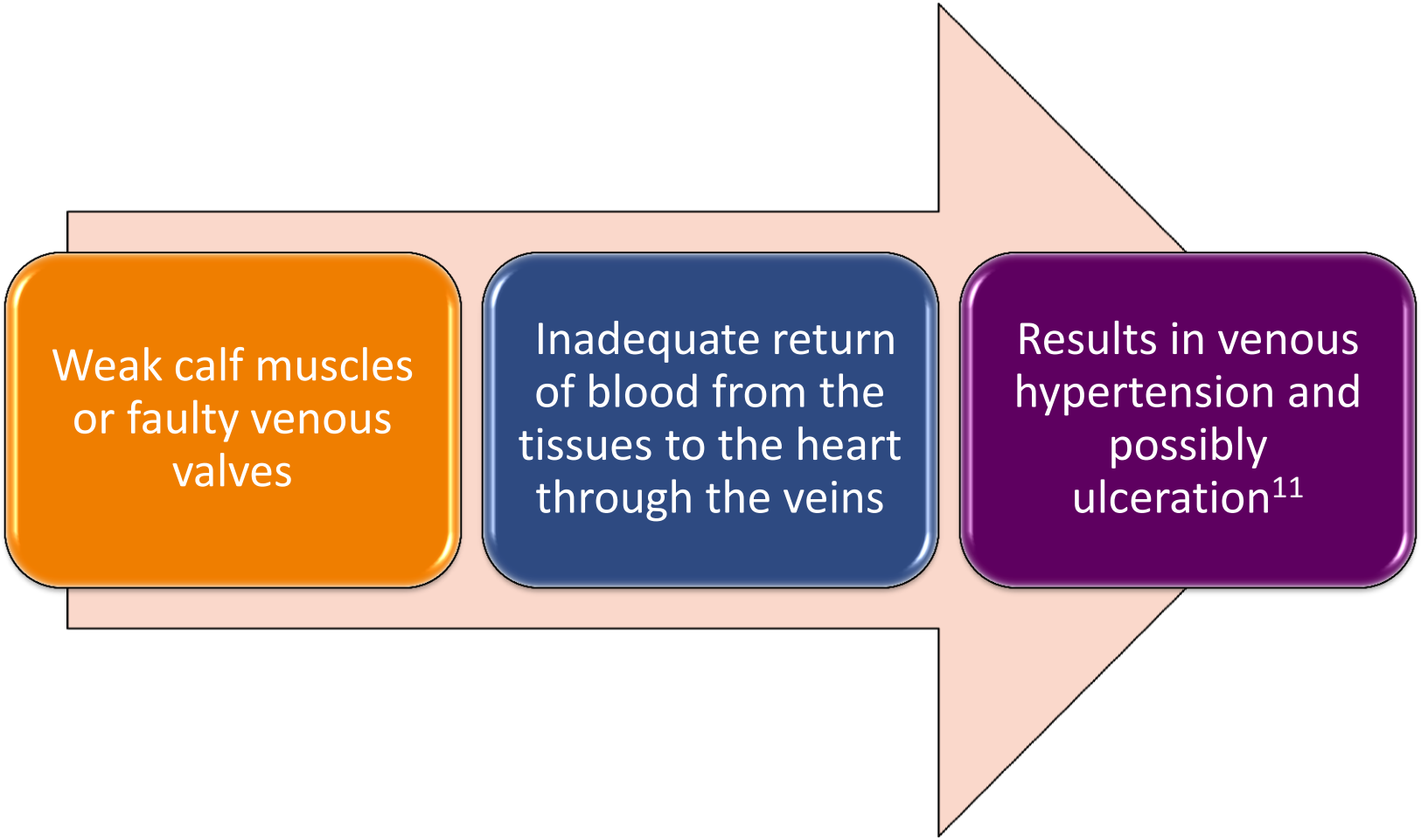
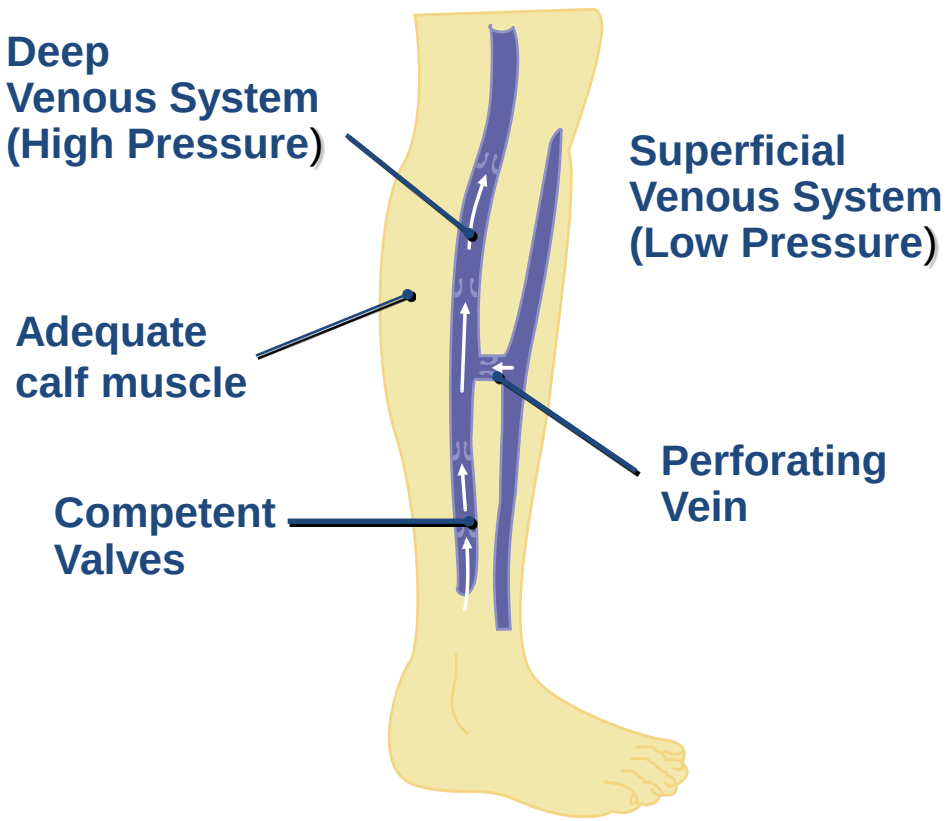
