WOUND CARE IN SURGERY

by

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OBJECTIVES

- DEFINITION: WOUND
- TYPES OF WOUNDS
- ASSESMENT OF WOUNDS
- PHASES OF WOUND HEALING
- FACTORS AFFECTING WOUND HEALING
- TYPES OF WOUND HEALING
- TYPES OF DRESSINGS
- COMPLICATIONS OF WOUND HEALING

DEFINITION: WOUND

- A wound represents a disruption in the normal structure and function of the skin and underlying soft tissues.

- Causes: Trauma, Surgery, Sustained pressure, Vascular disease, Infection.

TYPE OF WOUNDS (CONTAMINATION)

- Clean wound - not infected, usually intentional.

- Contaminated wound - high risk of infection usually unintentional.

- Infected wound - (dirty wound) contains bacteria; signs of infection.

TYPES OF WOUNDS (OPEN/CLOSED)

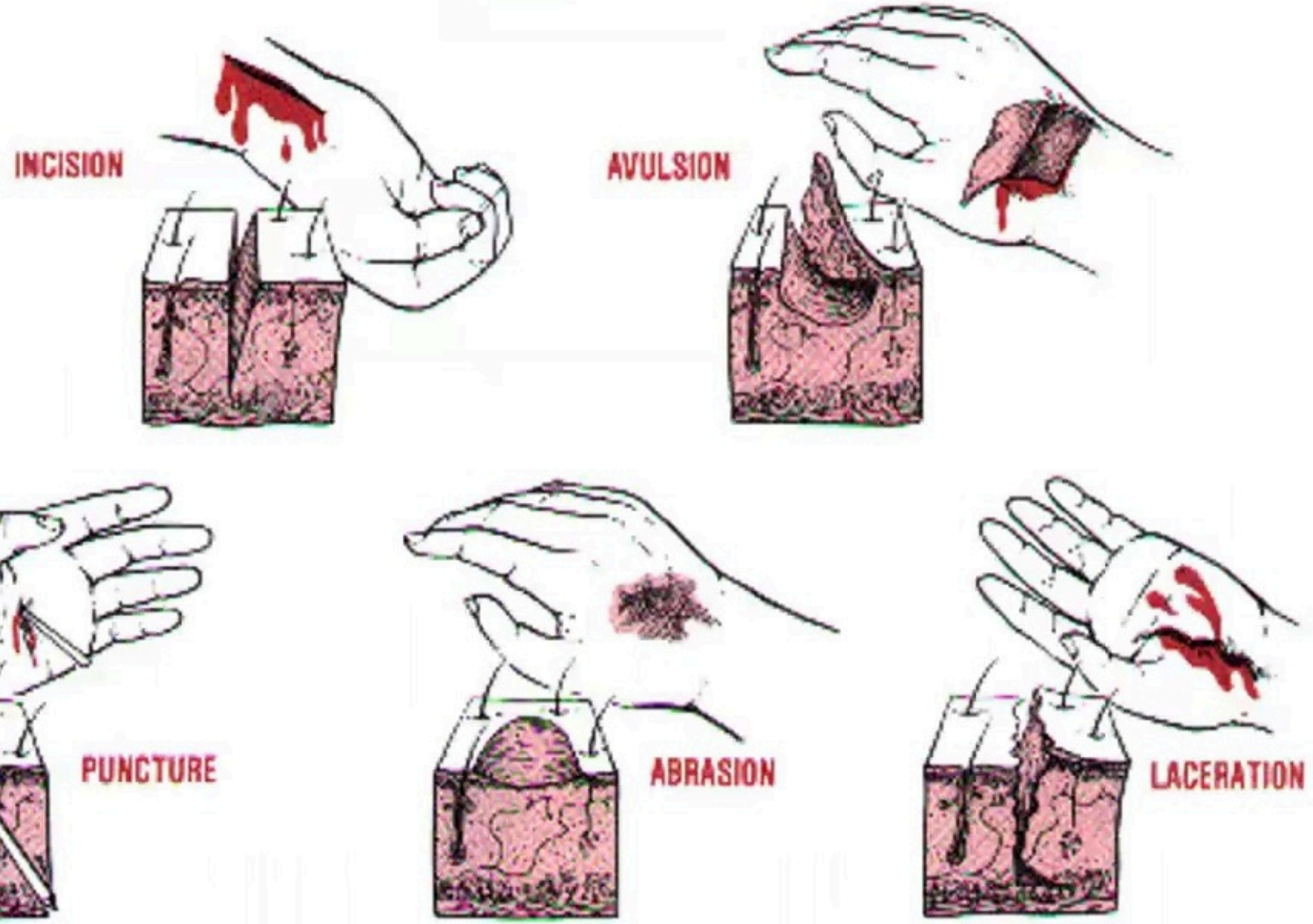
- CLOSED

- Contusion (Bruise) – Tissue injury without breaking of skin. It disrupts blood vessels; pooling of blood under the unbroken skin.

TYPES OF WOUNDS (OPEN/CLOSED)

- **OPEN**
- **Incision** - Surgically made separation of tissues with clean, smooth edges.
- **Laceration** – Traumatic separation of tissues with rough edges
- **Abrasion** - Traumatic scraping away of surface layers of skin.
- **Puncture** – Wound made by sharp, pointed object.
- **Avulsion** – Tearing away of a structure or a part, such as a fingertip, accidentally.
- **Ulceration** – Excavation of skin and/or underlying tissue from injury or necrosis

CLASSIFICATION OF OPEN WOUNDS



What Type of Wound is it? How long has it been there?

- **Acute**-generally heal in a couple weeks, but can become chronic:
  - Surgical
  - Trauma
