

# In The Name of God




# Pressure Injury



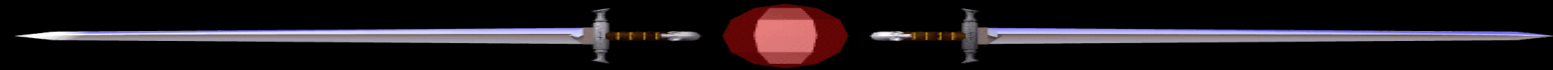
- **Hospital Stay**
- **Cost**
- **Pain**
- **Complication**
- **Staff Workload**

# Current State in Wound Management

- 
- **High Pressure Ulcers in Hospitals**
  - **No Responsibility**
  - **No Statistics**
  - **No Systematic Program**

**Pressure Ulcer ( III and IV )  
is Never Event**

# Team Approach in Wound Management



- **Nurse**
- **Wound Manager Nurse**
- **Safety Control Nurse**
- **Infection Control Nurse**
- **Physician**
- **Dietician**
- **Physical Therapy**



# Team Approach in Wound Management



- **Prevention**
- **Control**
- **Management**

**Education, Education, Education**  
**Supervision**

# Wound Management Supervisor



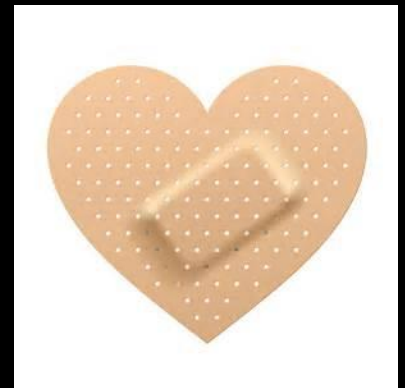
- Education
- Supervision
- Data Collection
- Documentation

**Education, Education, Education  
Supervision**

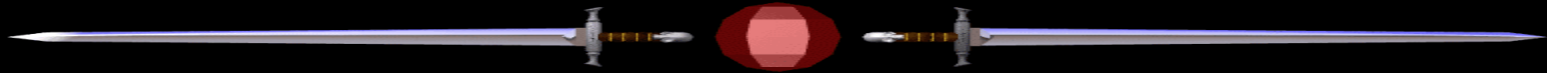
# Pressure Injury

Dr Bahram Ghaderi  
Ph-D in Surgical Nursing

[Ghaderi47@yahoo.com](mailto:Ghaderi47@yahoo.com)  
Mobile : 09143141493




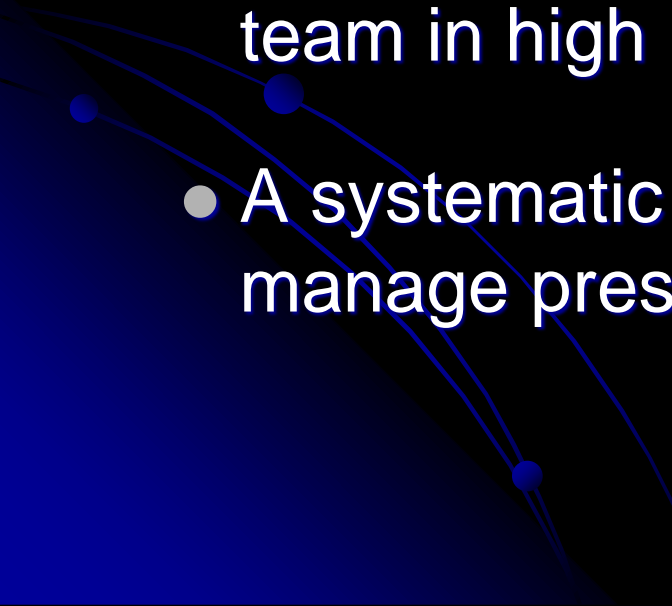
# Pressure Injury



A pressure Injury is a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shearing and friction forces and moisture.



# Pressure Injuries May Not be Preventable

- 
- Aggressive measures can reduce but not eliminate the incidence of pressure ulcers
  - Can develop despite best efforts of clinical team in high risk patients
  - A systematic approach to recognize and manage pressure ulcers is needed
- 

# Classification of Pressure Injuries



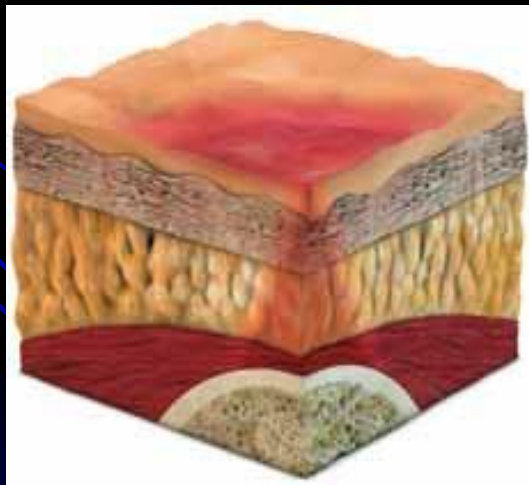
The staging of pressure ulcers, as defined by national guidelines (NPUAP), allow for common understandings for healthcare professionals. The staging of a pressure ulcer reflects the amount of tissue damage.

- STAGE I
- STAGE II
- STAGE III
- STAGE IV
- SUSPECTED DEEP TISSUE INJURY (DTI)
- UNSTAGEABLE



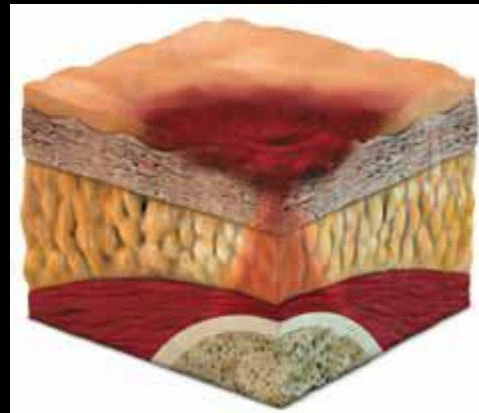
# Stage I Pressure Injury

- **Intact skin with non-blanchable redness** of a localised area usually over a bony prominence.
- Darkly pigmented skin may not have visible blanching; its colour may differ from the surrounding area.
- The area may be **painful, firm, soft, warmer or cooler** compared to adjacent tissue.
- May be difficult to detect in individuals with dark skin tones.
- May indicate “at risk” persons (a heralding sign of risk).



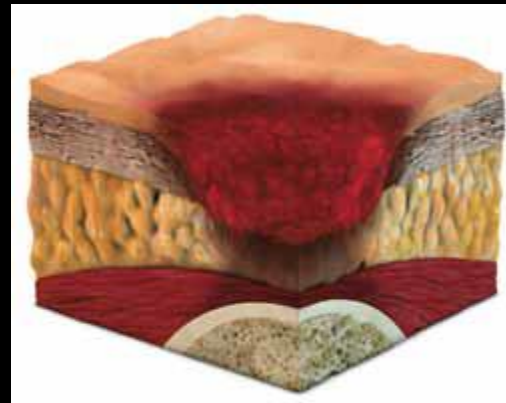
# Stage II Pressure Injury

- Partial thickness loss of dermis presenting as a **shallow, open wound with a red-pink wound bed, without slough.**
- May also present as an intact or open/ruptured **serum-filled blister.**
- Presents as a shiny or dry, shallow ulcer without slough or bruising.
- **Stage II should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation.**