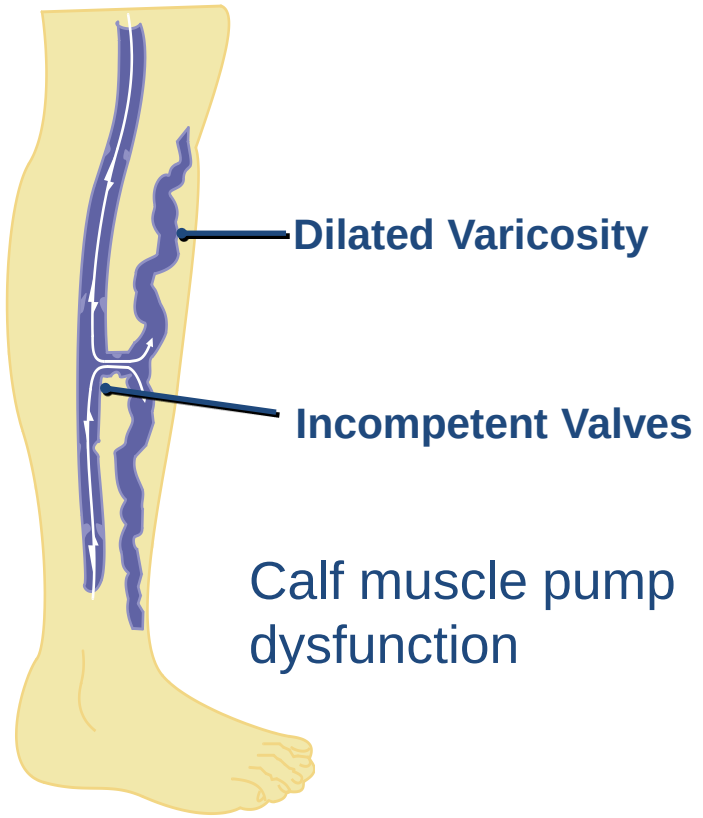