- **Chronic**-do not heal by normal repair process-takes weeks to months:
  - Vascular-venous stasis, arterial ulcers
  - Pressure ulcers
  - Diabetic foot ulcers (neuropathic)

Is the wound infected?

- All wounds are contaminated, but not necessarily infected:
  - Contamination-microorganisms on wound surface
  - Colonization-bacteria growing in wound bed without signs or symptoms of infection
  - Critical colonization-bacterial growth causes delayed wound healing, but has not invaded the tissue
  - Infection-bacteria invades soft tissue, causes systemic response

Inflammation, pus, increase/change in exudate, fever, pain, delirium in elderly

ASSESSMENT OF PATIENT WITH A WOUND

- **History**
  The patient's medical, surgical, pharmacological and social history
- **Examination**
  Of the patient as a whole; then focus on the wound
- **Investigations**
  What bloods, x-rays, scans do you require to help you make your...
- **Diagnosis**
- **Implementation**
  Of the plan of care

Assessment Tools

Bates-Jensen Wound Assessment Tool (BWAT)

- Wound shape and location plus:
- size
- edges
- necrotic tissue type
- exudates type
- skin color
- granulation tissue
- depth
- undermining
- necrotic tissue amount
- exudates amount
- tissue edema
- epithelialization

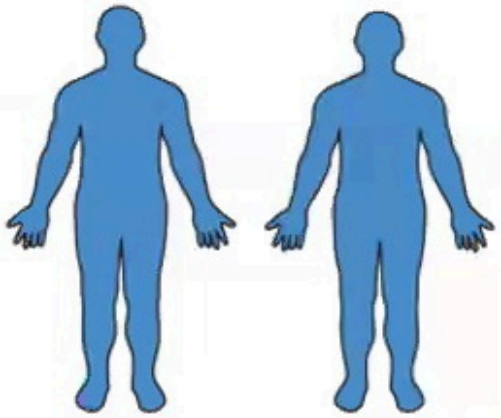
BATES-JENSEN WOUND ASSESSMENT TOOL NAME

Complete the rating sheet to assess wound status. Evaluate each item by picking the response that best describes the wound and entering the score in the item score column for the appropriate date. If the wound has healed/resolved, score items 1, 2, 3, & 4 as = 0.