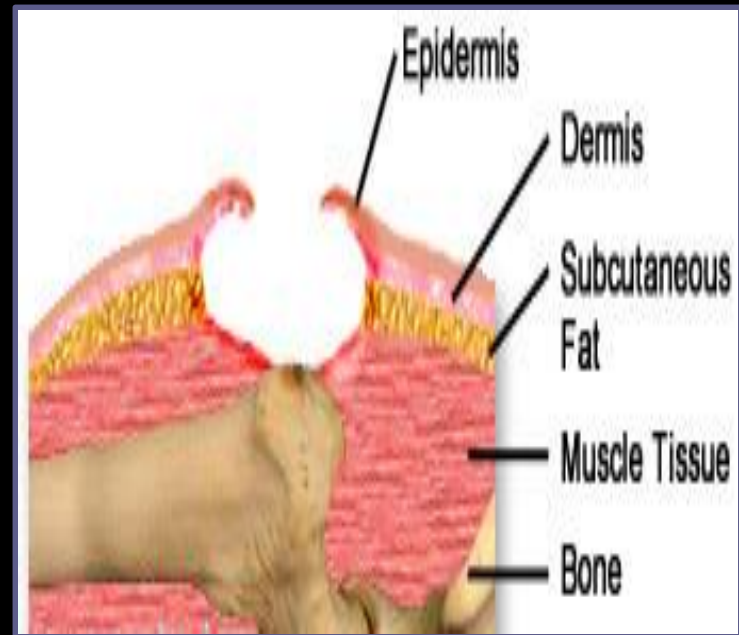
# Stage III Pressure Injury

- 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 tunnelling.
- The depth of a stage III PI varies by anatomical location. **The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and stage III PIs can be shallow.** In contrast, areas of significant adiposity can develop extremely deep stage III PIs. **Bone or tendon is not visible or directly palpable.**

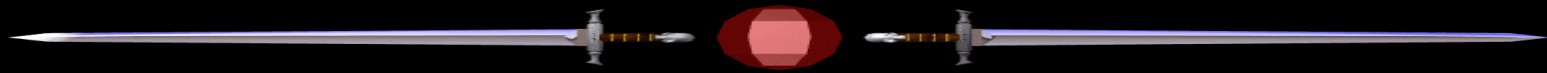


# Stage IV Pressure Injury

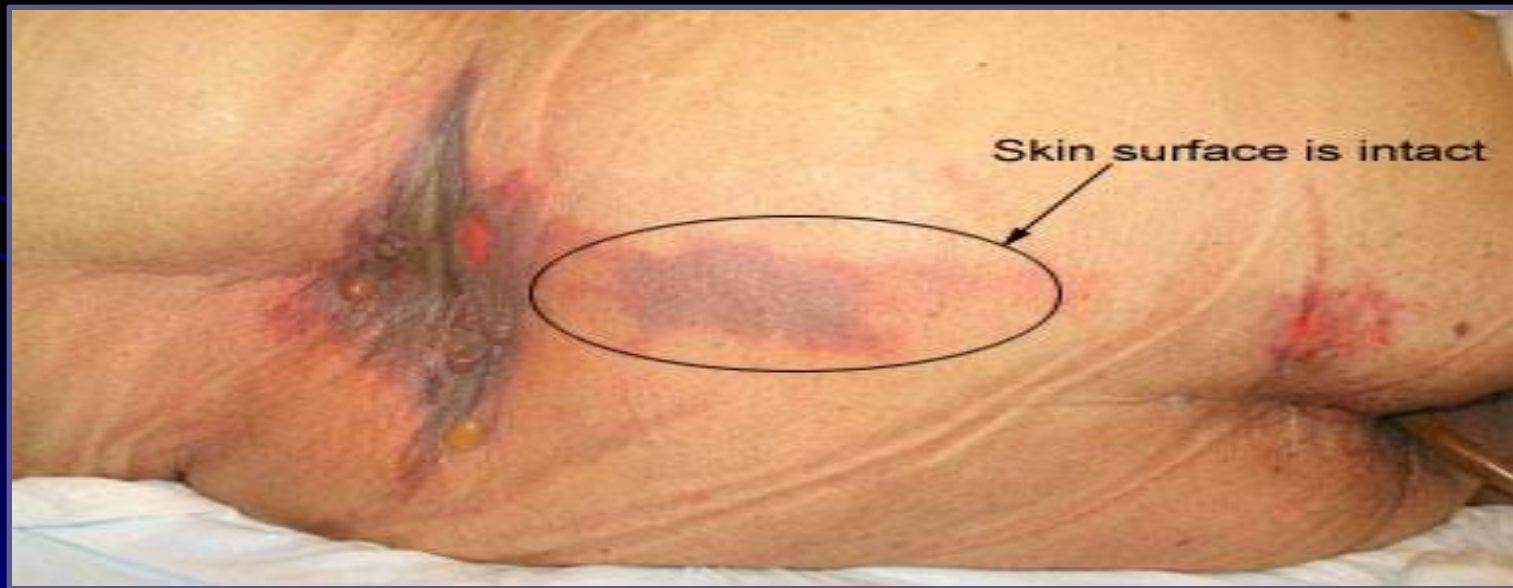
Full thickness tissue loss with **exposed bone, tendon or muscle**. **Slough or eschar** may be present on some parts of the wound bed. Often include undermining and tunneling.



# Suspected Deep Tissue Injury



Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

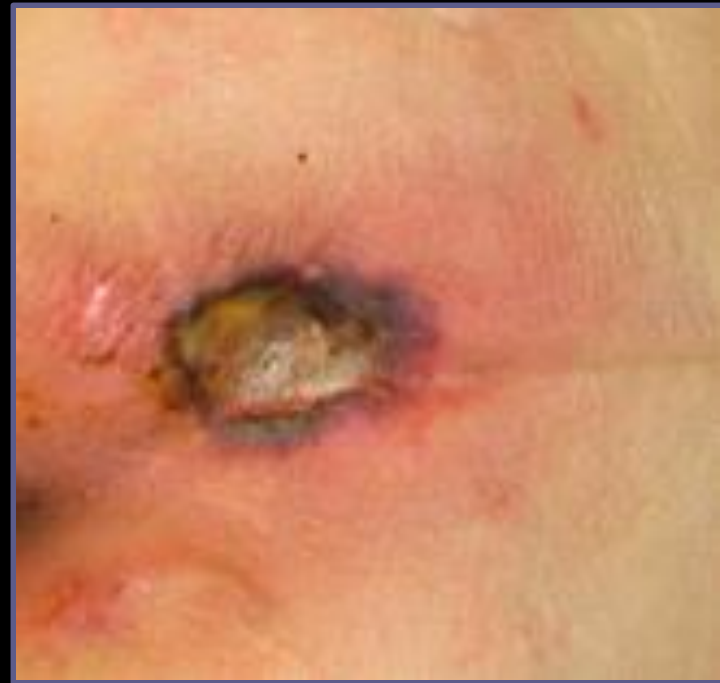




# Unstageable Pressure Injury



Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. Base of the wound cannot be visualized.





# Common Pressure Injury sites

## Supine:

23% sacro-coccygeal

8% heels

1% occiput; spine

## Sitting:

24% ischium

3% elbows

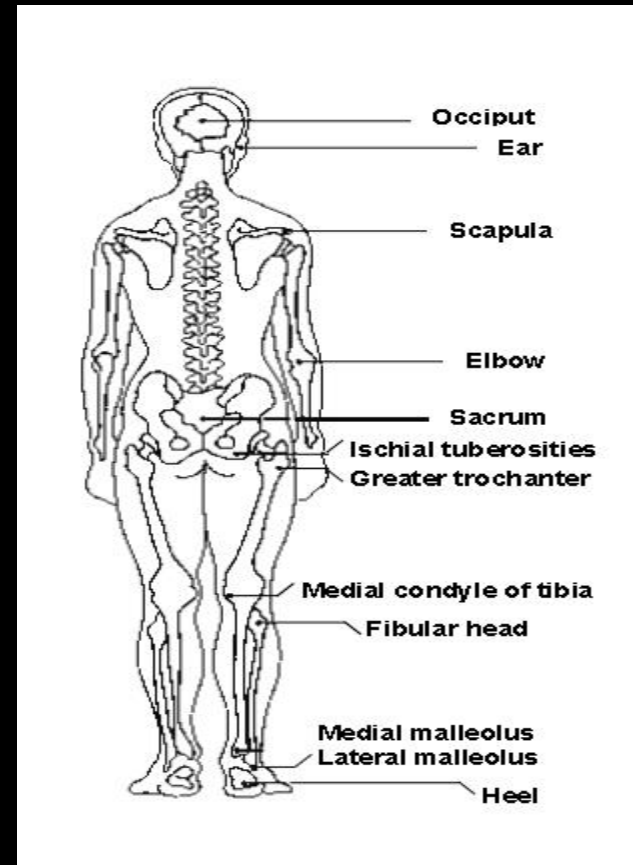
## Lateral:

