Wound Care Basics for the Primary Care Physician

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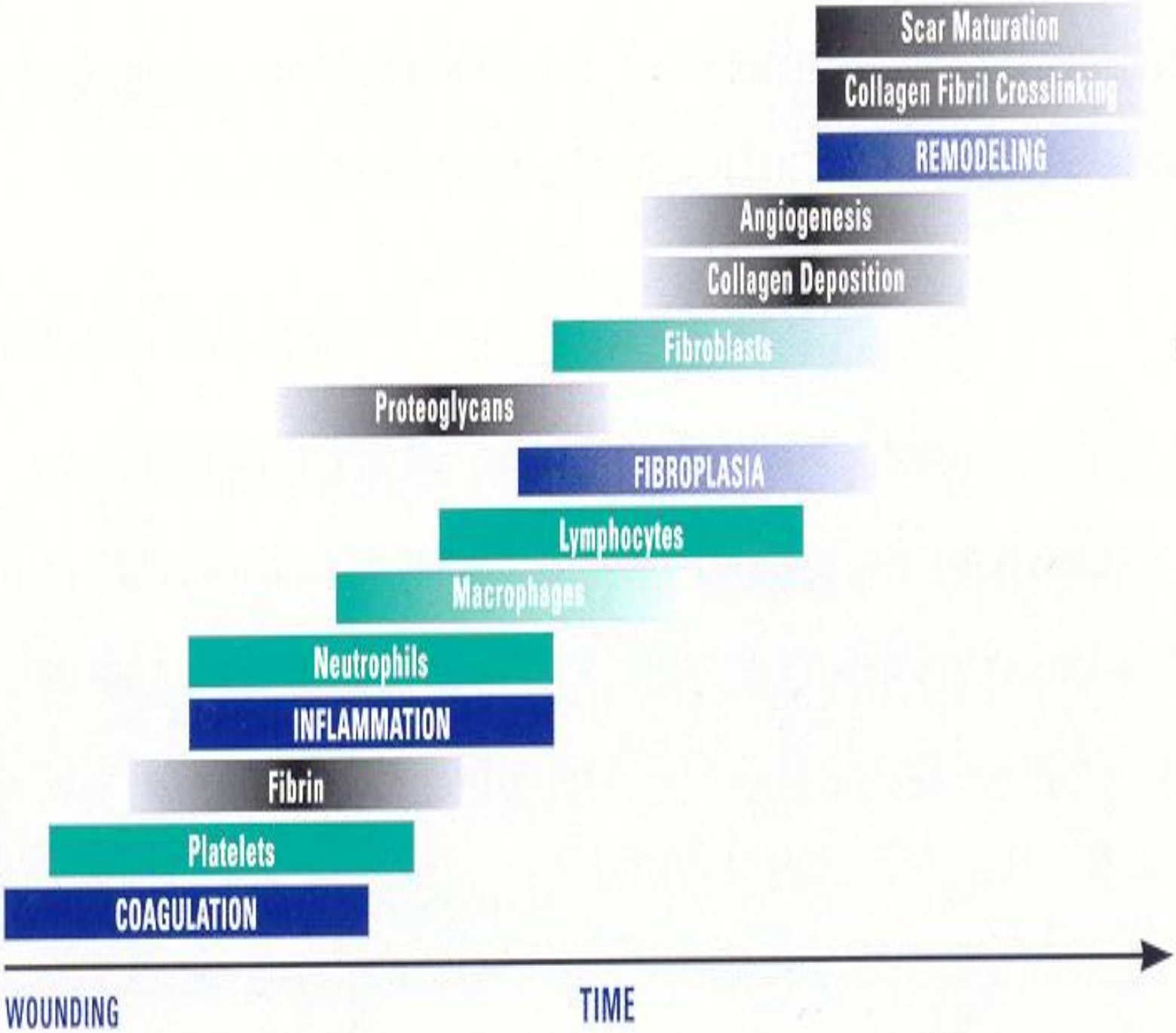
Objectives

1) To understand the etiology and treatment of common wound in primary care
2) Early recognition and prevention of pressure injuries
3) Able to understand and treat common outpatient wound care issues
4) To be able to recognize the resources in the systems

Wound Repair Is a Complex Cellular and Biochemical Response to Injury


Scar Maturation
Collagen Fibril Crosslinking
REMODELING
Angiogenesis
Collagen Deposition
Fibroblasts
Proteoglycans
FIBROPLASIA
Lymphocytes
Macrophages
Neutrophils
INFLAMMATION
Fibrin
Platelets
COAGULATION
WOUNDING
TIME

Wound Healing Physiology
Phases of Wound Healing

- **Hemostasis (0-3 hours)**
- **Inflammatory (0 - 3 days)**
- **Proliferative (3 - 21 days)**
- **Remodeling/Maturation (21 days - 1.5 yrs.)**

Factors that Impact Wound Healing

- Nutrition
- Aging
- Medications
- Infection
- Immobility
- Radiation Therapy
- Arterial / Venous Insufficiency
- Diabetes & Other Chronic Medical Diseases

Nutritional Assessment

- Patient History
- Physical Exam
- Laboratory Testing

Assessment of Protein Metabolism

- Visceral protein blood levels
  - Serum albumin 3.3-4.5 g/dl
  - Transferrin 200-400 mg/dl
  - Prealbumin: 20-40 mg/dl
- Total Lymphocyte counts
  - 1500-3000 cells/mm3

Nutritional Support

- Treatment Options
  - Oral nutritional support
  - Enteral tube feeding
  - Parenteral nutrition
- Get a Nutrition consult early on in the admission

Aging Skin

- Decrease dermal-epidermal turnover
- Decreased subcutaneous fat deposition
- Decreased elastin
- Decreased dermal blood flow
- Flattening of the rete ridges
- Thinning of the skin

Wound Infection

- Overgrowth of Microorganisms
- Resultant Tissue Destruction
  - Local symptoms
    - Wound deterioration
    - Erythema, edema, drainage (purulent), tenderness, warmth, induration and/or crepitus
  - Systemic symptoms
    - Fever, leukocytosis, confusion, tachycardia, hypotension, malaise

Bacterial Burden and Wound Infection

Negative Impact on Wound Healing

- Prolongs the inflammatory stage
- Induces additional tissue destruction
- Delays collagen synthesis
- Prevents epithelialization

