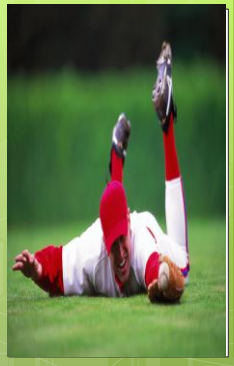


BATTER UP: Hit a Home Run With Wound Care Knowledge

Boone Hospital Wound Healing Center

Kimberly Jamison, MD, FACP, FAPWCA

Kim Mitchell, RN
Clinical Nurse Manager

Fundamentals of Chronic Wound Care

- ***Time- the 4 Clinical Indicators***
  - *Tissue*
  - *Infection*
  - *Moisture*
  - *Edge of Wound*

Acute vs. Chronic Ulcers

Any break in the skin is considered a wound

Regardless of what causes the wound, the healing process is much the same

The rate of recovery is influenced by:

- Extent of damage
- Type of damage
- Underlying intrinsic factors

Philosophy

"A chronic wound is a window to underlying disease. Each wound is a symptom of underlying infirmities that undermine the potential for healing."

– Dean Kane, MD

Startling Statistics

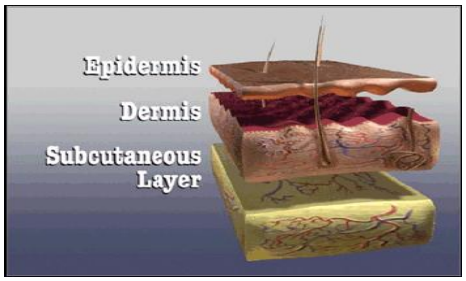
- One million Americans develop a chronic ulcer each year
- Elderly population is at risk and numbers(65+) are growing:
  - 2002: 35 million
  - 2010: 40 million
  - 2020: 55 million
- 18.2% of all elderly persons (85+) reside in a Nursing Home
  - -22% suffer with pressure ulcers
- There are approximately 11 million venous ulcers in the world
- 12.2 million people (60+) have diabetes
  - -15% will develop a diabetic foot ulcer
- Peripheral Arterial Disease affects about 8 million Americans
  - - most commonly associated with non-healing ulcers

(US. Census Bureau, 2002)

$tartling Co$t$

- Annual cost of venous stasis ulcers
  - -$2.5 to $3.5 billion
- Total annual economic cost of diabetes in 2007
  - - $174 billion
- Cost of diabetes –related limb amputations
  - - $3 billion annually
- Specialty dressings, devices, treatments
  - - 1.7 billion
- Additional cost:
  - Lost workdays / productivity

Basic Anatomy- the Foundation!



(Hess & Kirsner, 2003)

Basic Functions of the Skin

- Protects internal structures
- Sensory perception
- Thermoregulation
- Fluid Regulation

- Metabolism
- Absorption
- Immunologic
- Social communication
  - Impact on self- esteem

Phases of Normal Healing

1. **Hemostasis**
   - Vasoconstriction, platelet release, clot formation
2. **Inflammation**
   - Vasodilation
   - Neutrophils appear to destroy dying cells
   - Macrophages clean the ulcer and produce growth factors
3. **Proliferation**
   - Angiogenesis
   - Fibroblasts synthesize collagen fibers
   - Collagen fibers produce keratinocyte
4. **Maturation**
   - Shrinking and strengthening of the scar

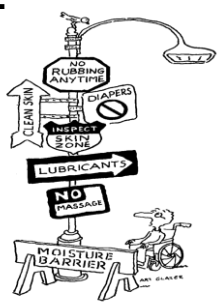
(Hess & Kirsner, 2003)

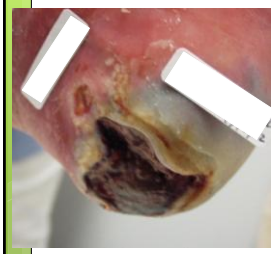
Comprehensive Patient Assessment

Facts You Need To Know

- When did the ulcer occur?
- Have there been previous ulcers?
- Who has taken care of the ulcer?
- What strategies have been employed in the past to assist the ulcer to heal?
- What documented findings can be reviewed to support the care of the ulcer?

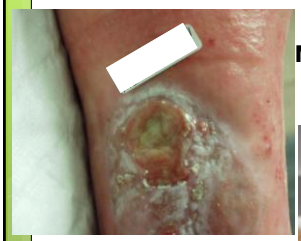
T.I.M.E





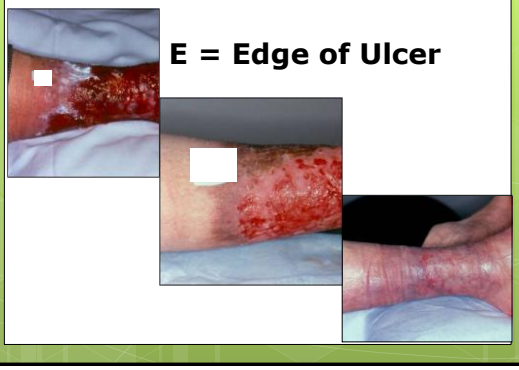
T = Tissue, Nonviable

I = Infection / Inflammation



M = Moisture Imbalance

E = Edge of Ulcer



Factors That Affect Healing

- Nutrition
- Infection
- Oxygenation
- Age
- Underlying chronic health conditions
- Medications
- Smoking