15% trochanter

7% malleolus

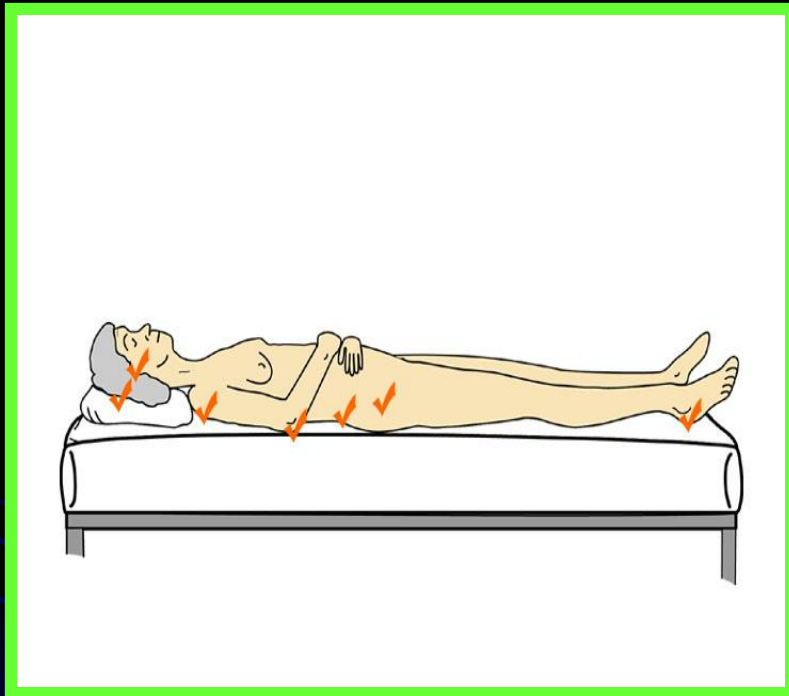
6% knee

3% heels

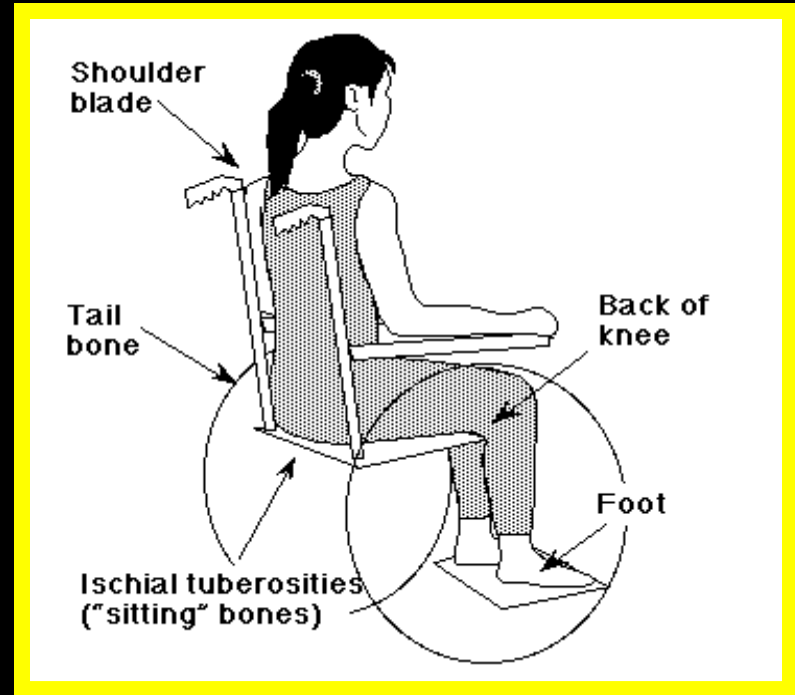


# Common places to find a pressure Injury

Bed Fast



Chair Fast



**Pressure ulcers usually form over a bony part of the body**

# Variations in neonatal skin



**Deficient in collagen Dermal instability**

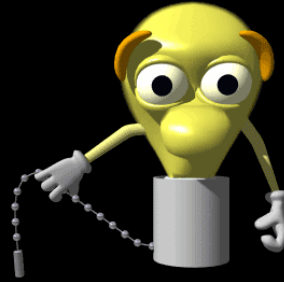
**Underdevelopment of the Stratum Corneum**

**Decreased cohesion between Epidermis and Dermis**

**Dermis of the newborn is only 60% as thick as adult dermis**

**Neonates may also have excessive evaporative heat and fluid losses**

**Increased susceptibility to infection, toxicity from topically substances**

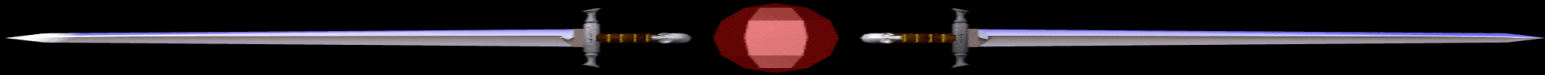


# The greatest risk factor for Pressure Injury

between hospitalized neonates  
is the belief on the part of health professionals,

**that the PrIs are not a problem in neonates**

# **Pressure Injury III and IV are a NEVER-EVENT**



**Hospital acquired pressure Injuries (HAPI) have been  
classified as a NEVER-EVENT**

**Never-Events are hospital associated problems that occur in  
the hospital/institutional setting that can be prevented**

**Never-Events will not be reimbursed by insurance companies**

**Never-Events must be reported**

**Hospital Acquired pressure injuries may not be covered,  
the hospital will have to absorb the cost of these injuries**

# Prl in Neonates



**Among neonates and children, more than 50% of pressure ulcers are related to equipment and devices.**

**Frequent skin assessments under blood pressure cuffs, transcutaneous oxygen pressure probes, tracheostomy plates, nasal prong and mask CPAP, arm boards, plaster casts, and traction boots are important preventive measures.**

**Beds, cribs, and isolettes must be inspected to ensure that tubing, leads, toys, and syringe caps are not under or on top of patient's skin.**

**The skin around nasogastric and orogastric tubes, head dressings, and hats should be assessed for pressure damage.**













# Pressure injury risk

## Pressure

Impaired mobility

Impaired activity

Impaired sensory perception

## Tissue tolerance

### Extrinsic factors

Moisture

Shear

Friction

### Intrinsic factors

Nutrition

Demographics

Oxygen delivery

Skin temperature

Chronic illness

# Risk Assessment

## **PrI risk-factors in General :**

Diabetes Mellitus , Peripheral Vascular Disease , Anemia, CVA , MS  
COPD & lung disease

## **PrI risk-factors in OR :**

Type of surgery , Type of operation , Time in anesthesia , Time in surgery  
Vasopressors , Hypothermia ( duration) , IABP

## **PrI risk-factors in ICU :**

BP in admission , Vasopressors , Sedatives , Narcotics , MV , IABP  
Restraint , GCS



## Braden Risk Assessment Scale

Sensory/ Mental	Moisture	Activity	Mobility	Nutrition	Friction/ Shear
1. Totally limited	1. Constantly moist	1. Bedfast	1. 100% immobile	1. Very poor	1. Frequent sliding
2. Very limited	2. Very moist	2. Chairfast	2. Very limited	2. < ½ daily portion	2. Feeble corrections
3. Slightly limited	3. Occasionally moist	3. Walks w/ assistance	3. Slightly limited	3. Most of portion	3. Independent corrections
4. No impairment	4. Dry	4. Walks w/out assistance	4. Full mobility	4. Eats everything	
<p style="text-align: center;">Total Braden Score _____</p> <p style="text-align: center;">15-16 Mild Risk    12-14 Moderate Risk    &lt;12 High Risk 15-18 is considered Mild Risk for those &gt; 75 years</p>					

## Braden Q Scale

Sensory Per.	Moisture	Activity	Mobility	Nutrition St.	Friction/ Shear	Tissue Perfusion & Oxygenation
--------------	----------	----------	----------	---------------	--------------------	-----------------------------------

# Medical Device-Related Pressure Injury ( MDRPI )



- Localized injury to the skin or underlying tissue as a result of sustained pressure from a device (Black, 2010)
  - Tissue injury usually mimics the shape of the device
  - Tend to progress rapidly due to lack of adipose tissue



# Comparison

Location	Device	Non Device
Head/Face/Neck	70.3%	7.8%
Heel/Ankle/Foot	20.3%	16.9%
Coccyx/Buttocks	7.8%	67.5%
Sacrum	1.6%	16.9%

















# PU Prevention Recommendations

- Risk assessment
- Skin assessment
- Minimize pressure
- Minimize friction and shear
- Manage incontinence/moisture
- Assessment and management of pain
- Manage of nutrition and hydration needs
- Provide patient and family members education



# Skin Assessment

**Bundle Care**

**Clinical Guidelines**

**Clinical Pathway**

A clinical pathway is a structured multidisciplinary plan of care designed to support the implementation of clinical guidelines.