Location: Anatomic site. Circle, identify right **(R)** or left **(L)** and use **"X"** to mark site on body diagrams:

___ Sacrum & coccyx
___ Trochanter
___ Ischial tuberosity
___ Lateral ankle
___ Medial ankle
___ Heel

Other Site



Shape: Overall wound pattern; assess by observing perimeter and depth. Circle and date appropriate description:

___ Irregular
___ Round/oval
___ Square/rectangle
___ Linear or elongated
___ Bowl/boat
___ Butterfly

Other Shape

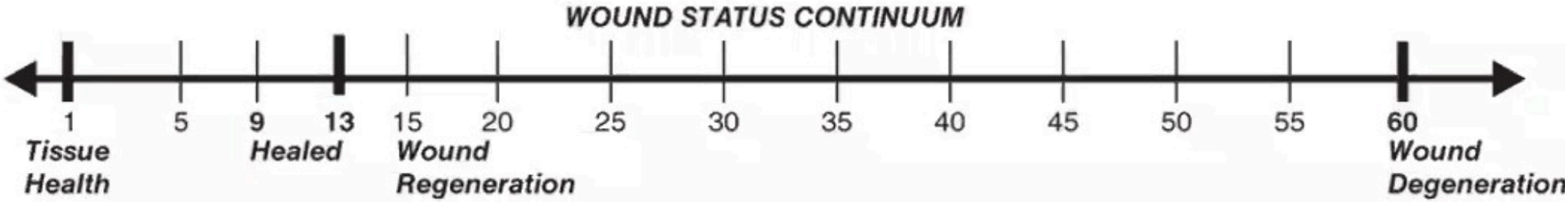
Item	Assessment	Date Score	Date Score	Date Score
1. Size*	*0 = Healed, resolved wound 1 = Length × width < 4 sq cm 2 = Length × width 4–< 16 sq cm 3 =Length × width 16.1–< 36 sq cm 4 = Length × width 36.1–< 80 sq cm 5 = Length × width > 80 sq cm			
2. Depth*	*0 = Healed, resolved wound 1 = Nonblanchable erythema on intact skin 2 = Partial thickness skin loss involving epidermis &/or dermis 3 = Full thickness skin loss involving damage or necrosis of subcutaneous tissue; may extend down to but not through underlying fascia; &/or mixed partial & full thickness &/or tissue layers obscured by granulation tissue 4 = Obscured by necrosis 5 = Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structures			

3. Edges*	*0 = Healed, resolved wound 1 = Indistinct, diffuse, none clearly visible 2 = Distinct, outline clearly visible, attached, even with wound base 3 = Well-defined, not attached to wound base 4 = Well-defined, not attached to base, rolled under, thickened 5 = Well-defined, fibrotic, scarred, or hyperkeratotic		
4. Under-mining*	*0 = Healed, resolved wound 1 = None present 2 = Undermining < 2 cm in any area 3 = Undermining 2–4 cm involving < 50% wound margins 4 = Undermining 2–4 cm involving > 50% wound margins 5 = Undermining > 4 cm or tunneling in any area		
5. Necrotic Tissue Type	1 = None visible 2 = White/grey nonviable tissue &/or nonadherent yellow slough 3 = Loosely adherent yellow slough 4 = Adherent, soft, black eschar 5 = Firmly adherent, hard, black eschar		
6. Necrotic Tissue Amount	1 = None visible 2 = < 25% of wound bed covered 3 = 25% to 50% of wound covered 4 = > 50% and < 75% of wound covered 5 = 75% to 100% of wound covered		
7. Exudate Type	1 = None 2 = Bloody 3 = Serosanguineous: thin, watery, pale red/pink 4 = Serous: thin, watery, clear 5 = Purulent: thin or thick, opaque, tan/yellow, with or without odor		

