

Wound Care and Healing Process

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The skin is the largest organ of the human body and plays a vital role in protection, thermoregulation, sensation, immunity, and fluid balance. One of the most important nursing responsibilities is maintaining skin integrity and promoting optimal wound healing.

Impaired skin integrity is uncommon in healthy individuals but represents a major risk in older adults, patients with limited mobility, chronic diseases, trauma, or those undergoing invasive medical procedures.

Wound care is one of the most important skills that nursing students must master. It is not merely a procedural task; it requires an in-depth understanding of skin anatomy, wound physiology, risk factors, assessment techniques, and potential complications. Improper wound management can lead to infection, delayed healing, severe tissue damage, amputation, or even systemic complications such as sepsis.

Skin Integrity:

Skin integrity refers to intact skin and underlying tissue without disruption.

The appearance of the skin and skin integrity are influenced by internal factors such as genetics, age, and the underlying health of the individual, as well as external factors such as activity, genetics, and heredity. Genetics and heredity determine many aspects of an individual's skin, including skin color, sensitivity to sunlight, and allergies. Age influences skin integrity in that the skin of both the very young and the very old is more fragile and susceptible to injury than that of most adults. Wounds tend to heal more rapidly in infants and children, however.

Many chronic illnesses and their treatments affect skin integrity. Individuals with impaired peripheral arterial circulation may have skin on the legs that is easily damaged.

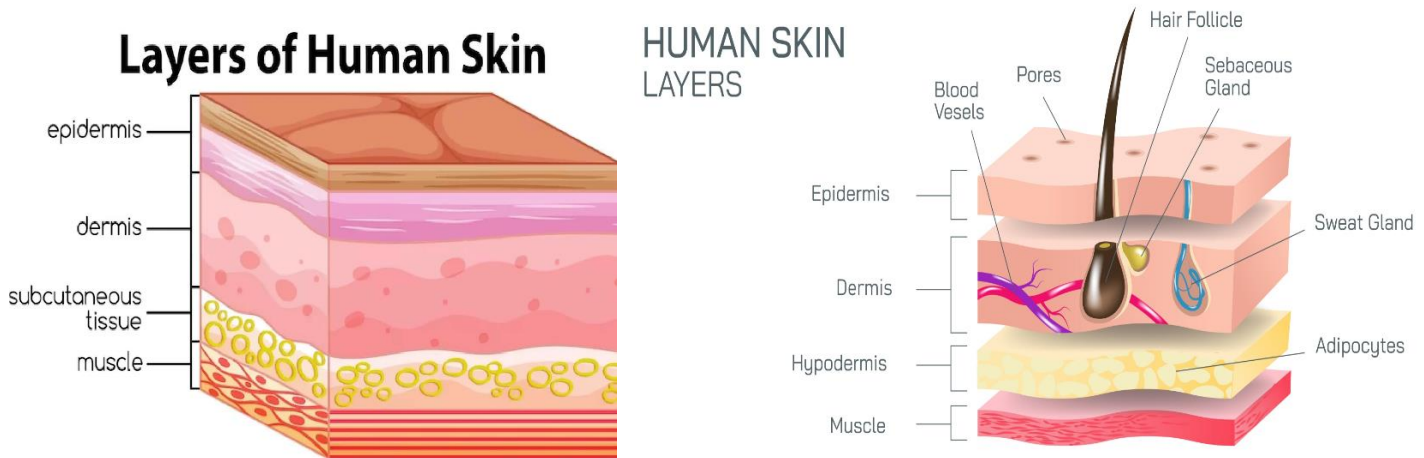
Risk Factors affecting skin integrity

1. **Immobility**
 - Limited movement increases pressure on bony prominences, leading to pressure ulcers. Poor circulation further damages skin integrity.
2. **Age**
 - **Elderly:** Thinner, less elastic skin; slower healing.
 - **Infants/Children:** Fragile, sensitive skin prone to injury.
3. **Dehydration:** Reduces skin turgor and elasticity, making it more susceptible to tears and delayed healing.
4. **Malnutrition:** Protein, vitamin (A, C, E), and zinc deficiencies impair skin repair and immune defense, slowing wound healing.
5. **Chronic disease like diabetes:** Impairs circulation, increases infection risk, and causes neuropathy, which can mask injuries and worsen skin damage.
6. **Moisture**
7. **Friction**

8. **Sunlight Exposure:** UV radiation causes cellular damage, dryness, premature aging, and increases the risk of skin cancer.
9. **Medical Treatments:** corticosteroids, radiation therapy, and certain medications thin skin, delay wound healing, and increase vulnerability to injuries.