The first step in clinical pathway is the performance of a

**comprehensive skin assessment**

Prevention start with this seemingly easy task

# Comprehensive Skin Assessment

Process by which the entire skin of every individual is examined for any abnormalities.

It requires **looking and touching** the skin

from ***head to toe***

With a particular emphasis ***over bony prominences***

***Inspection*** and ***palpation*** are key

# Comprehensive Skin Assessment

Usual practice includes assessing the following parameters :

*Temperature , Color , Moisture level , Turgor , Skin integrity*

Persistent erythema  
Non-blanching hyperaemia  
Blisters  
Localised oedema  
Localised induration  
Purplish/bluish localised areas



# Comprehensive Skin Assessment

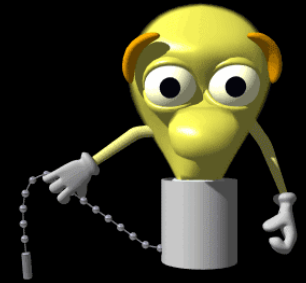
Hand washing before and after the examination, or use gloves before the procedur are important.

Make sure the patient is comfortable.

Minimize exposure of body parts.

be sure to have good lighting.

Ask for assistance to turn the patient , if needed.

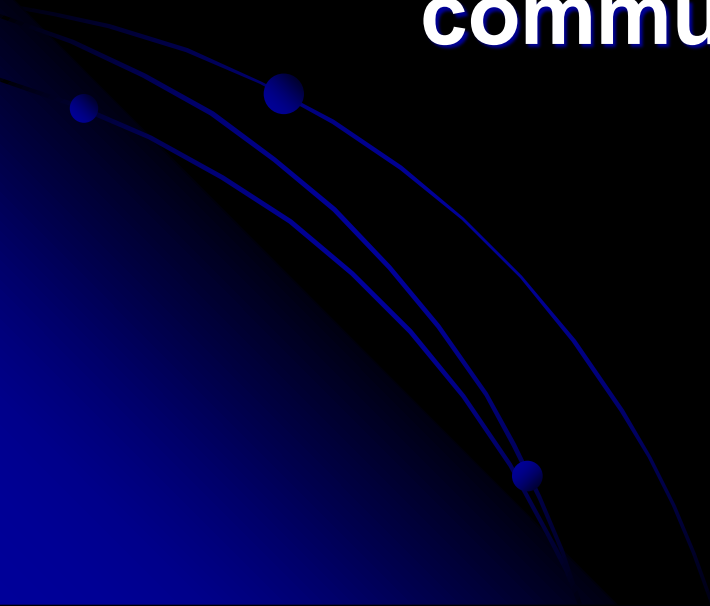


Look at the skin underneath any devices such as oxygen tubing, indwelling catheter, restraint, ...



# Comprehensive Skin Assessment

the result of the comprehensive skin assessment must be documented in the patient's **medical record** and **communicated** among staff