Source: J.B. Halter, J.G. Ouslander, S. Studenski, K.P. High, S. Asthana, M.A. Supiano, C. Ritchie, W.R. Hazzard, N.F. Woolard: Hazzard's Geriatric Medicine and Gerontology, Seventh Edition, www.accessmedicine.com

Item	Assessment	Date Score	Date Score	Date Score
8. Exudate Amount	1 = None, dry wound 2 = Scant, wound moist but no observable exudate 3 = Small 4 = Moderate 5 = Large			
9. Skin Color Surrounding Wound	1 = Pink or normal for ethnic group 2 = Bright red &/or blanches to touch 3 = White or grey pallor or hypopigmented 4 = Dark red or purple &/or nonblanchable 5 = Black or hyperpigmented			
10. Peripheral Tissue Edema	1 = No swelling or edema 2 = Nonpitting edema extends < 4 cm around wound 3 = Nonpitting edema extends > 4 cm around wound 4 = Pitting edema extends < 4 cm around wound 5 = Crepitus and/or pitting edema extends > 4 cm around wound			
11. Peripheral Tissue Induration	1 = None present 2 = Induration, < 2 cm around wound 3 = Induration 2–4 cm extending < 50% around wound 4 = Induration 2–4 cm extending > 50% around wound 5 = Induration > 4 cm in any area around wound			
12. Granulation Tissue	1 = Skin intact or partial thickness wound 2 = Bright, beefy red; 75% to 100% of wound filled &/or tissue overgrowth 3 = Bright, beefy red; < 75% & > 25% of wound filled 4 = Pink, &/or dull, dusky red &/or fills 25% of wound 5 = No granulation tissue present			

13. Epithe-lialization	1 = 100% wound covered, surface intact 2 = 75% to < 100% wound covered &/or epithelial tissue extends > 0.5 cm into wound bed 3 = 50% to < 75% wound covered &/or epithelial tissue extends to < 0.5 cm into wound bed 4 = 25% to < 50% wound covered 5 = < 25% wound covered			
	TOTAL SCORE			
	SIGNATURE			



Plot the total score on the Wound Status Continuum by putting an "**X**" on the line and the date beneath the line.
Plot multiple scores with their dates to see-at-a-glance regeneration or degeneration of the wound.

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PHASES OF WOUND HEALING

There are three phases of wound healing - inflammation, proliferation, maturation

1. Inflammatory Phase

- 0 – 3 days
- Hemostasis (bleeding stops)
- Inflammation (redness, swelling, warmth and pain maybe present)
- Phagocytosis + Growth factor stimulation.

PHASES OF WOUND HEALING

2. Proliferation Phase

- 3 – 21 days
- Angiogenesis (new blood vessels develop).
- Collagen synthesis (protein fibers)
- Granulation formation
- Epithelialization
- Contraction

3. Maturation Phase

- 21 days – 2 years
- Reorganization of collagen
- Tensile strength improves (up to 80% of original)

TABLE 2-1 Factors Affecting Wound Healing

Intrinsic	Extrinsic
• Age	• Smoking
• Alcoholism	• Radiation
• Immunosuppression	• Chemotherapy
• Hereditary skin disease	• Infection (local or systemic)
• Chronic disease:	• Poor nutritional intake
• COPD	• Insufficient oxygenation
• CAD	• Medication therapy
• CVD	• Anticoagulants
• Liver failure	• Cyclosporine
• Renal failure	• Steroids
• Renal insufficiency	• Immobility (e.g., SCI)
• Diabetes mellitus	
• Peripheral vascular disease	
• Chronic venous disease	
• Sickle cell disease	
• Vasculitic/thrombotic disorders	
• Pain	
• Psychological stress	

TYPES OF WOUND HEALING

1.) Healing by primary intention (aka. primary wound healing or primary closure)

2.) Healing by secondary intention (aka. secondary wound healing or spontaneous healing)