Venous System



Normal Venous Function



Venous Hypertension

Venous Ulcer

Venous ulcers are chronic skin and subcutaneous lesions usually found on the lower extremity at the pretibial and the medial supra malleolar areas of the ankle, where the perforator veins are located."[12]

Arterial Ulcer

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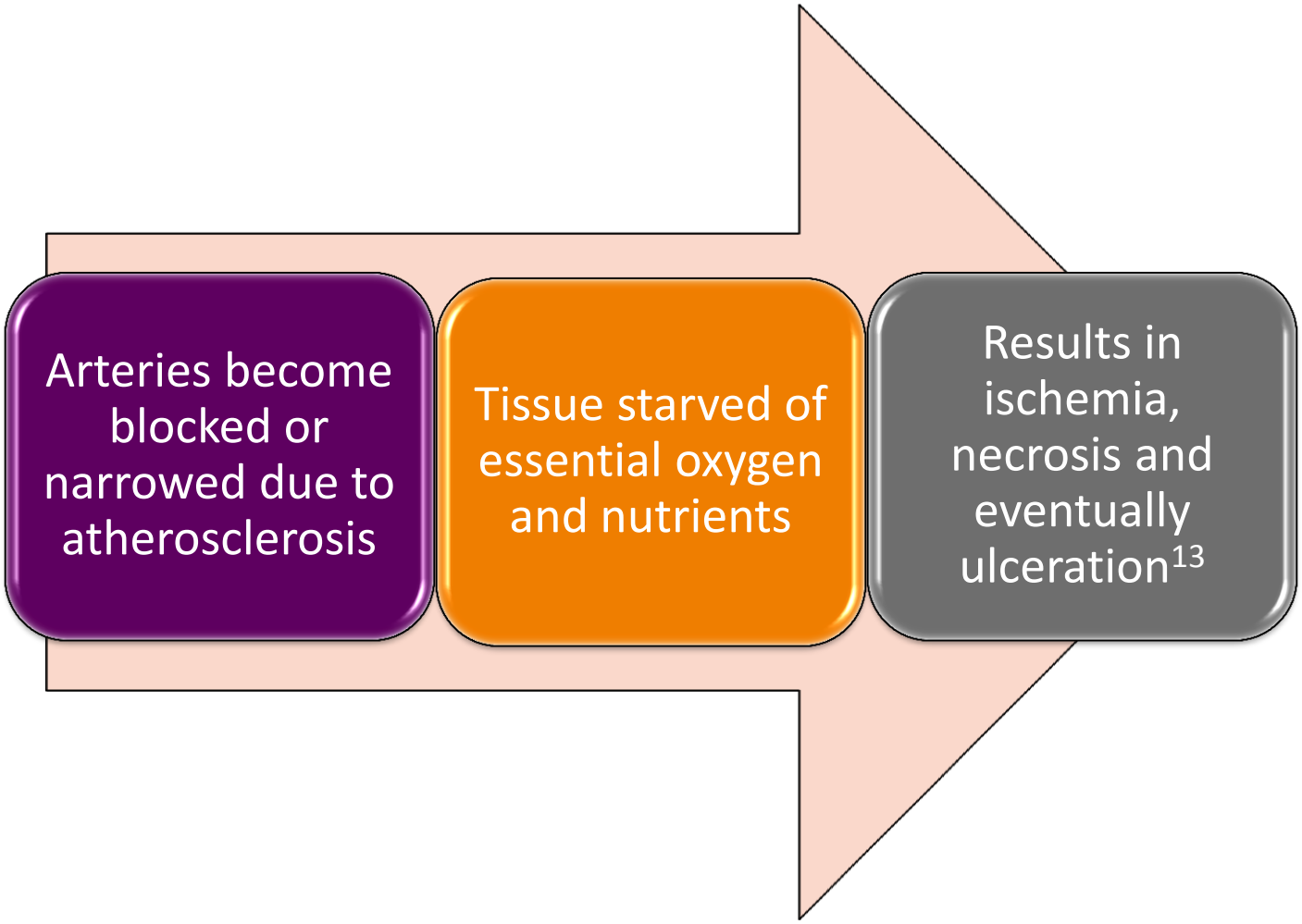