Antimicrobial Therapy

- Determination of wound infection
- Identification of organism by culture or gram stain prior to therapy
- Do not use systemic therapy if infection is local
- Consideration of pharmacology and toxicology

Major Types of Wounds

- Pressure Ulcers (Injuries)
- Vascular Ulcers
  - Arterial Ulcers
  - Venous Stasis Ulcers
- Neuropathic/Diabetic Foot Ulcers
- Others
  - Pyoderma gangrenosum, malignancies, calciphylaxis

Pressure Ulcers

- > 1.3 Billion dollars annually
- Aging population
  - Increase in frail elderly
- Prevalence in nursing homes is ~24%
- Most pressure ulcers begin in the hospital in the 1st 2 weeks of admission

Pressure Ulcer Facts

- Approximately 1 million hospital-acquired PU occur in US hospitals every year, resulting in a total cost of approximately $55 billion dollars
- The US health care system could realize a net savings of $44.5 billion dollars per year, and virtual eradication of hospital-acquired PU could be achieved if widespread hospitals consistently used preventive measures for persons at risk for pressure

National Decubitus Foundation, 2009

Pressure Ulcer Facts

- The incidence of hospital-acquired PU is considered an indicator of the quality of patient care, and failure to provide appropriate preventive care may increase the risk of litigation
- Patients who develop hospital PU experience additional morbidity, pain, and psychosocial distress associated with a loss of independence and social isolation
- Patients tend to have longer hospital stays and pain related to the PU and increased non-reimbursable costs to the facility

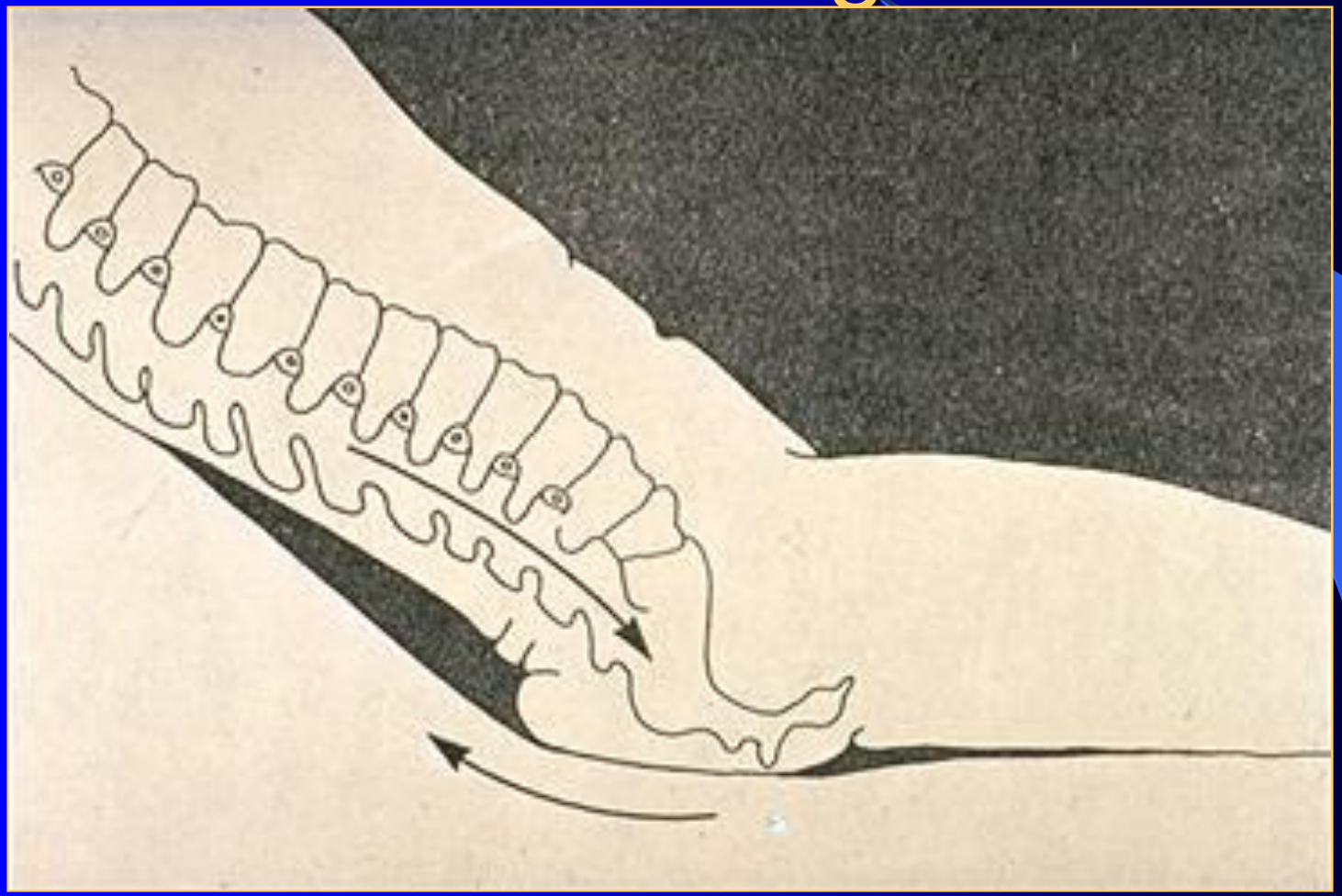
Etiology of Pressure Ulcers

- Pressure
  - Tissue that exceeds capillary filling pressures of 12-32 mm Hg for more than 2 hours = tissue death
- Shearing
  - Blood vessels become occluded or torn
- Friction
  - Abrasion type wound with large amounts of exudate contributing to adhesion of skin
- Moisture
  - Leads to maceration of tissues and removal of protective oils