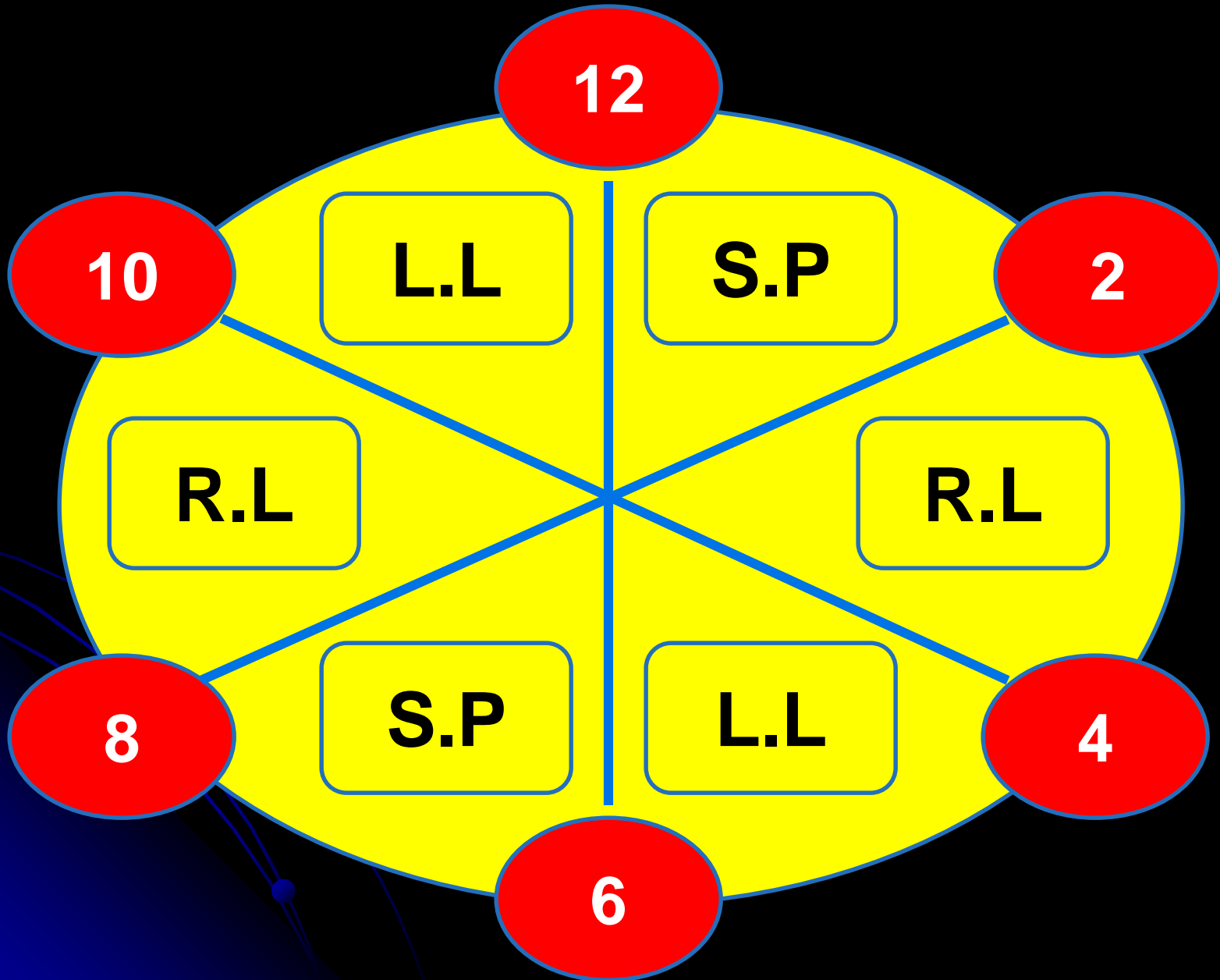
# Minimize pressure

## Minimize friction and shear

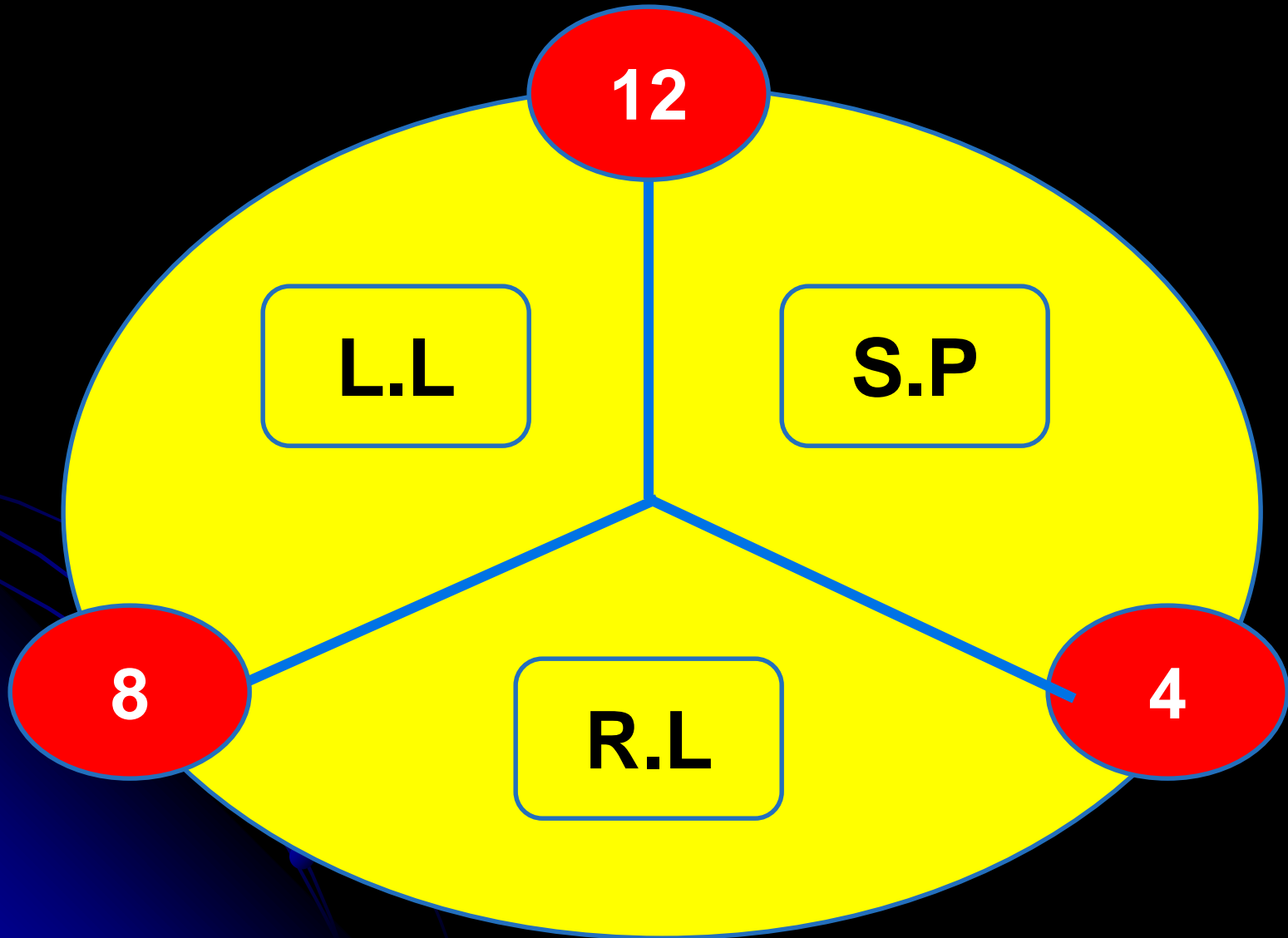
- Reposition bed-bound persons at least every two hours and chair-bound persons every hour consistent with overall goals of care.
- Consider postural alignment, distribution of weight, balance and stability, and pressure redistribution when positioning persons in chairs or wheelchairs.
- Teach chair-bound persons, who are able, to shift weight every 15 minutes.
- Use a written repositioning schedule.



# Turn Clock Position Model



# Turn Clock Position Model In Neonates & Pediatrics in ICUs



# Minimize pressure

## Minimize friction and shear

- Place at-risk persons on pressure-redistributing mattress and chair cushion surfaces.
- Avoid using donut-type devices and sheepskin for pressure redistribution.
- Use pressure-redistributing devices in the operating room for individuals assessed to be at high risk for pressure ulcer development.
- Use lifting devices (e.g., trapeze or bed linen) to move persons rather than drag them during transferring and position changes.

# Minimize pressure

## Minimize friction and shear

- Use pillows or foam wedges to keep bony prominences, such as knees and ankles, from direct contact with each other.
- Use devices that eliminate pressure on the heels.
- For short-term use with cooperative patients, place pillows under the calf to raise the heels off the bed.
- Maintain the head of the bed at or below 30° or at the lowest degree of elevation consistent with the patient's medical condition.



# Manage incontinence/moisture

- Individualize bathing frequency.
- Use a mild cleansing agent.
- Avoid hot water and excessive rubbing.
- Use lotion after bathing.
- Establish a bowel and bladder program for patients with incontinence.
- When incontinence cannot be controlled, cleanse skin at time of soiling, and use a topical barrier to protect the skin.



# Manage incontinence/moisture

- Select under pads or briefs that are absorbent and provide a quick drying surface to the skin.
- Consider a pouching system or collection device to contain stool and to protect the skin.
- Use moisturizers for dry skin.
- Minimize environmental factors leading to dry skin such as low humidity and cold air.
- Avoid massage over bony prominences

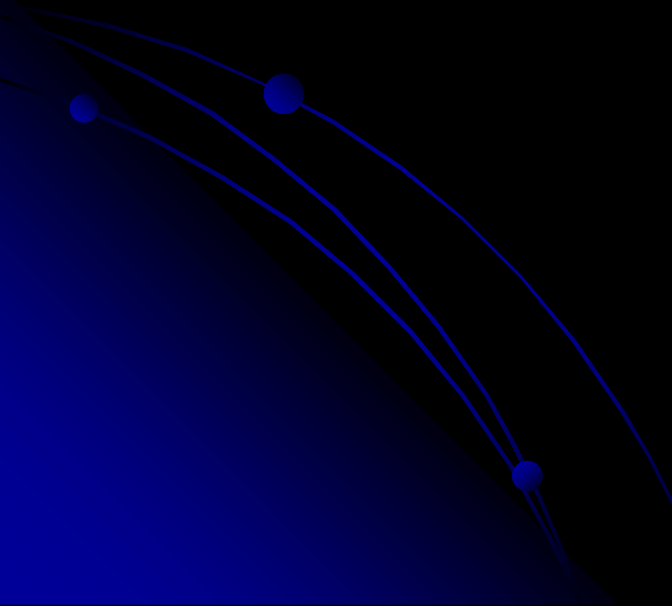
# Manage of nutrition and hydration needs

- Identify and correct factors compromising protein/calorie intake consistent with overall goals of care.
- Consider nutritional supplementation/support for nutritionally compromised persons consistent with overall goals of care.
- If appropriate offer a glass of water when turning to keep patient/resident hydrated.
- Multivitamins with minerals per physician's order.
- Vitamins A, C, and E and zinc.



# Complications

*cellulitis , osteomyelitis , septic  
arthritis sepsis , endocarditis ,  
meningitis*



# Wound Location



The wound location should be precisely identified.

Use directional terms such as left or right, medial or distal, and the correct anatomic location.

- Buttocks: sacral, coccyx, ischium, trochanteric, etc.

Abdomen: RLQ, RUQ, Suprapubic, etc.