Layers of the Skin:

1. **Epidermis** – protective outer layer
2. **Dermis** – contains vessels, nerves, glands, and collagen
3. **Subcutaneous layer** – fat storage, insulation



Skin Functions

Protection, Sensation, Thermoregulation, Vitamin D synthesis, Fluid balance, Immunologic defence, Absorption, and Elimination.

Terminologies

Wound: is a disruption in the normal skin integrity.

Exudate: Fluid produced during inflammation.

Fibroblast: Cells responsible for collagen synthesis.

Scar: Fibrous tissue replacing normal tissue after healing.

Dehiscence: Partial or total separation of wound layers.

Evisceration: Protrusion of internal organs through a wound.

Skin Graft: Surgical transfer of skin to cover a wound.



Dehiscence



Evisceration



Skin Grafting

Skin Graft

Classification of Wounds

By Intent

- **Intentional (surgical):**
 - Result from planned therapeutic procedures.
 - Purposefully inflicted by healthcare providers to achieve treatment goals.
 - Examples: Surgical operations (e.g., tumor removal, appendectomy)
- **Unintentional (trauma):** Result from accidents

Integrity of the skin



Open wounds



Closed wounds



- Open wounds
- Closed wounds
- Complex wounds



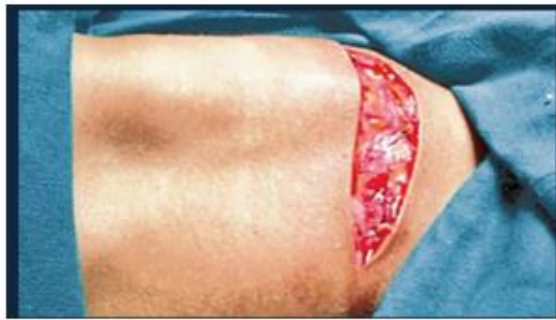
- **Closed wound:** If there are no breaks in the skin, the wound is described as closed. Contusions (bruises) or tissue swelling from fractures are common in closed wounds.
- **Open wound:** A wound is considered open if there is a break in the skin.

Likelihood and Degree of Wound Contamination:

- **Clean wounds** are uninfected wounds in which there is minimal inflammation and the gastrointestinal, genital, and urinary tracts are not entered. Clean wounds are primarily closed wounds.
- **Clean-contaminated wounds** are surgical wounds in which the gastrointestinal, genital, or urinary tract has been entered. Such wounds show no evidence of infection.
- **Contaminated wounds** include open, accidental, and surgical wounds involving a major break in sterile technique or spillage from the gastrointestinal tract. Contaminated wounds show evidence of inflammation.
- **Dirty or infected wounds** include wounds with evidence of a clinical infection, such as purulent drainage or necrosis.



Clean-contaminated wounds



Clean wounds



Contaminated wounds



infected wounds

Length of Time for Healing

- **Acute wounds** are expected to be of short duration
- **Chronic wounds** that exceed the expected length of recovery. Wounds that do not heal within 2 to 4 weeks may be considered chronic. Pressure ulcers are a type of chronic wound.

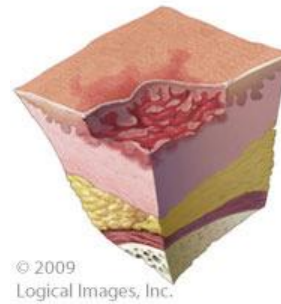
By Depth

- **Superficial Wound**

- **Depth:** Epidermis only.
- **Characteristics:** Red, slightly painful, heals quickly.
- **Examples:** Minor scratches, mild sunburn.