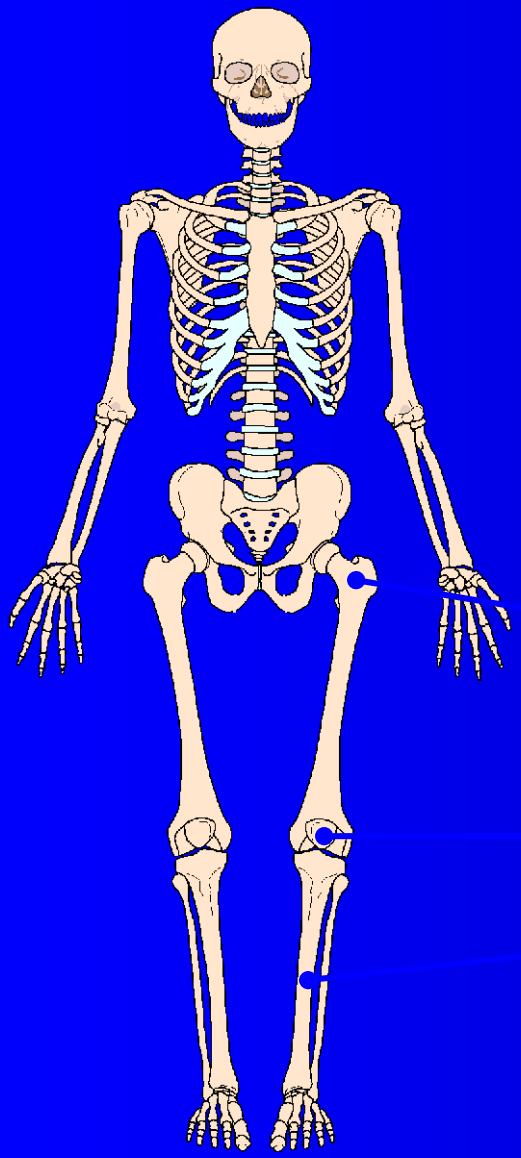
Pressure Ulcers
Excessive Moisture

Pressure Ulcers
Friction

Pressure Ulcers
Shearing



Common Sites of Pressure Ulcers



Occiput (<1%)

Scapula (<1%)

Spine (<1%)

Elbow (<1%)

Sacrum & Coccyx (65%)

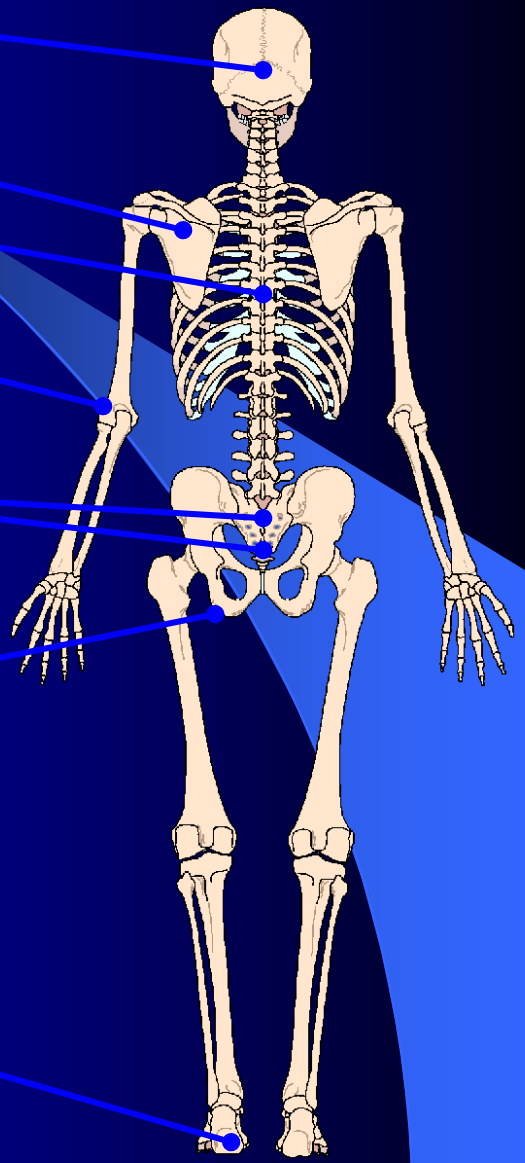
Trochanter (9%)

Ischium (4%)

Knee (3%)

Tibia (2%)

Heel & Ankle (15%)