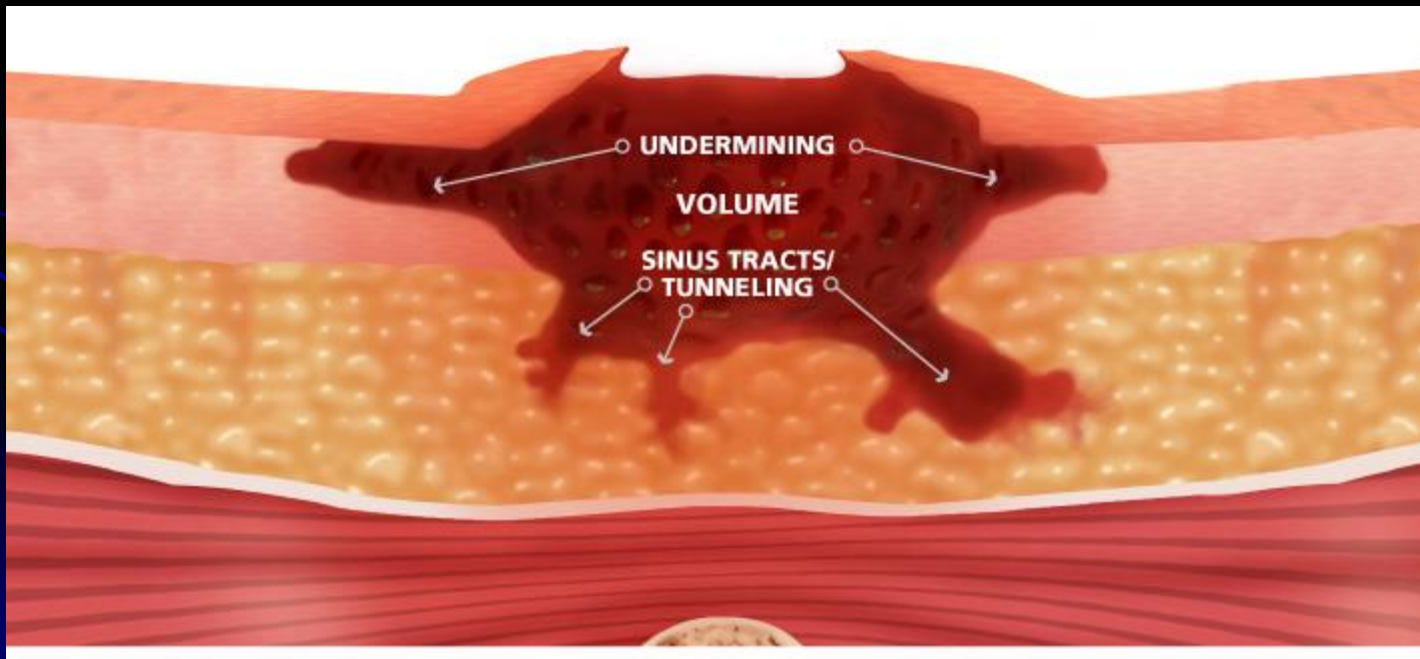
# Wound Dimensions/Size



Length— head to toe dimension

Width— side to side; greatest width perpendicular to the length

Depth— from visible to the deepest area

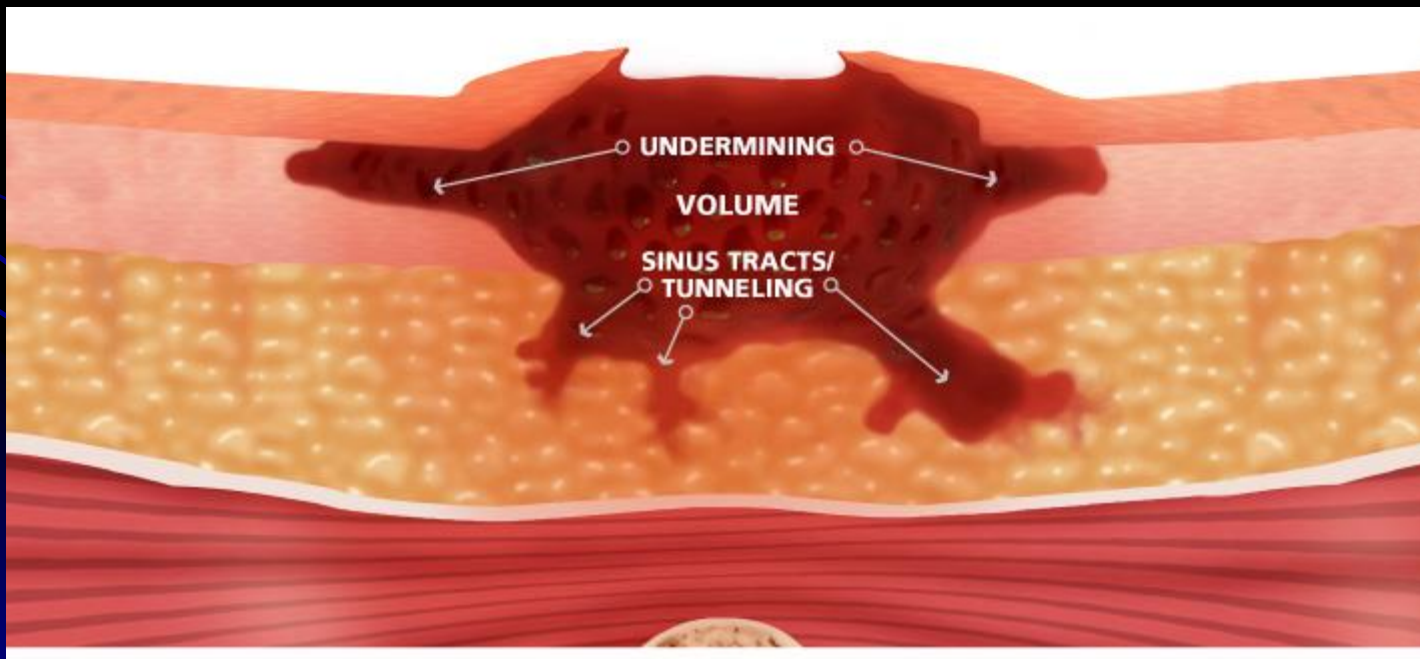


# Tunneling , Undermining



Tunneling is a pathway that can extend in any direction from the wound and results in dead space with potential for abscess formation. Also called sinus tract

Undermining is a area of tissue destruction underlying intact skin along the wound margins.





# Wound Base



## Healthy Tissue

- ✓ Granulation – red/pink, moist and beefy appearance
- ✓ Epithelialization - dry, deep pink to pearly pink.
- ✓ Maturation - light purple from edges in full thickness wounds or may form islands of superficial wounds

## Necrotic tissue

Slough – yellow, tan

Eschar – black, brown

# Black Necrosis



# Yellow Necrosis



# Granulation

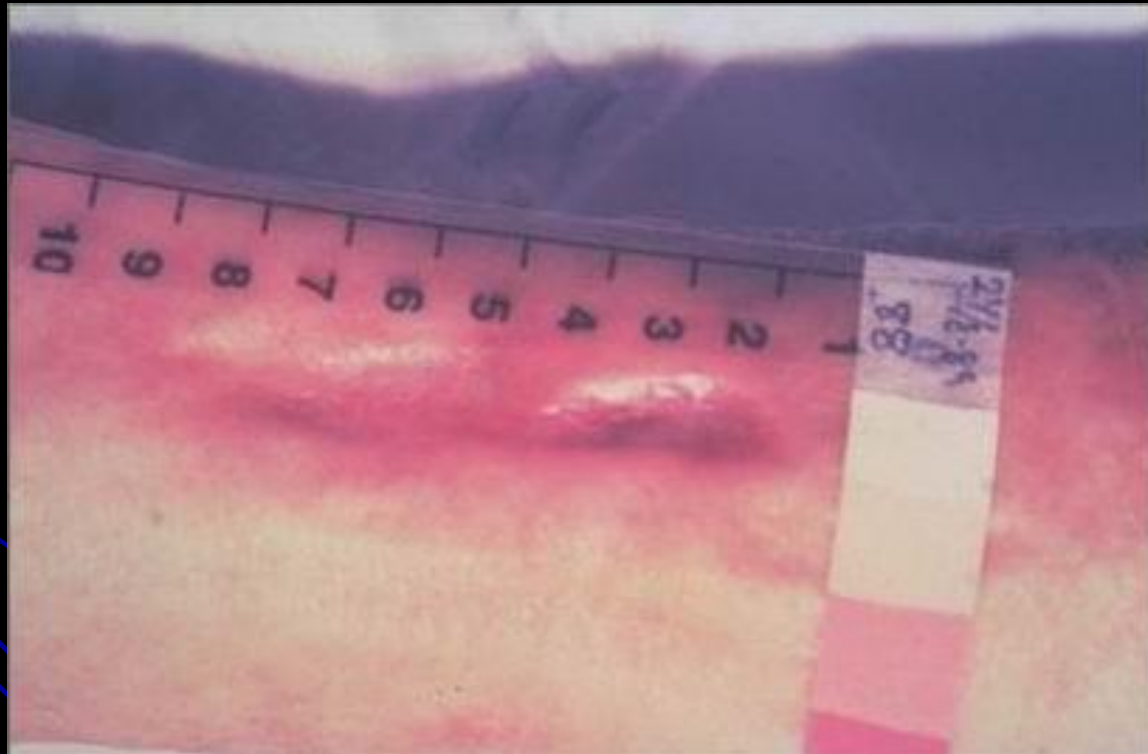




# Epithelialization



# Maturation





# Periwound Skin



4 cm of the wound edges

Edema / Pitting, Non pitting

Induration

Erythema

Periwound Pain

Maceration

Rash

Absence of hair

# Wound Exudate



**Serous** – clear to light color , Thin, watery

Normal during inflammatory and proliferative phases of healing.