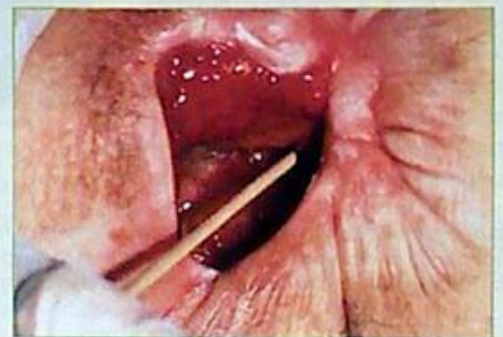
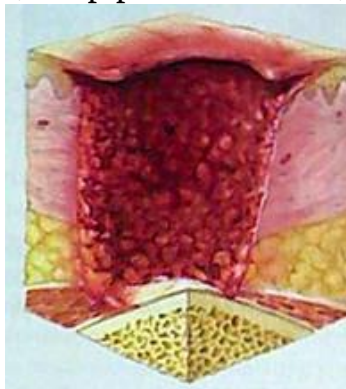
- **Partial-Thickness Wound**

- **Depth:** Epidermis + upper dermis.
- **Characteristics:** Red, may blister, slight bleeding, heals in 1–3 weeks.
- **Examples:** Superficial second-degree burns, deep surface scratches.



- **Full-Thickness Wound**

- **Depth:** All layers of skin and sometimes subcutaneous tissue; may reach muscle or bone.
- **Characteristics:** Often painless initially, slow healing, may require medical intervention.
- **Examples:** Third-degree burns, deep pressure ulcers, major traumatic wounds.



By Cause

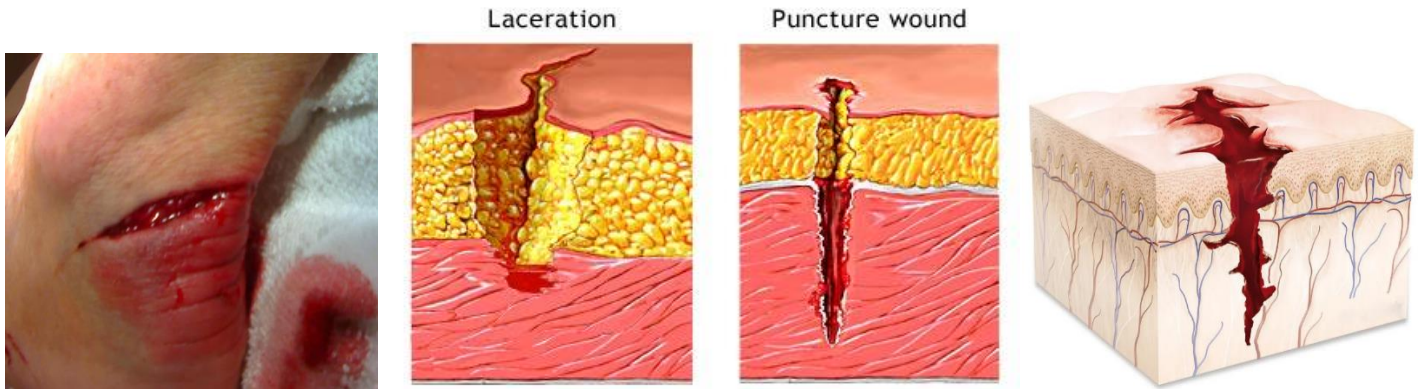
1. Incision

- A clean, straight cut caused by a sharp instrument (e.g., scalpel, knife).
- **Example:** Surgical incision.

2. Laceration

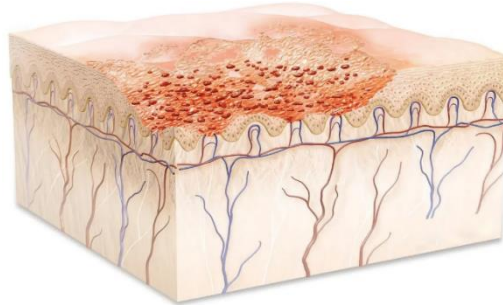
- A jagged or irregular tear of the skin and underlying tissues.
- Often caused by accidents with blunt objects.
- **Example:** Skin torn in a fall or machinery accident.





3. Abrasion

- Superficial scraping of the skin, usually affecting only the top layer (epidermis).
- **Example:** Road rash or skin scraped by rough surfaces.



4. Contusion (Bruise)

- Closed wound caused by blunt force trauma. Skin is intact, but underlying tissues are damaged, and blood leaks into the surrounding tissue.
- **Example:** Bruise after a fall or hit.



5. Puncture

- Small, deep wound caused by a sharp, pointed object. It can damage underlying tissues or organs.
- **Example:** Needle, nail, or animal bite.

6. Thermal Injuries

- Damage caused by **extreme heat or cold**.

7. Chemical Injuries

- Skin or tissue damage caused by contact with corrosive substances.
- **Example:** Acid or alkali burns.