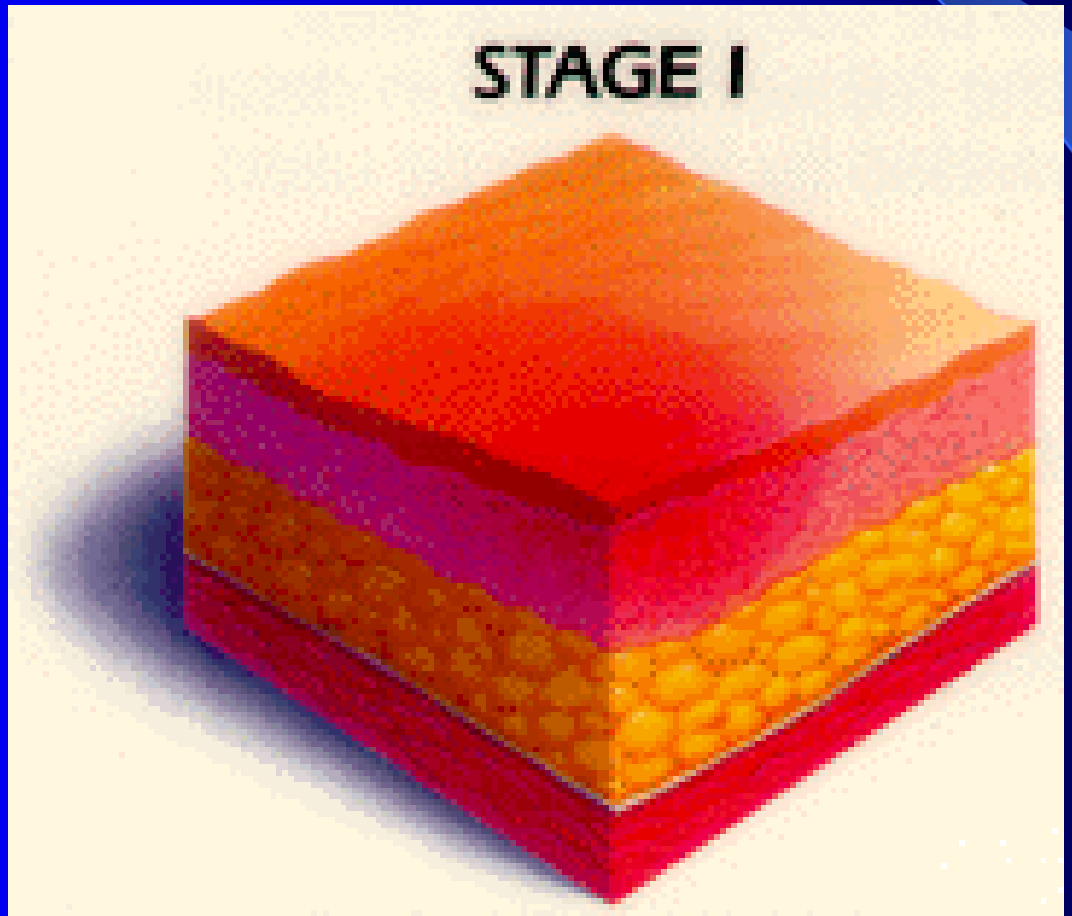


Wound Staging

- Clinicians commonly describe *pressure ulcers* using a four stage classification system to define the depth of tissue involved

