

Principles of Wound Management

- **Partial thickness wound**

Level of wound is through the epidermis and/or dermis

Heals through regeneration

- **Full thickness wound**

Level of wound is into the subcutaneous or deeper

Heals through remodeling (filling in with granulation forming collagen and contraction); fat, tendon, muscle, etc. are not regenerated

Primary: All layers approximated at time of surgery or injury

Minimal amount of granulation tissue and epithelia cells required; thin scar line

Secondary: fills in from wound base over time

Large amount of granulation tissue with wound contraction; wide scarring

Tertiary: contaminated wound left open until antibiotics or debris removed; later closed by primary intention

- **Acute wound healing:** hemostasis, inflammation, proliferative (granulation formation), maturation (epithelialization and remodeling); tissue repair predictable

Wound healing occurs via overlapping phases: each phase triggers the next phase

Injury: disruption of blood vessels, bleeding, exposure of blood to collagen

Cell disruption and release of histamine leads to vasodilation

Hemostasis (day 1-3): coagulation pathways activated and fibrin clot formed; platelets degranulate and release growth factors

Chemoattraction of neutrophils and macrophages

Stop bleeding

Inflammatory phase (day 3-20): leakage of plasma, neutrophils, and macrophages into wound bed; may observe edema, warmth, exudate

Debridement of necrotic tissues; phagocytosis of bacteria

New framework for blood vessel growth

Chronic wounds often stuck in this phase

Proliferative or granulating or rebuilding phase (week 1-6): continued production and recruitment of growth factors

Granulation tissue formation: ingrowth of new capillaries providing oxygen and nutrients; connective tissue synthesis provides a support matrix

Contraction of wound edges: contractile proteins (myofibroblasts) develop

Wound defect filled

Epithelial resurfacing: migration of skin cells from wound edges across bed of granulation tissue

Pulls the wound closed: wound resurfaced

Maturation phase (week 6-2 years): collagen lysis and synthesis; scar formation

Remodeling or maturation

- **Chronic wound healing:** does not progress in orderly manner; wound becomes stalled

Exudate contains pro-inflammatory elements: cytokines and proteases

- Principles of wound management

Identify and control or eliminate the cause

Mechanical factors: pressure, shear, friction, MARSII, skin tear

Moisture and chemical factors: wound drainage, incontinence, perspiration, MASD

Vascular: arterial, venous, mixed

Neuropathic (aka diabetic)

Atypical: radiation, trauma, cancer, vasculitis, thermal, infections

Surgical

Support the host

Control and stabilize health issues

Optimize nutrition status

Pain control

Optimize the physiologic wound environment (TIME)

Tissue: remove macro and micro revitalized tissue

Infection/inflammation control: prevent or treat

Moisture balance

Edge of wound: fill dead space, protect peri wound, prevent/remove epibole, callous

- Comprehensive assessment: patient (history, systems, medication, OLDCART), focused exam (wound, diagnostics)
- Moist wound healing: moisture is vital to tissue viability and should be maintained in most wounds at the wound/dressing interface; promotes faster healing, less scarring, protects from infection from external contamination, promotes autolysis, improves patient comfort

Passive dressings: absorb, hydrate, do not add ingredients to wound

Active dressings: add active ingredients to wound (e.g. antibiotics, growth factors)

Advanced therapies

Wound Bed Preparation and Infections

- Debridement

Indications: necrotic tissue or debris; remove or reduce biofilm, infection, odor control

Do not debride ischemic wounds with dry gangrene or stable heel eschar

Goals: reduce bioburden, infection control, facilitate wound visualization, interrupt chronic wound cycle

- Forms of non-viable tissue

Eschar: necrotic (devitalized) tissue; leathery black or brown appearance; can be soft, firm, adherent, or loose

Slough: consists of avascular (necrotic/devitalized) tissue, serous exudate, bacteria, fibrin, cell debris, intact leukocytes; soft, moist, white, yellow, tan, firm or loosely adherent