3.) Healing by third intention (aka. tertiary wound healing or delayed primary closure)

- **Primary Intention**; most clean surgical wounds and recent traumatic injuries are managed by primary closure. The edges of the wounds are approximated with steri strips, glue, sutures and/or staples. Minimal loss of tissue and scarring results.
- **Secondary intention;** occurs slowly by granulation, contraction and re-epithelialisation and results in scar formation. Commonly used for 1. Pressure Injuries 2. Leg ulcers 3. Dehisced wounds
- **Delayed Primary Intention;** is defined as the surgical closure of a wound 3 -5 days after the thorough cleansing or debridement of the wound bed. Used for 1. Traumatic wounds, 2. Contaminated surgical wounds.

Dressings-The Basics

- DO:
  - Relieve pain, especially prior to dressing change
  - RELIEVE PRESSURE!
    - TURN AT LEAST EVERY 1-2 HOURS!
    - Consider specialty support surfaces for bed/chair
  - Fill in dead space if wound is deep
  - Protect skin from incontinence by using barrier cream
  - Protect periwound tissue by using Skin Prep

- DO NOT:
  - DO NOT use wet-to-dry dressings!
  - DO NOT wrap tape completely around an extremity!
    - Tourniquet effect
  - DO NOT pull dressing off a wound
    - Can cause further tissue damage
      - Soak to remove

DRESSING SELECTION

- Determined by condition of the wound bed
- Determine dressing according to amount of exudate (drainage)
- Consider cost and availability of dressings

- Assess wound at least every 2 weeks and change treatment if not improved

CLEANSING THE WOUND BED

- Be gentle!
- Saline or wound cleanser

Eliminating necrotic tissue:

- Necrotic tissue increases bioburden
  - Contamination vs. colonization vs. infection
- Debridement-remove devitalized tissue
  - Autolytic-body's enzymes in drainage
  - Enzymatic-Santyl
  - Sharp-surgical
  - Biologic-maggots

- If malodorous wound, try Xeroform gauze or Flagyl gel

Management of devitalized tissue

- Eschar-black necrotic tissue
- Slough-soft, moist, avascular tissue

Dressings:

- Manage drainage while maintaining a moist environment

- Basically 5 categories:
  - Films
  - Hydrogel
  - Hydrocolloids
  - Alginates
  - Foam

Dressings that add moisture

- Films-retain moisture, protect from infection
- Hydrogel-creates moist environment, not for excessive drainage
- Hydrocolloid-moist environment, promotes autolytic debridement

Dressings that absorb moisture

- Foams for moderate drainage
- Calcium alginate for moderate to heavy drainage, hemostasis

Specialty Dressings

- Antimicrobial dressings
  - Silver
  - Cadexomer iodine
- Specialty Treatments
  - Vacuum-assisted wound treatments
  - Hyperbaric oxygen treatment

WOUND CLOSURE METHODS

- **Stitches.**
- **Staples.**
- **Butterfly bandages** are small strips of paper tape that are put across the wound edges to hold them together
- **Adhesive glue** may be used on a small wound that's not very deep.

SUTURE REMOVAL GUIDELINES (AVERAGE)

- Face 5 days
- Scalp 5 days
- Trunk 7-10 days
- Extremities 10-14 days

ARE ANTIBIOTICS INDICATED?

- The vast majority of wounds repaired in the ED do not require antibiotics.

Special circumstances.

1. Wounds associated with animal or human bites are often contaminated
2. Wounds grossly contaminated by dirty water or seawater.
3. Wounds with obvious evidence of cellulitis.

- Based on local resistance patterns.

Wounds appropriate for consultation/referral

1. Wounds with special cosmetic considerations eg. face. (plastic surgery or ENT)
2. Wounds that breach the border of the eyelid (ophthalmology)
3. Wounds with underlying bone, tendon or joint involvement (orthopedics)
4. Wounds to genitals to genitals may require specialized urologic or gynecologic repair

THANK YOU