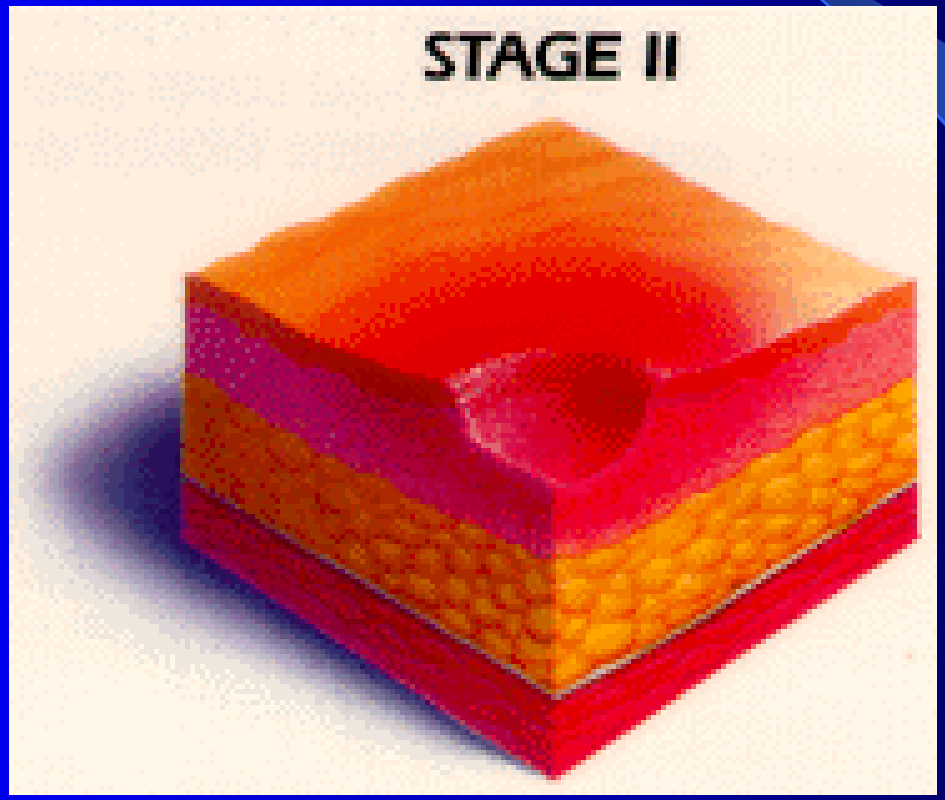
CLASSIFICATIONS

Stage I - Nonblanchable erythema of intact skin

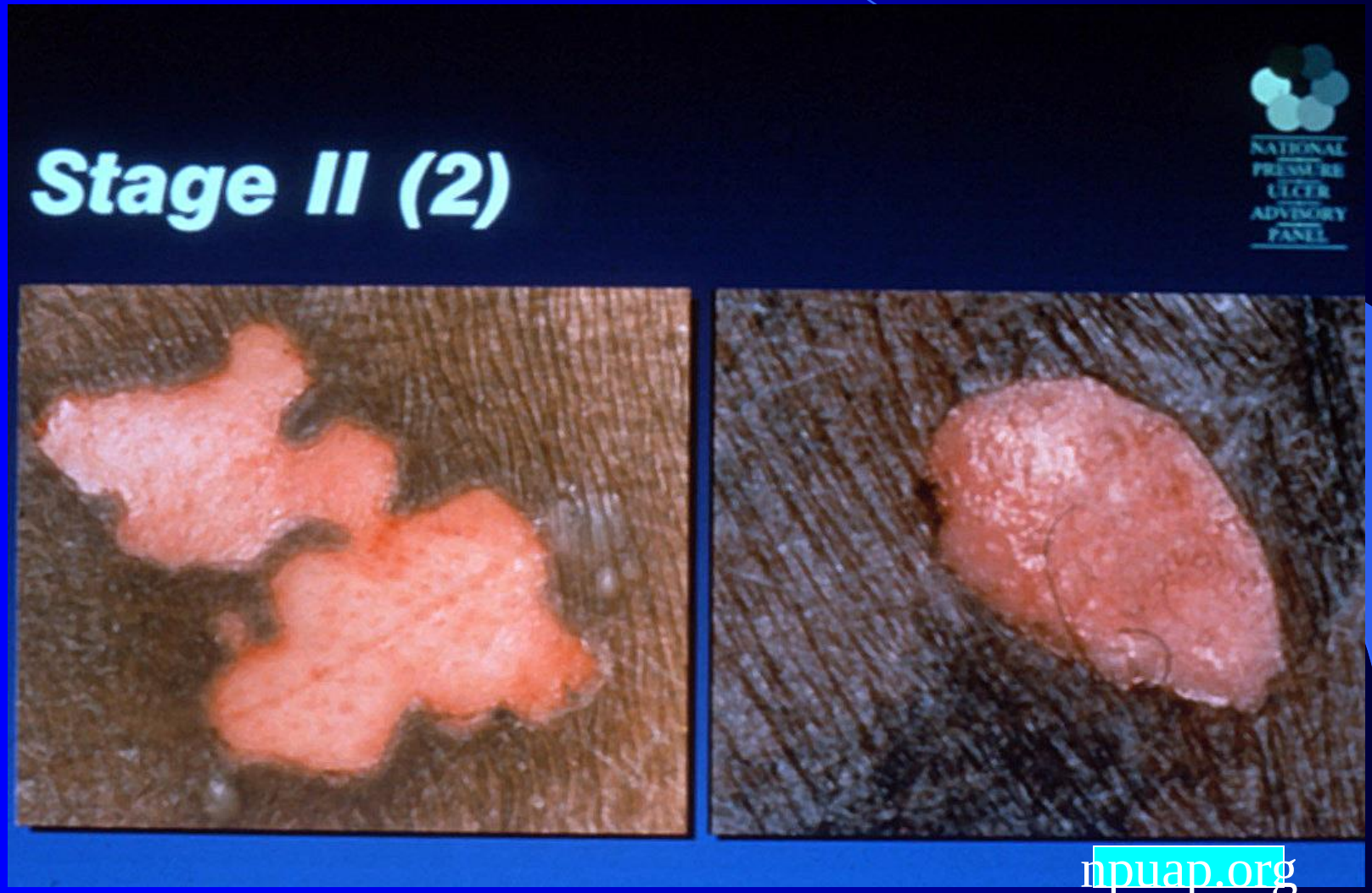


Stage 1 Pressure Ulcer

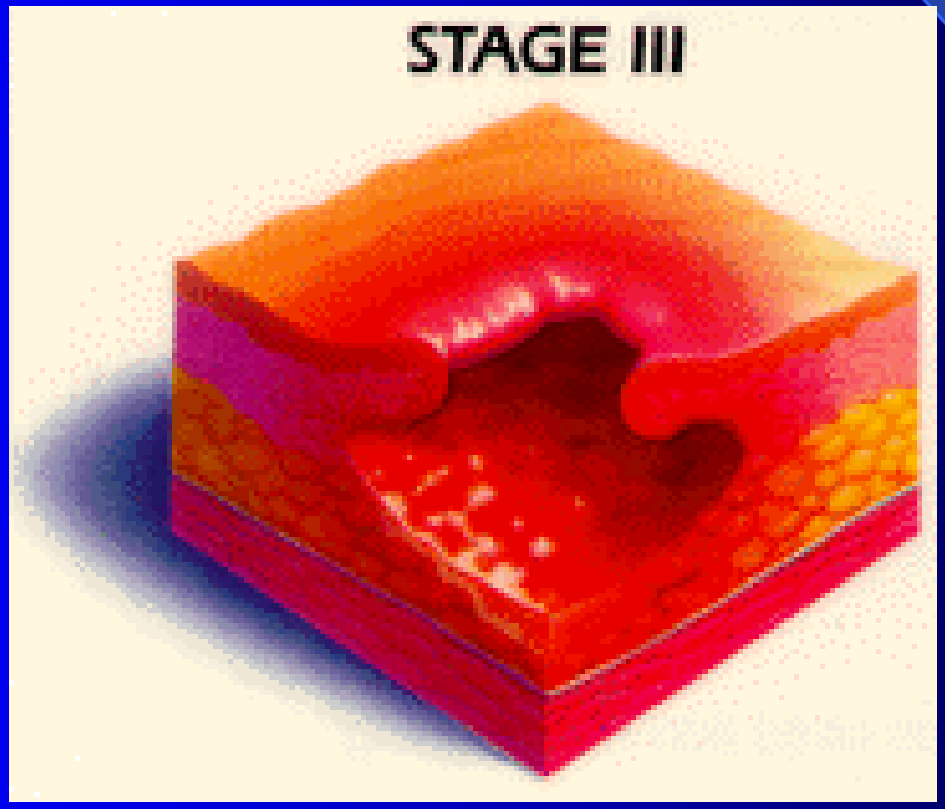
Stage II - Partial thickness skin loss involving epidermis, dermis, or both



Stage II Pressure Ulcer



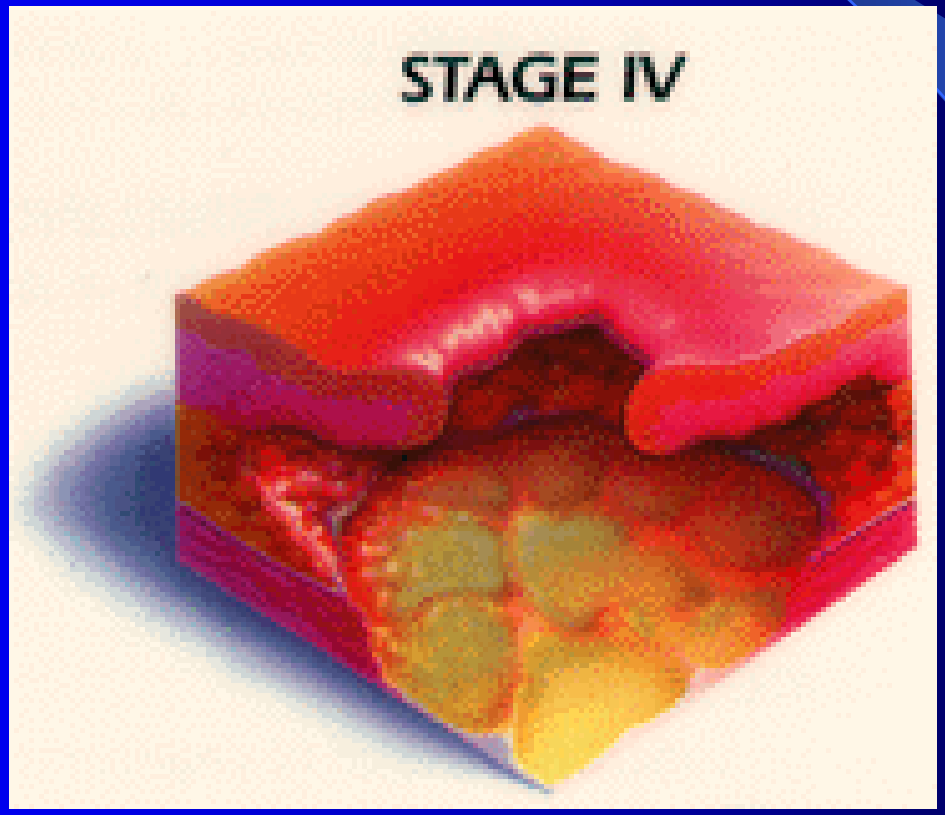
Stage III- Full thickness skin loss involving subcutaneous tissue that may extend to, but not through underlying fascia