Arterial Ulcer

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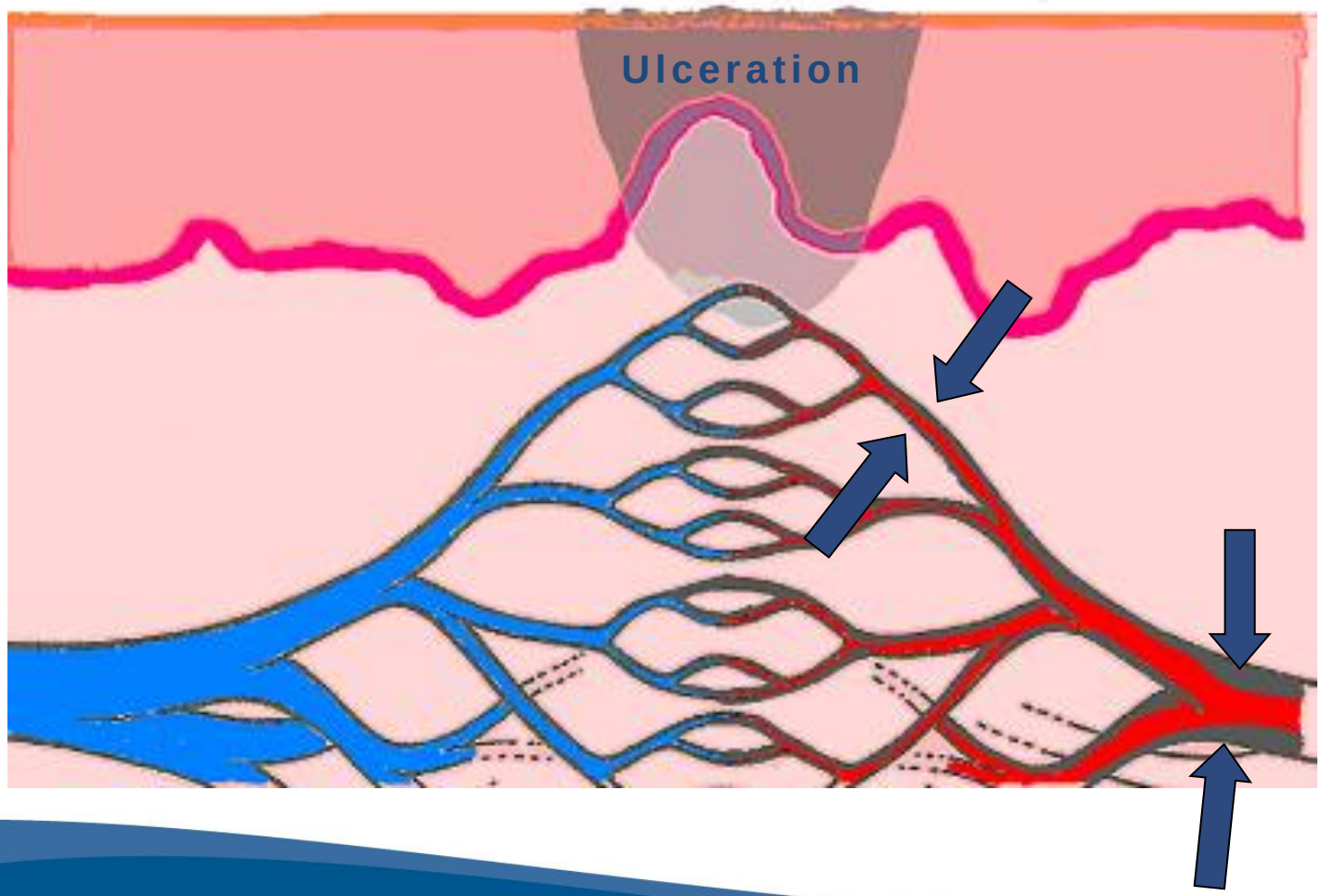

Arterial Ulcer

Arterial ulcers are chronic lesions usually found on the lower extremity often affecting the toes, shin or over pressure points

Arterial Ulcer

Arterial ulcers are wounds that will not heal due to compromised or inadequate arterial blood flow[14]

Mixed Venous-Arterial Ulcers

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Mixed

Usually have symptoms of both venous and arterial insufficiency

Venous-Arterial

Correct assessment and diagnosis leads to appropriate management and treatment

Ulcers

Up to 26% of chronic venous ulcers also have an arterial involvement[15]