8. Pressure Injuries (Pressure Ulcers/Bedsore)

- Localized damage to skin and underlying tissue caused by prolonged pressure, often over bony prominences.
- **Example:** Ulcers on heels, sacrum, or elbows in bedridden patients.



FIGURE 48-5 Wounds classified by color assessment. **A**, Black wound. **B**, Yellow wound. **C**, Red wound. **D**, Mixed-color wound. (**A** and **D** Courtesy Scott Health Care—A Mölnlycke Company, Philadelphia, PA; **B** and **C** from Bryant RA, Nix DP, editors: *Acute and chronic wounds: current management concepts*, ed 5, St Louis, 2016, Elsevier.)

Pressure Injuries

Pressure injuries are localized damage to the skin and/or underlying tissue, usually over bony prominences, caused by pressure alone or in combination with shear. They were previously called pressure ulcers, pressure sores, or bedsores. Pressure injuries occur in acute care, long-term care, and home settings.



FIGURE 48-2 Pressure ulcer with tissue necrosis.

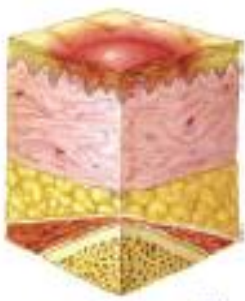
Etiology:

- Pressure injuries result from localized ischemia, a deficiency in blood supply due to compression of tissue between a bony prominence and an external surface (e.g., bed or chair).
- Prolonged pressure reduces oxygen and nutrient delivery, leading to tissue necrosis.

Risk Factors for Pressure Injuries

- **Immobility:** inability to change position frequently
- **Friction and shear:** sliding or dragging of skin over surfaces
- **Inadequate nutrition:** protein, vitamins, and calorie deficiency
- **Fecal and urinary incontinence:** moisture and skin maceration
- **Decreased mental status:** inability to communicate discomfort
- **Diminished sensation:** neuropathy or paralysis
- **Excessive body temperature:** increases the metabolic demand of tissues
- **Advanced age:** thinner skin, reduced elasticity
- **Chronic conditions:** diabetes, vascular disease, or other illnesses that impair healing

Stages of Pressure Injuries



Stage 1



A

Stage 1: Skin is unbroken and reddened, but does not blanch.

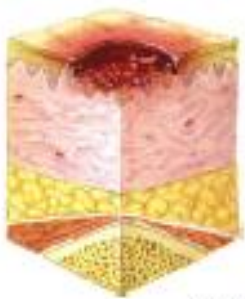


Stage 4



D

Stage 4: Full-thickness tissue loss with damage to underlying structures (muscle, tendon, bone).



Stage 2



B

Stage 2: Partial-thickness skin loss.



Unstageable



E

Unstageable or unclassified: Full-thickness skin loss in which the depth of the wound cannot be determined because it is **covered by slough or eschar**.



Stage 3



Suspected deep tissue injury



C

F

Stage 3: Full-thickness skin loss; damage may extend to subcutaneous tissue; fascia may be involved; edges may roll under (epibole).

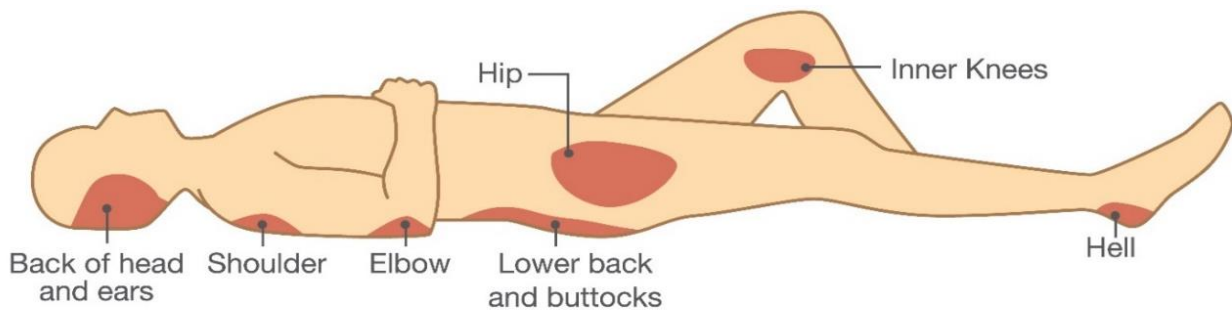
Deep tissue pressure injury—depth unknown: Dark area of discolored, intact skin due to damage of underlying soft tissue.