Stage III Pressure Ulcer

- Pressure Ulcers

Stage IV- Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structure



Stage IV Pressure Ulcer

Unstageable Defined

Unstageable:

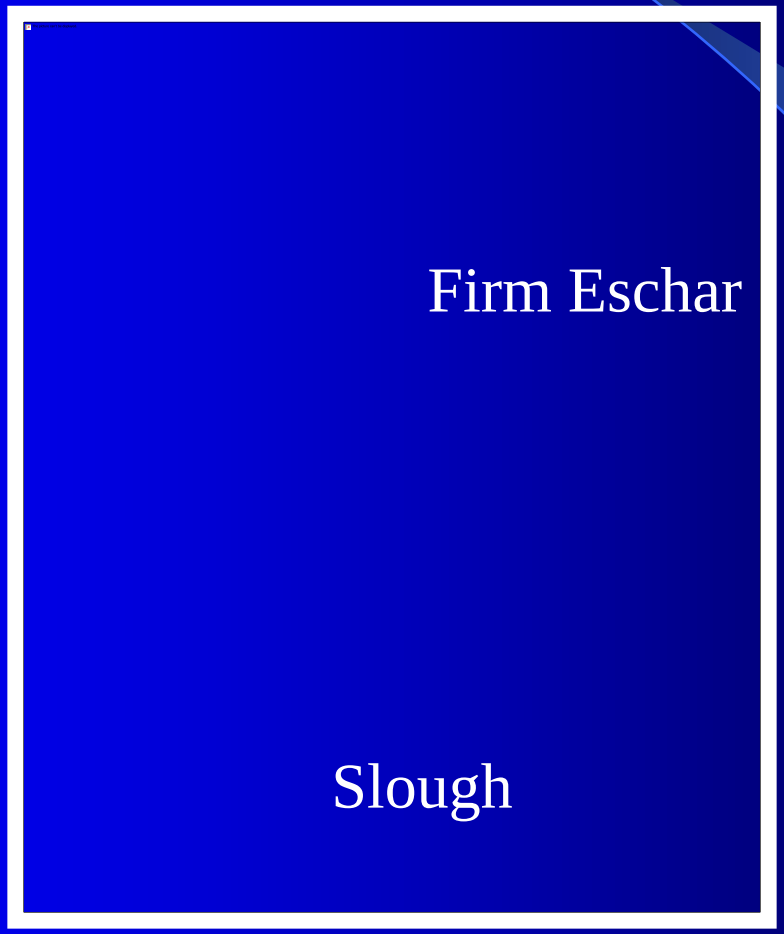
Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.

Further description:

Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as "the body's natural (biological) cover" and should not be removed.

http://www.ihi.org/IHI/Programs/Campaign/accessed

Unstageable Pressure Ulcer



NPUAP.org

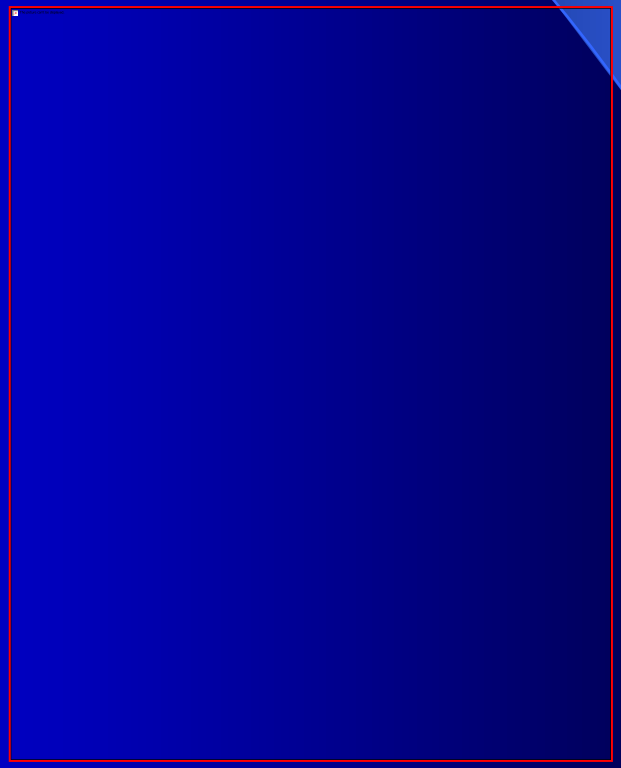
Deep Tissue Injury - DTI

- 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.


03/24/2006

Objective #2

- Discuss the relationship and importance of offloading in managing and preventing pressure ulcers



Pressure = Tissue injury

- All patients at risk identified
- Support surface
- Wedges
- Linen
- Heel pressure relief device
- Education
  - Skin assessment
  - Importance of barriers and turning patient