Wound Management

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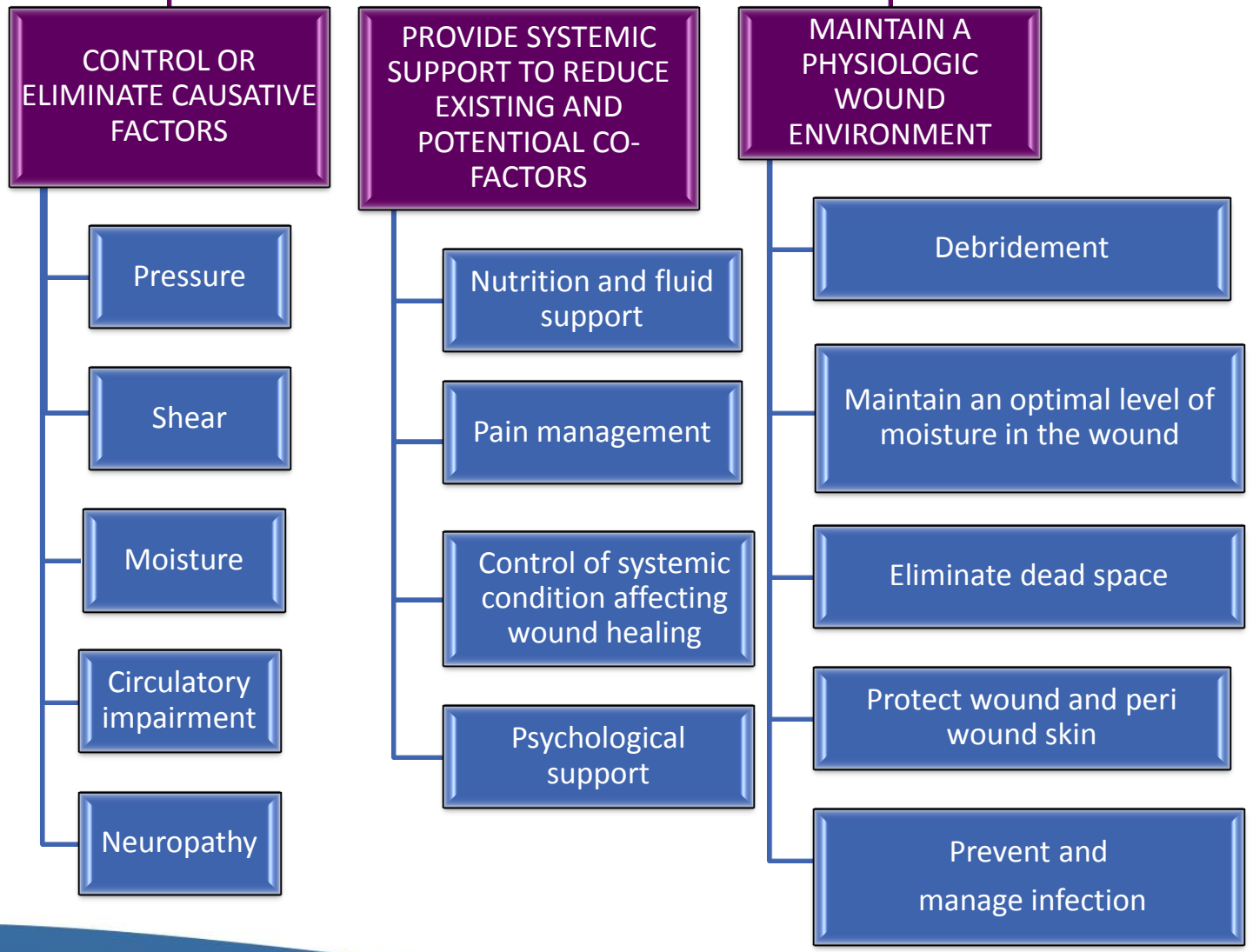
PRINCIPLES OF WOUND MANAGEMENT [16]



Nutrition

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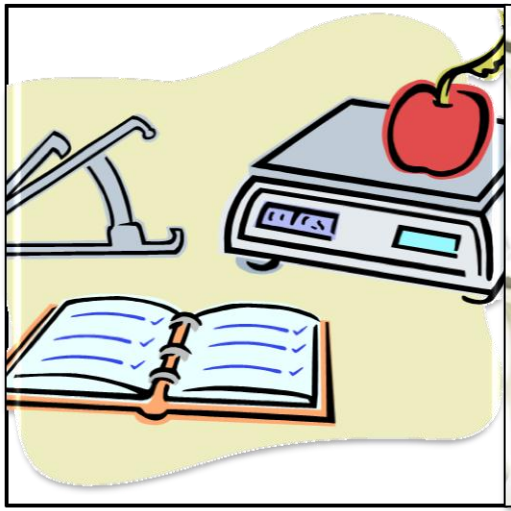

Assess the nutritional status of every individual with a wound in each health care setting[5]

Refer each individual with nutritional risk and a wound to a registered dietitian[5]

Offer each individual at risk a minimum of:

- 30-35 kcal per kg body weight per day
- 1.25-1.5 g/kg/day protein
- 1ml of fluid intake per kcal per day [5]

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Adequate Nutrition

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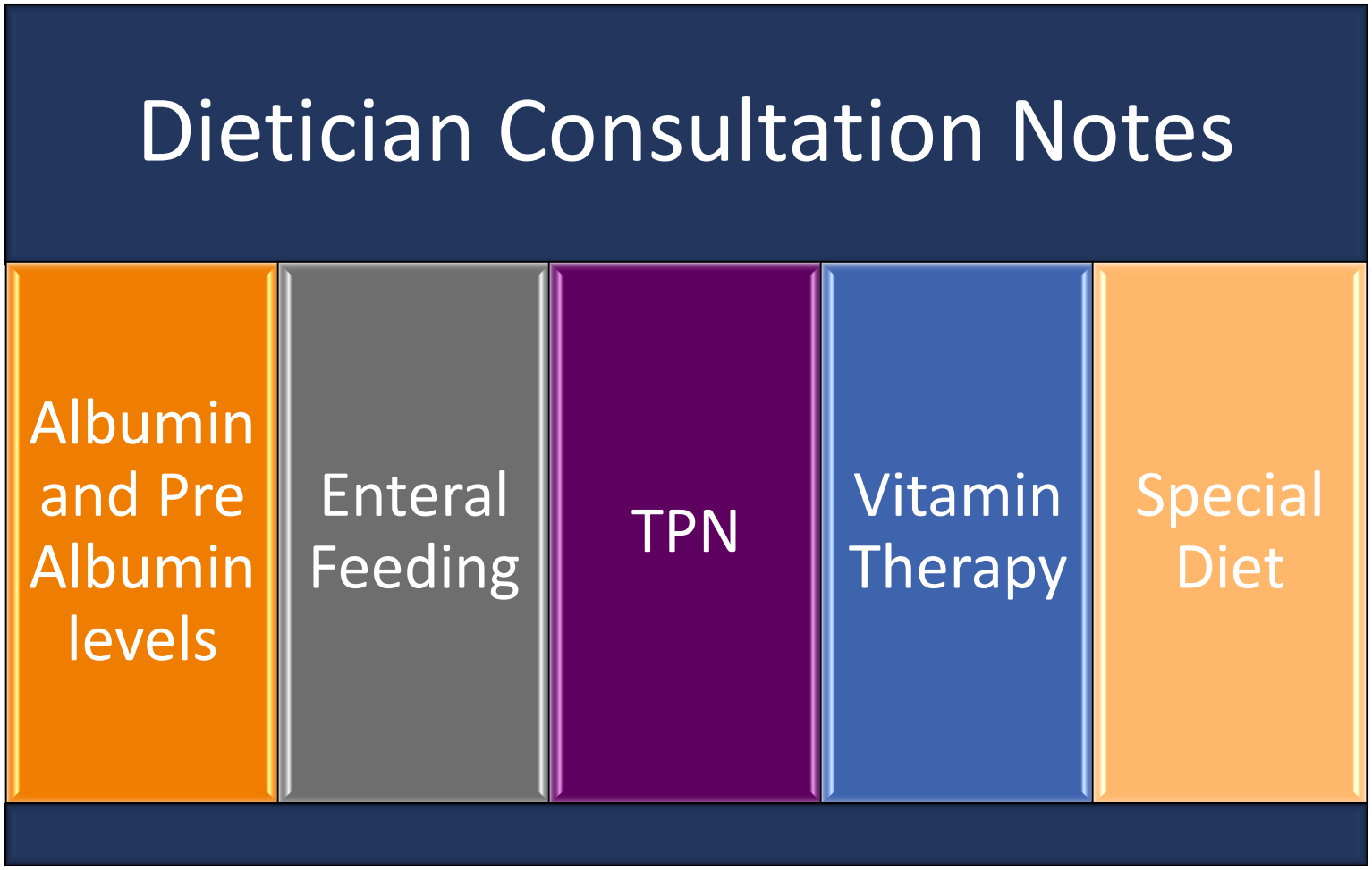

Topical Wound Management

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- Debride devitalized tissue when appropriate
- Cleanse wound with a noncytotoxic wound cleanser.
- Provide/maintain a moist wound environment
- Prevent premature wound closure
- Eliminate dead space
- Absorb excess exudate
- Protect periwound skin
- Prevent and manage infection