Risk Assessment Tools for Pressure Ulcers

The tool chosen for use should include data collection in the areas of **immobility, incontinence, nutrition, and level of consciousness.**

A. The Braden Scale for Predicting Pressure Ulcer Risk

B. Norton's Pressure Area Risk Assessment Scoring System.



PRESSURE SORES

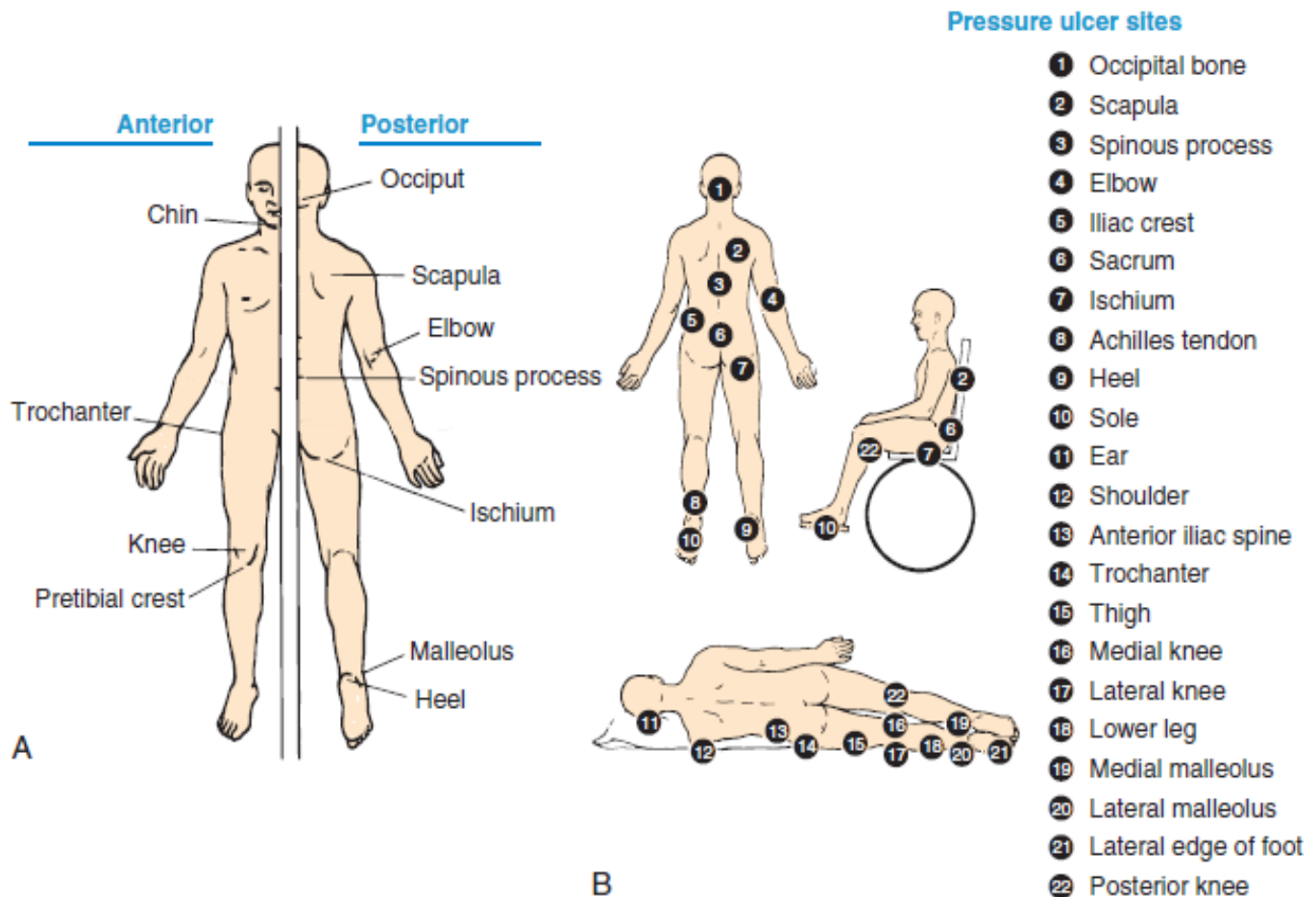


FIGURE 48-9 **A**, Bony prominences most frequently underlying pressure ulcer. **B**, Pressure ulcer sites. (Modified from Trelease CC: Developing standards for wound care, *Ostomy Wound Manage* 20:46, 1988.)