Assess for Immobility

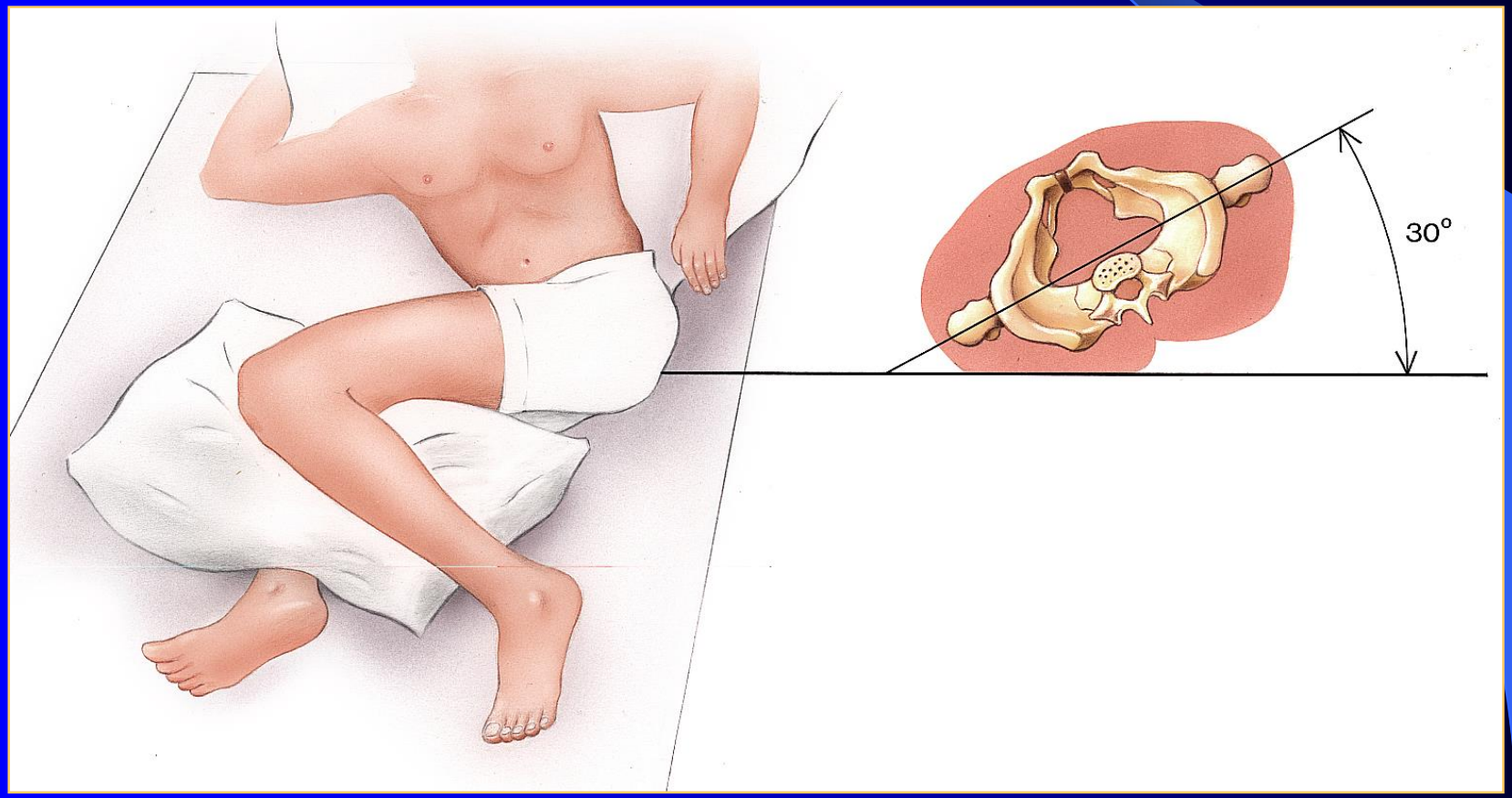
- Most significant risk factor for pressure-ulcer development = decreased mobility of those who are……
  - Non-ambulatory
  - Confined to chairs, bed, wheelchairs, recliners and couches (before admission)
  - Paralysis or contractures
  - Orthopedic devices that limit function
  - Requiring assistance with turning, moving, repositioning, getting out of bed or chairs

Positioning in bed

- Flatter position distributes weight more evenly
- Sitting
  - Semi-Fowler and Prone positions yield **lowest** interface pressures when sitting
  - 90 degree side-lying yields the highest
- 30-degree tilted side-lying (alternating right side, left side and back) is recommended

NPUAP, 2009

Therapeutic Positioning 30 Degree Laterally Inclined Position



Therapeutic Positioning

- **Managing tissue loads while in bed**
  - Avoid using donut devices
  - Establish a written repositioning schedule (even if patient is on a support surface)
  - Assess risk for developing additional pressure ulcers
  - Elevate heels off of the bed
  - Use foam and pillows to eliminate direct contact between bony prominences
  - Maintain the bed at the lowest degree of elevation appropriate

Positioning in chair

- Prolonged chair sitting is implicated with increased risk of Pressure ulcers
- Limit to 2 hours with 30 minute intervals for offloading
- Poor sitting posture creates posterior pelvic tilt or side tilting to one buttock
  - Feet should touch floor

NPUAP, 2009

Devices related to pressure ulcers

- Full thickness pressure ulcer

Firm boot devices

Leg immobilizer creating a pressure ulcer wound to the posterior leg

Ulcer

Make sure orders are on the chart to assess under devices

Full thickness ulcer

Monitor pressure under devices

Acquired PU's from Ted Hose

Center of Excellence in Elder Abuse & Neglect • www.centeronelderabuse.org

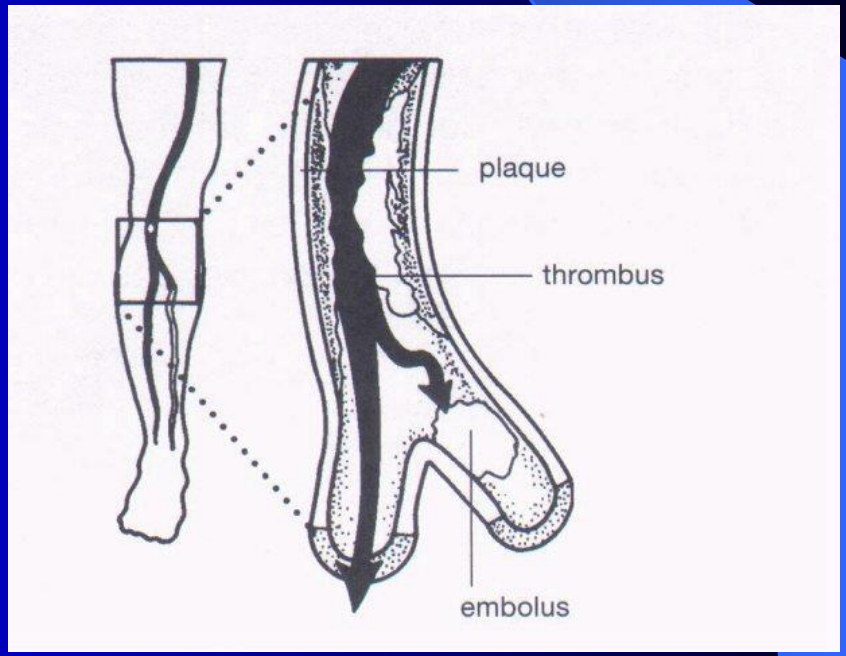
Pressure sites often covered by devices

Abdominal skin folds

Bariatric Patient

Arterial Insufficiency/Ulceration

- Risk Factors:
  - Peripheral Vascular Disease (PVD)
  - Diabetes Mellitus
  - Hypertension
  - Advanced age
  - Smoking