(Rolstad, 2007)

Debridement of Necrotic Tissue

Sharp Debridement

- Use of surgical instrument to debride
- Conservative sharp debridement
- Surgical sharp debridement

Enzymatic Debridement

- Topical application of exogenous enzymes
- Selective debridement

Mechanical Debridement

- Wet-to-dry = Nonselective Debridement
- Irrigation = Selective Debridement

(Ramundo, 2007)

Moist Wound Environment

Principles of Moist Wound Healing

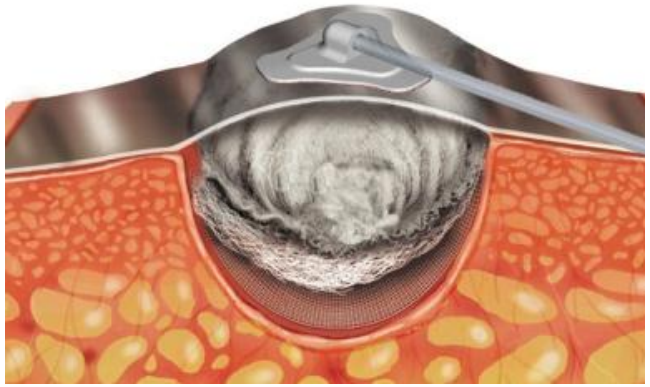
- Since the 1960s, it has been accepted that wound healing is optimized when the wound is kept in a moist environment rather than dried.[5]
- Occlusive or semi occlusive dressings that maintain wound bed moisture promote re-epithelialization and wound closure.[5]

Moisture-Retentive Dressing

- One that is capable of consistently retaining moisture at the wound site by interfering with natural evaporative loss of moisture vapor [18]

Prevent Premature Wound Closure

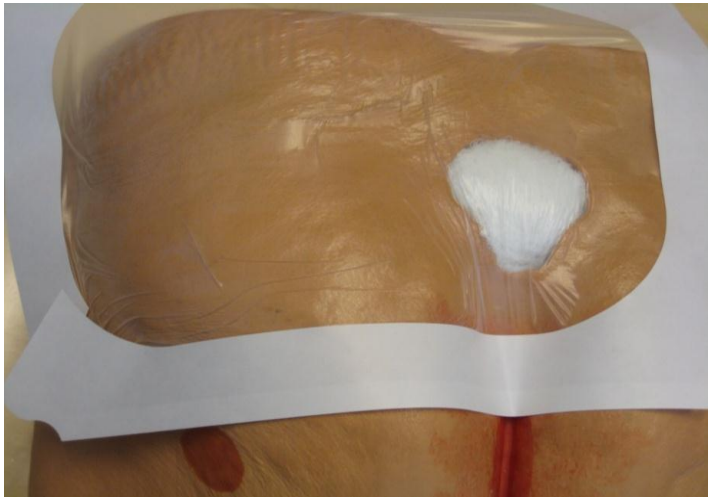
- Goals
  - Prevent premature wound closure
  - Prevent epibole
  - Prevent abscess formation
- Loosely fill *all* cavities with appropriate dressing
- Fill cavity to the level of the epidermis



(Ramundo, 2007)

Protect Periwound Skin

- Appropriate frequency of dressing changes so that exudate does not pool on the surrounding skin[18]
- Use absorptive dressing appropriate to level of exudate[18]
- Use skin barrier to protect periwound skin from moisture[18]



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Prevent and Manage Infection

- Infection control precautions
- Use Antimicrobials when appropriate
- Cover wound to protect from outside contaminates
- Use appropriate wound culture technique