**Serosanguinous** – light red to pink , Thin, watery

Normal during inflammatory and proliferative phases of healing.

**Sanguineous** – Red , Thin, watery

Indicates disruption of blood vessels

**Purulent** – Yellow or tan , thick

Signals wound infection

# 1/ mechanism of onset



Surgical wounds generally heal faster than traumatic wounds, because there is less cell and tissue damage in surgical wounds.

Wound due to underlying pathology often become chronic, due to the comorbidities and changes in the wound bed.

## 2/ Wound dimensions



Wound shape, size and depth affect the rate of healing.

Circular wound close more slowly than square or rectangular wounds, which close more slowly than linear wounds.

- Large and full-thickness wounds heal more slowly than small or superficial wounds.

Changes in wound surface over time can assist with predicting wound healing.

# 3/ Temperature



Wound and environmental temperature affect wound healing.

Maintaining a normothermic wound environment at 37-38 degrees celsius has been shown to improve wound healing.

- Chronic wounds have been found to be hypothermic, measuring 5-6 degrees below normal body temperature.

## 4/ Wound hydration



Desiccation slows epithelial cell migration resulting in delayed healing.

When a wound is covered, its fluids are trapped, maintaining a moist environment.

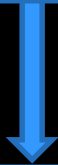
These fluids:

- Stimulate collagen synthesis*
- Induce angiogenesis*
- Enhance contraction*
- Contain growth factors and enzymes*

There is a delicate balance between a moist wound and a wet wound.



Not enough  
moisture



**dry**  
wound bed

**painfull**

**slower healing**

**Too much  
moisture**



**macerated**  
periwound

**Possible  
increase  
in wound size**

**Slower healing**

## *5/ Necrotic tissue or foreign bodies*



Necrotic tissue is dead, devitalized tissue present in the wound bed.

Necrotic tissue promotes infection

Foreign bodies prolong inflammation

**Necrotic tissue**  
Promotes infection

The diagram features two large arrows pointing in opposite directions. The left arrow is red and points left, containing the text 'Necrotic tissue Promotes infection'. The right arrow is yellow and points right, containing the text 'Foreign bodies Prolong inflammation'. The background is dark blue with some faint, curved lines and dots.

**Foreign bodies**  
Prolong inflammation

## 6/ infection



Wound infection is the invasion and multiplication of microorganisms in body tissues.

High concentration of microorganisms impair wound healing by competing with body cells for oxygen and energy, and by secreting cytotoxic substances.

- Infection :

Prolongs inflammation

Promotes wound dehiscence

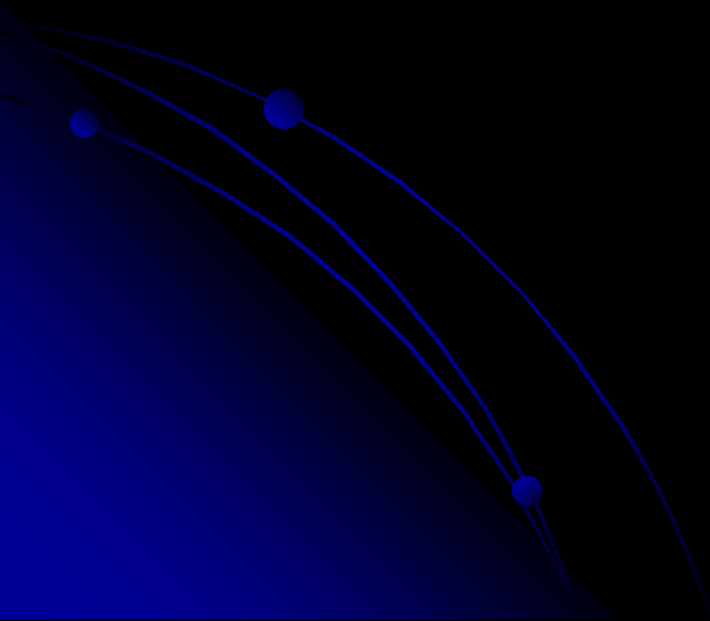
Increase scarring

Slow wound healing

# Wound bed preparation



*Debridement*  
*Bacterial control*  
*Exudate management*



# Methods of debridement



Sharp  
Autolytic  
Enzymatic  
Mechanical  
Biological  
Surgical

# Sharp debridement



Sharp debridement involves using forceps, scissors, or a scalpel to selectively remove devitalized tissue, foreign materials, and debris from a wound bed.

Fastest and most aggressive form of debridement outside of surgery.

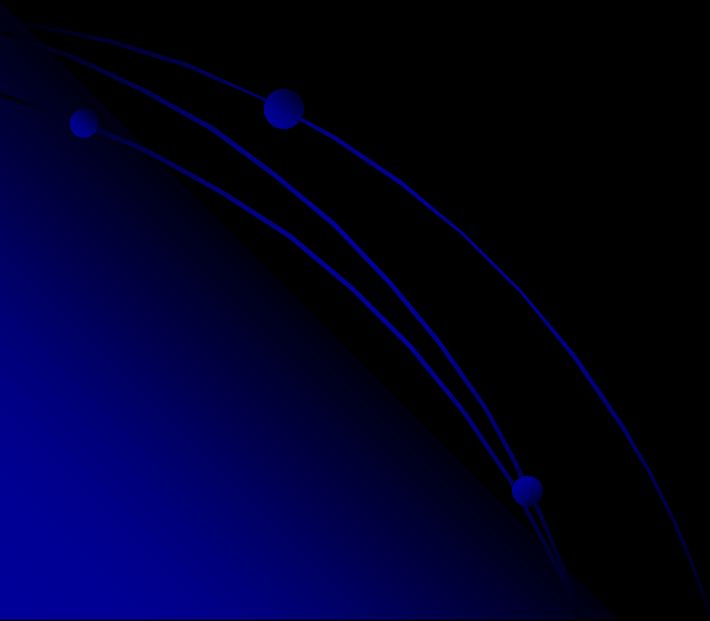


# Sharp debridement



## *Types of sharp debridement*

Selective sharp debridement  
Serial instrumental debridement



befor



after





befor



after



befor



after

# Autolytic debridement



The use of the body's endogenous enzymes to digest necrotic tissue with a moisture-retentive dressing.

Wound fluid trapped beneath the dressing :

Softens and liquefies necrotic tissue

Contains growth factors and inflammatory cells

# Biologic debridement



## Debridement using live maggots

- Larvae release enzymes that degrade / liquefy necrotic tissue
- Larvae ingest necrotic tissue and bacteria
- Contraindications: psychological stress and pain



# Surgical debridement



Refers to the use of scalpels, scissors, or lasers in a sterile environment by a physician to remove nonviable tissue from the wound

- Reduced risk of infection
- Allows for extensive exploration
- Can be stressful and costly

# Mechanical debridement



Use of force to remove devitalized tissue, foreign material, and debris.