Arterial Ulcer Location

- Distal toes
- Heel
- Pretibial area
- Lateral malleolus

Arterial Ulcer Characteristics

- Painful ulceration
- Pale wound bed lacking granulation
- Minimal drainage – desiccated and dry
- Appearance – “punched out”
- May be necrotic
- Peri-wound skin pale

Arterial Ulcer Management

- Maximize blood flow and tissue perfusion
- Treatment Options:
  - Surgical revascularization
  - Angioplasty
  - Pharmacotherapy agents
  - Lifestyle changes

Venous Insufficiency

- 1% of the population
- 3.5% of persons over 65 yr of age
- Recurrence rate of 70%
- Venous ulcers account for 90% of all chronic wounds on the lower leg
- Result from disorders of the deep venous system

Venous Ulcer
Location/Characteristics

- Most common location
  - medial aspect of leg superior to medial malleolus
- Exudation varies
- Degree of pain varies greatly from painless to extremely painful
- Irregular wound margins
- Granulation tissue usually present

Venous Ulcer Management

- Goal:
  - Reduce venous hypertension and improve venous return
- Treatment Options
  - Elevation of legs
  - Topical Management/Dressings
  - Compression therapy
  - Surgical ligation of incompetent perforators

Venous Ulcer Management
Optimize Wound Environment

- Compression therapy
  - Increases interstitial tissue pressure, which eliminates the leakage of fluid from capillaries into tissues and supports reabsorption of fluid back into blood stream

Diabetic Ulcer Characteristics

- Painless
- Even wound margins with propensity to form callous
- Deep wound bed
- Granular tissue

Charcot Foot Deformity

- Arterial vascular compromise and bone infarcts leading to midfoot micro fractures result in collapse of normal boney architecture
  - disfigurement, swelling, and abnormal bony prominences
- Plantar ulcerations with necrosis and infection

Diabetic Ulcer Management

- Control serum glucose levels
- Offloading & Orthotics
- Absorb drainage
- Maintain a moist wound environment
- Monitor for infection
- Debride necrotic tissue and hyperkeratotic rim

Wound Evaluation, Assessment and Documentation

Wound Assessment

- Location on the body
- Standard Assessment is based on the premise that the wound is rectangular
- Length x Width x Depth in centimeters
- Undermining or tunneling?

Wound Documentation

- Why is it important?
  - Documentation serves as a tool for communication for members of the healthcare team
  - Litigation!!
    - The best way to prevent litigation is to have good documentation of vigilance and care

General Principles of Wound Management

- Reduce/eliminate the cause
- Provide systemic support
- Appropriate topical therapy

Provide Systemic Support

- Support fluid and nutritional intake
- Gain control of systemic factors affecting wound healing

Topical Therapy

- Partial Thickness Wounds
  - Moist wound environment
  - Protect wound bed

Topical Therapy

- Necrotic wounds

Debridement Rationale

- Necrotic tissue prolongs the inflammatory phase and delays wound healing
- Necrotic tissue is a medium for bacterial growth
- Facilitates visualization of wound base
- Transforms the chronic wound by creating an “acute” wound

Debridement Contraindications

- Ischemic wound covered with dry eschar
  - no signs/symptoms of infection
- Wounds with dry gangrene
- Heel ulcer covered with dry eschar
  - no signs/symptoms of infection

Eschar

- Stable eschar
  - Dry “scab”
  - Do not remove
- Unstable eschar
  - Erythema, drainage, odor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Debridement
Non-Surgical Options

- Mechanical
- Autolytic
- Biotherapy
- Enzymatic (Chemical)

Wet-to-Dry for Healing

- Requires frequent dressing changes (bid / tid)
  - Labor intensive
  - Causes additional cooling-off of the wound
- Evaporation occurs and reduces the temperature of the wound
  - Impeding the healing process
  - Increasing susceptibility to infection
- Typically not “Moist Wound Healing”

Autolytic Debridement

- The process by which a wound bed clears itself of debris via proteolytic enzymes

- Use occlusive dressing
  - Hydrocolloid
  - Film dressing

Enzymatic Debridement

- The application of a substance to chemically digest and remove necrotic tissue.
  - Can be employed in conjunction with other forms of debridement and moist wound healing.
- Types of enzymatic debriders
  - Santyl
  - Iodosorb

Cleansing Guidelines

- Wound cleansing important to decrease bacterial load
- Should be delivered between 8 and 15 psi to not damage viable tissue
- Cleansing may be performed via irrigation (using a syringe and catheter tip), pulsed lavage, whirlpool, etc.

Cleansing Guidelines

- CYTOTOXIC AGENTS
  - Betadine
    - only approved by FDA as surgical scrub
    - toxic at concentrations greater than 0.001%
    - iodine toxicity
  - Hydrogen Peroxide
    - may cause air emboli
    - little bactericidal action in wounds

Cleansing Guidelines

- Hibiclens
  - presurgical scrub on intact skin
  - dilution index of 1:10,000 to be nontoxic
- Dakin's solution
  - applied at 0.25% to 0.5% dilution
  - effective against strep,staph, etc.
- Acetic Acid
  - dilution of 0.5%
  - effective against pseudomonas

WHAT IS BEST?

- NORMAL SALINE!!

Topical Therapy

- Granular wounds

The Granular Wound

- Desired healing process for wounds which involves the growth of small blood vessels and connective tissue in a full thickness wound.
- Goal is to maintain a moist wound environment

Resources

- Memorial Hermann Wound Care center
- Methodist wound clinic
- CHI St. Lukes wound clinic
- HHS wound clinics at Ben Tuab, LBJ, osteomyelitis clinic , lymphedema management clinic

Pearls and Tidbits

- Accountability with best practices
- Know your clinical practice guidelines
- Have products for prevention and treatment readily available
- Collaborate with other disciplines
- Work as a team
- Ongoing education

Summary

- Alleviate the bioburden-DEBRIDE
- Maintain a moist wound environment
- Document, Document, Document!!
- Know the resources and you are not alone

Resources

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