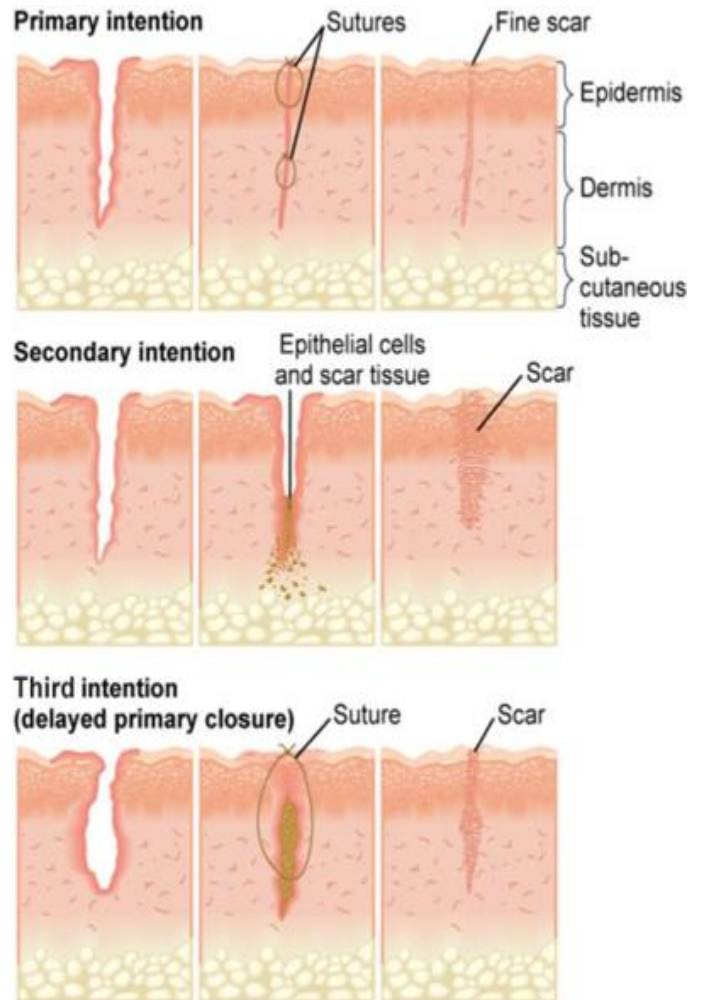
Wound Healing:

- **Wound healing** refers to a living organism's replacement of destroyed or damaged tissue by newly produced tissue.
- Series of events that restore integrity to a damaged tissue.
- In undamaged skin, the epidermis and dermis form a protective barrier against the external environment. When the barrier is broken, a regulated sequence of biochemical events is initiated to repair the damage.

Types of Wound Healing

1. Primary Intention (first intention healing)

Primary intention healing occurs when wound edges are well approximated with minimal or no tissue loss. It is characterised by minimal granulation tissue formation and minimal scarring. A typical example is a closed surgical incision. Another example is the use of tissue adhesive, which is applied to clean lacerations or incisions and usually results in less noticeable scarring. Example: surgical incision.



2. Secondary Intention:

Secondary intention healing differs from primary intention healing in

- Extensive tissue loss.
- Granulation tissue formation.
- Slower healing and larger scar.
- Example: pressure injury.

3. Tertiary Intention (Delayed Primary):

Wounds that are left open for 3 to 5 days to allow edema or infection to resolve or exudate to drain and are then closed with sutures, staples, or adhesive skin closures.

Phases of Wound Healing:

Wound healing is a **dynamic, orderly biological process** that occurs in three overlapping phases. These phases overlap, and disruption of any phase (e.g., infection, poor perfusion, diabetes) may delay healing or lead to chronic wounds.

1. Inflammatory Phase:

- The inflammatory phase begins immediately after injury and lasts 3 to 6 days.
- Two major processes occur during this phase: **hemostasis and phagocytosis**.
- Blood vessels constrict to control bleeding, followed by dilation, which allows immune cells to reach the wound.