## Nonselective debridement

- ✓ Wet-to-dry dressings
- ✓ Scrubbing
- ✓ Wound cleansing
- ✓ Wound irrigation
- ✓ Whirpool
- ✓ Pulsatile lavage
- ✓ Negative Pressure Wound Therapy (NPWT)

# Variations in neonatal skin



**Deficient in collagen Dermal instability**

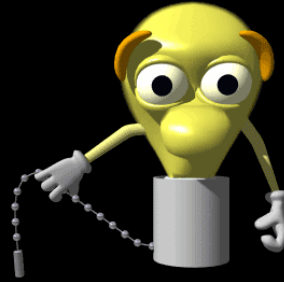
**Underdevelopment of the Stratum Corneum**

**Decreased cohesion between Epidermis and Dermis**

**Dermis of the newborn is only 60% as thick as adult dermis**

**Neonates may also have excessive evaporative heat and fluid losses**

**Increased susceptibility to infection, toxicity from topically substances**



# The greatest risk factor for Pressure Ulcers

between hospitalized neonates  
is the belief on the part of health professionals,

that the PUs are not a problem in neonates

# **Pressure Ulcers are a NEVER-EVENT**

**Hospital acquired pressure ulcers (HAPU) have been  
classified as a NEVER-EVENT**

**Never-Events are hospital associated problems that occur in  
the hospital/institutional setting that can be prevented**

**Never-Events will not be reimbursed by insurance companies**

**Worse, Never-Events must be reported**

**Hospital Acquired pressure injuries may not be covered, the  
hospital will have to absorb the cost of these injuries**



## **PU in neonates**

**Among neonates and children, more than 50% of pressure ulcers are related to equipment and devices.**

**Frequent skin assessments under blood pressure cuffs, transcutaneous oxygen pressure probes, tracheostomy plates, nasal prong and mask CPAP, arm boards, plaster casts, and traction boots are important preventive measures.**

- Beds, cribs, and isolettes must be inspected to ensure that tubing, leads, toys, and syringe caps are not under or on top of patient's skin.**

**The skin around nasogastric and orogastric tubes, head dressings, and hats should be assessed for pressure damage.**

# NCPAP

- Irritation of nasal lining, recurrent sinus infections
  - Nasal septum deviation, leading to obstruction of nasal passages
  - Nasal cartilage necrosis leading to nasal collapse or stenosis
  - Abrasion of the cartilage may alter shape of the nose
- 
- Devices that can cause injury to nasal area, cheeks and forehead





























# PU Prevention Recommendations

- Risk assessment
- Skin assessment
- Minimize pressure
- Minimize friction and shear
- Manage incontinence/moisture
- Assessment and management of pain
- Manage of nutrition and hydration needs
- Provide patient and family members education





# Wound Management Strategies

**Relieve or minimize pressure**

**Assess wound for infection  
and need for Debridement**

**Appropriate Dressing**

**Pain management**



# WOUND CLEANSING

Sterile water and normal saline are the most commonly recommended cleansing agents for pediatric wounds, with sterile water being preferred for neonates

These cleansers should be warmed to body temperature for neonates, and normal saline should be diluted 1:1 with sterile water. Use of a 20-mL syringe with a blunt needle or a polytetrafluoroethylene (Teflon) catheter is recommended to gently flush away wound exudate

## Type of dressing

( foam, hydrocolloid, transparent films, Hydrogel, silicone )







# How Dressings Interact in Wound Healing ?

- Help to debride
- Providing optimal moist environment
- Promoting granulation
- Promoting epithelialization
- Protecting from infection

# Wound color

**Black**  
(Eschar)

Hydrogel and  
transparent Film

**Yellow**  
(Slough)

Exudate Quantity

**Heavy Exudate**

Alginate and  
Absorbent Foam

**Moderate Exudate**

Hydrogel and  
Absorbent Foam

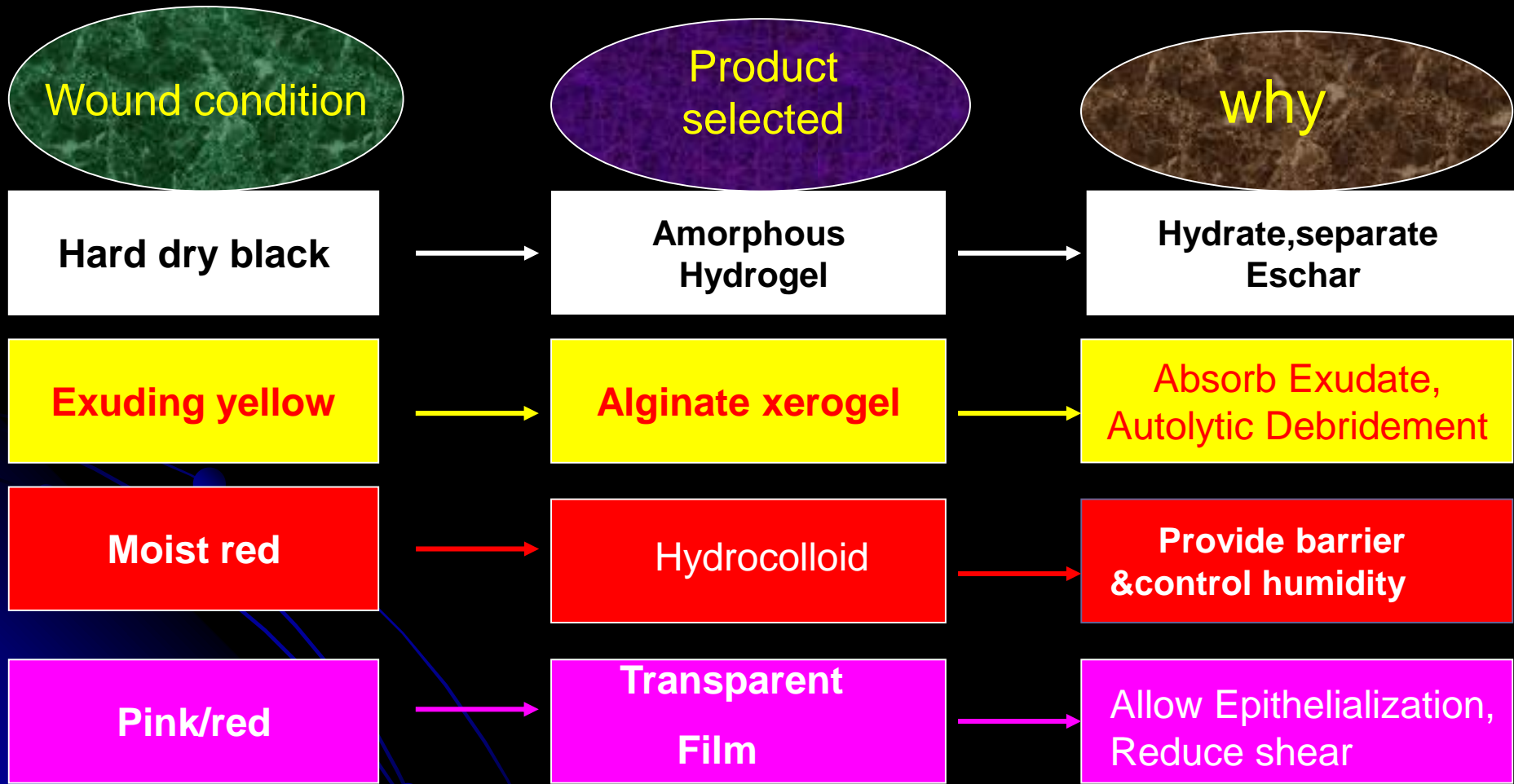
**Little**

Hydrocolloid

**Red**  
(Granulation)

Hydrocolloid

# Selecting the correct dressing as the wound changes

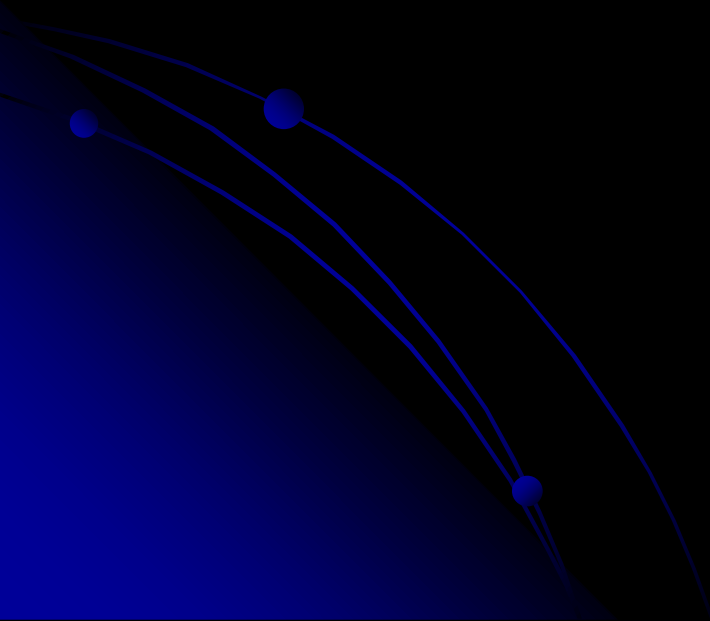


# Wound Manager

- Management and recommendations for treatment
- Monitor progress of management
- Discuss problems , EBP
- Education

and

*documentation*



**WITH THANKS**