Management of Pressure Ulcers

Measures for all wounds previously mentioned

Appropriately turned and positioned patient

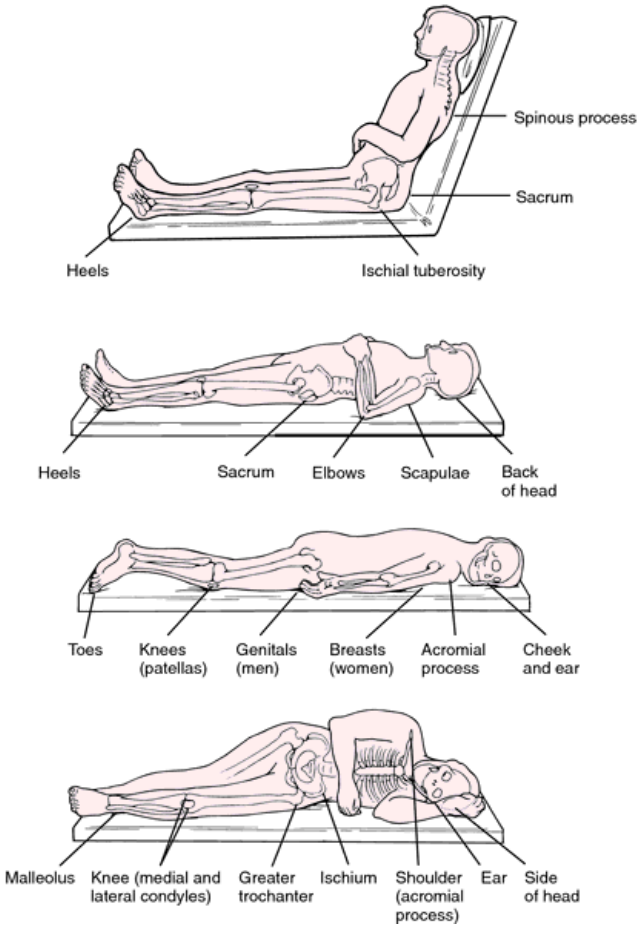
Place the patient on a group 2 or 3 support surface if the pressure ulcer is on the posterior trunk or pelvis

Manage the patient's moisture and incontinence appropriately

(CMS, 2011)

Repositioning

- Repositioning frequency will be influenced by variables concerning the individual and the support surface in use.
- Reposition in such a way that pressure is relieved or redistributed.
- Avoid subjecting the skin to pressure and shear forces.
- Avoid positioning the individual on bony prominences with existing non-blanchable erythema.
- Use transfer aids to reduce friction and shear. Lift - don't drag - the individual while repositioning.
- Avoid positioning directly onto medical devices, such as tubes and drains



(Hunter, 2007)

Management of *Neuropathic Ulcers*

Measures for all wounds previously mentioned

The patient has been on a comprehensive diabetic management program

Reduce pressure on the foot ulcer using appropriate modalities

(CMS, 2011)

Comprehensive Diabetic Management Program

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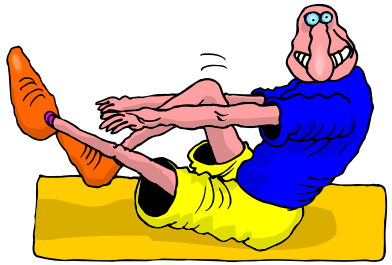
- Glycemic control [10]
  - Glucose
  - HbA1c

- Utilize basic principles of nutritional management[7]
- Rule out or diagnose osteomyelitis[7]

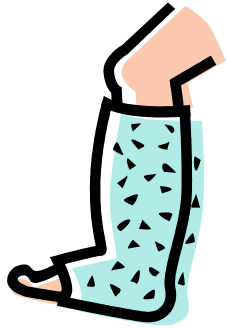
- Initiate a customized exercise program based on patient limitations and/or wound complications[7]



Appropriate Pressure Reduction Modalities

Offload ulcer[10]

- Ensure adequate offloading of pressure though wound closure
- Use aggressive offloading techniques such as cast walkers and total contact cast



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Management of *Venous Ulcers*

Measures for all wounds previously mentioned

Compression bandages and/or garments have been consistently applied

Leg elevation and ambulation have been encouraged

(CMS, 2011)

Compression Overview

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- Compression is seen as the cornerstone of therapy for managing venous ulcers[20]
- The mainstay of management for lower leg edema is to treat the underlying condition and a combination of leg elevation, exercise and compression[21]
- Clinicians should be competent in selecting and applying compression according to the individual patients needs[22]

Compression Therapy

- Provides constant compression to tissues
- Partially collapses the superficial dilated veins , which reduces the diameter of the vessels and thereby increases the velocity of blood flow
- Provides support to calf muscles during ambulation
- Prevents blood pooling
- Opposes the leakage of fluid out of the capillary systems
- Return of interstitial fluid back into the blood stream

(Doughty, 2007)

Management of *Arterial Ulcers*

Measures for all wounds previously mentioned

Pressure over the wound is relieved

(CMS, 2011)

Summary

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The benefits of using Wound Management principles and practice to achieve optimal wound healing are evidence based. During this module we learned about the etiology and management of wounds which may benefit from the use of NPWT to enhance wound healing

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