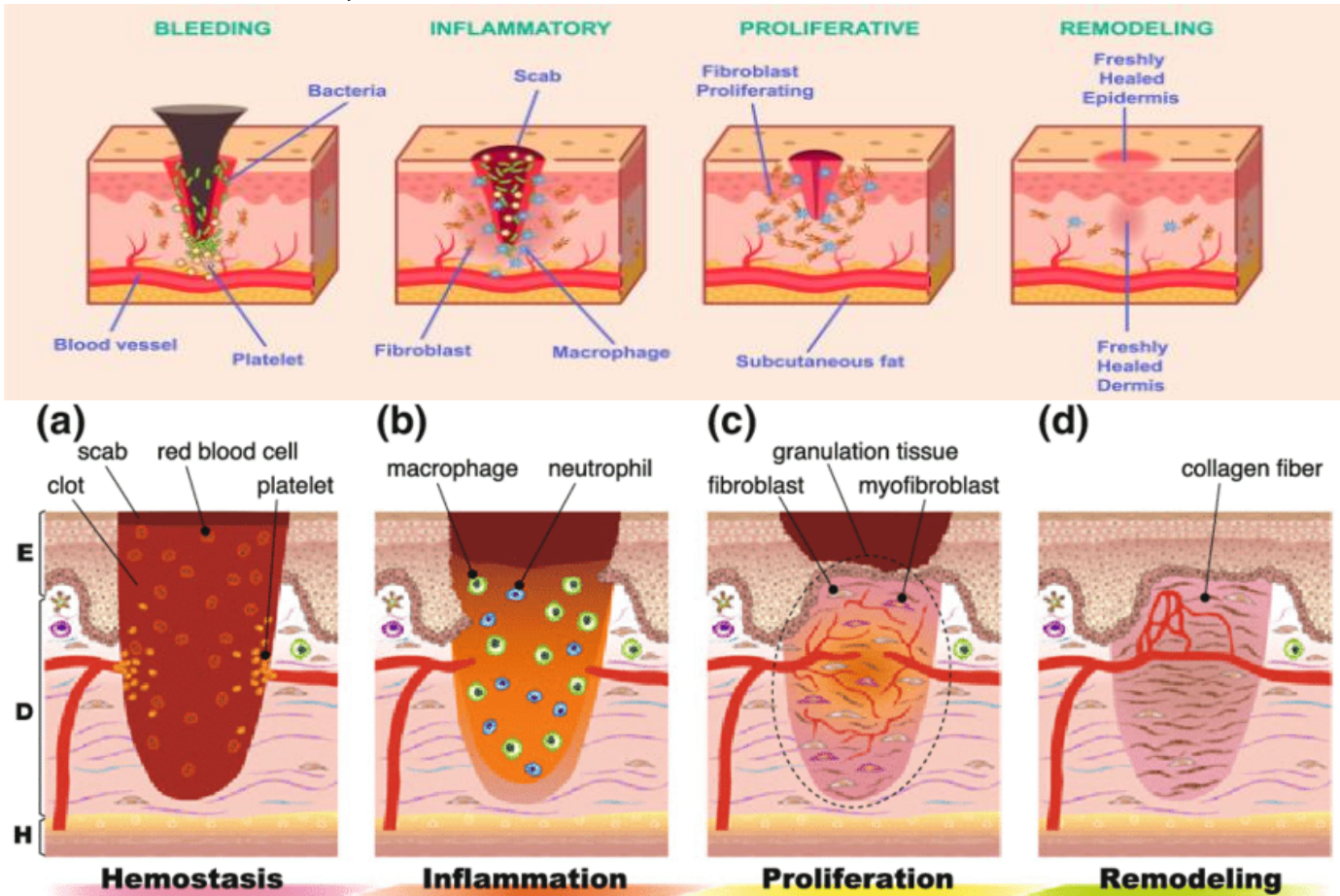
- Inflammation helps remove debris and foreign particles.

2. Proliferative Phase (3–21 days)

- Begins a few days after the injury and can last for several weeks
- New tissue is formed to replace the lost or damaged tissue.
- Fibroblasts produce collagen to build a framework for healing.
- Epithelial cells multiply to cover the wound surface.

3. Remodeling/ Maturation Phase (Weeks to months, sometimes years)

- Can last for months to years, depending on the wound's severity.
- Collagen is remodeled to increase tissue strength.
- Scar tissue forms, and the wound contracts.



Types of Wound Drainage (Exudates)

Exudate is the fluid that comes out of a wound. Its type gives important information about the wound condition.

1. Serous

- Clear, thin, watery fluid
- Normal in healing wounds
- Indicates **healthy healing**

2. Purulent

- Thick, cloudy fluid
- Yellow, green, or brown
- Indicates **infection**

3. Serosanguineous

- Pink, watery fluid
- Common in **surgical wounds**
- **Normal in early healing**

4. Sanguineous

- Red, bloody fluid
- Seen in fresh or **deep wounds**
- Indicates bleeding

Type	Appearance
Serous	Clear, watery plasma 
Purulent	Thick, yellow, green, tan, or brown 
Serosanguineous	Pale, pink, watery; mixture of clear and red fluid 
Sanguineous	Bright red; indicates active bleeding 

Factors Affecting Wound Healing

Wound healing is influenced by several factors that can be classified into **local** and **systemic** factors.

I. Local Factors

1. **Blood Supply and Oxygenation:** Adequate blood flow and oxygen are essential for cell growth and tissue repair.
2. **Infection:** Infection prolongs inflammation and delays wound healing.
3. **Edema and Pressure:** Edema and continuous pressure reduce blood flow and slow healing.
4. **Necrotic Tissue or Foreign Bodies:** Dead tissue or foreign material interferes with new tissue formation and increases infection risk.
5. **Wound Size, Depth, and Location:** Large, deep wounds or wounds over joints heal more slowly.

II. Systemic Factors

1. **Age:** Healing is generally slower in older adults.

2. **Nutrition:** Adequate protein, vitamins (A and C), and minerals (zinc) are necessary for tissue repair.
3. **Chronic Diseases:** Conditions such as diabetes mellitus, anemia, and vascular diseases delay healing.
4. **Medications:** Corticosteroids and chemotherapy drugs impair the healing process.
5. **Smoking:** Smoking reduces oxygen delivery to tissues and delays healing.
6. **Stress:** Physical or psychological stress weakens the immune response and slows healing.
7. **Hydration:** Dehydration reduces tissue perfusion and delays wound healing.

Wound Complications

- Infection
- Hemorrhage
- Hematoma: Blood accumulation under tissue
- Dehiscence
- Evisceration
- Fistula formation
- Chronic non-healing wounds

Nursing Management of Wounds

Not all surgical wounds require frequent dressing changes. Some surgical dressings, applied in the operating room, may remain until suture removal. However, many wounds require regular dressing changes to prevent infection.

1. Emotional Support

- Encourage the patient to express feelings about the wound and its impact.
- Identify anxiety or fear related to wound size, location, appearance, or odor. Accept the patient's feelings.
- Maintain neutral body language; avoid reactions that may communicate negativity about the wound.

2. Monitor Vital Signs

- Record temperature, pulse, respirations, blood pressure, and assess pain regularly.

3. Wound Assessment

- **Inspection:** Observe wound colour, edges, and surrounding tissue.
- **Dehiscence:** Note size and location if present.
- **Dressing Assessment:** Check location, color, consistency, odor, and saturation of dressings. Count saturated gauze or measure drainage.
- **Swelling:** Minimal to moderate swelling is normal early in healing.
- **Pain:** Expect moderate to severe postoperative pain for 3–5 days; sudden or persistent severe pain may indicate hemorrhage or infection.
- **Drains (if present):** Check placement, security, drainage amount and character, and functioning of collection devices.

4. Pain Management

- Identify wound-related pain using an objective rating scale.

- Administer prescribed analgesics 30 minutes before dressing changes if pain is anticipated.

5. Wound Care and Dressing

- Clean and apply dressings according to assessment findings and institutional policy.
- Ensure aseptic technique to prevent infection.

Wound Drainage Systems

Surgical drains are inserted to permit the drainage of excessive serosanguinous fluid and purulent material and to promote healing of underlying tissues. These drains may be inserted and sutured through the incision line, but they are most commonly inserted through stab wounds a few centimetres away from the incision line so that the incision itself may be kept dry. Without a drain, some wounds would heal on the surface and trap the discharge, potentially forming an abscess.

A closed wound drainage system consists of a drain connected to either an electric suction or a portable drainage suction, such as a Hemovac or Jackson-Pratt. The closed system reduces the potential for microorganisms to enter the wound through the drain. The drainage tubes are sutured in place and connected to a reservoir. For example, the Jackson-Pratt drainage tube is connected to a reservoir that maintains constant low suction. These portable wound suction devices also provide for accurate measurement of the drainage.