Nutrition

- Often a primary factor affecting ulcer healing
  - Malnutrition is reported in 53-74% of older hospitalized patients
- Malnutrition decreases
  - Wound tensile strength
  - T-cell function
  - Phagocyte activity
  - Complement and antibody levels
  - Body's ability to defend against infection

Nutrition

Nutrition screen – a part of every new patient evaluation

Baseline Laboratory Evaluation

- CBC
- Comprehensive Metabolic Chemistry (SMA)
- Albumin
- Pre-Albumin
- Hemoglobin A1C for known or suspected diabetic

Infection

- Peri-ulcer and soft tissue edema / erythema
- Fever
- Foul odor
- Increased pain at the ulcer site
- Tenderness at the ulcer and peri-ulcer site
- Excessive and/or purulent drainage
- Increased warmth
- Elevated WBC's

Oxygenation

- Healing depends on a regular supply
  - Helps leukocytes destroy bacteria
  - Helps fibroblasts stimulate collagen synthesis
- Causes of inadequate oxygenation can include:
  - PAD
  - Occlusion in the artery
  - Anemia
  - Smoking
  - COPD

Underlying Chronic Health Conditions

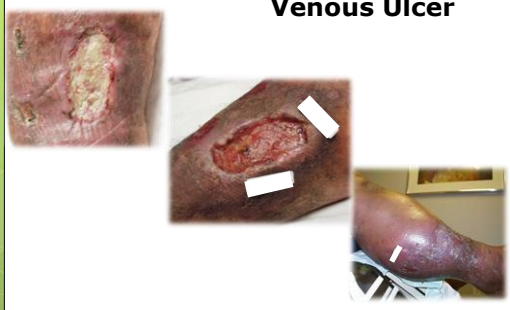
- Venous insufficiency
- Peripheral arterial disease
- Diabetes
- Pressure points in at risk patient
- Atypical causes

Etiology: Venous

- Mid-calf to heel (Gaiter Region)
- Usually shallow
- Irregular shape
- Painless to severely painful

- Lower leg edema
- Scaly dermatitis
- Hemosiderin deposits
- Exudate usually present

Venous Ulcer



Etiology: Arterial

- Cool / cold skin
- Distinct margins
- Gangrene or necrosis
- Absent or diminished pulses
- Decreased temperature
- Pale ulcer bed

- Painful
- Pallor on elevation
- Dependent rubor
- Shiny skin
- Loss of hair
- Thickened toenails

Arterial Ulcer

Etiology: Diabetes

- Common location - weight bearing surfaces of feet
- Undefined borders
- Neuropathy
- Foot deformities
- Palpable pulses unless PAD is present

Diabetic Ulcer

Etiology: Pressure

- Localized injury to the skin or underlying tissue
- Usually over a bony prominence
- Resulting from pressure
- Combined with shear / friction

(NPUAP, 2007)

Pressure Ulcer

Contributing Factors

Extrinsic Factors

- Excessive Pressure
  - Duration and extent of pressure
  - 70 mmHg for 2 hours = tissue death
- Impact Injury
- Friction/Sheer
- Heat
- Moisture
- Posture

Intrinsic Factors

- Immobility
- Sensory Loss
- Age
- Disease
- Body Type
- Poor Nutrition
- Infection
- Medications

Etiology: Mixed, Unusual, Systemic

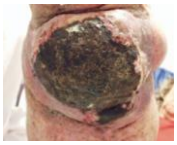
Dependent upon causative factors

Examples:

- Brown Recluse Spider Bite
- Post radiation treatment
- Malignancy
- Autoimmune process
- Etc

Atypical Ulcers

RA, Sjögren Syndrome



Malignancy

Vasculitis

Lupus, Fungal Infection

Recluse spider bite

Pyoderma

Ulcer Assessment

History

Location

Size

Peri-ulcer

Ulcer bed

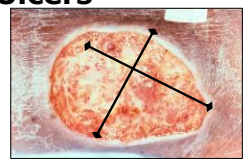
Ulcer edges

Stage / Classification

Measuring Ulcers

Size

- Length
- Width
- Depth
- Tunneling
- Undermining



Assessment of Exudate

- Serous
  - Clear fluid which leaks out through cell membranes and blood vessels
  - Straw colored
- Serosanguineous
  - Blood-stained fluid when serous fluid mixes with blood,
  - Red/pink in color
- Purulent
  - Frank pus coming from the ulcer
  - Indicates infection
  - Yellow/green or brown/red

Ulcer Bed Assessment

Granulation

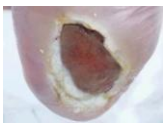
Necrosis

Peri-Ulcer Assessment

Rolled edges

Induration

Maceration



Inflammation

Ulcer Classification

- *NPUAP Staging System* – pressure ulcers
- *Wagner Classification System* – diabetic lower extremity ulcerations
- *Partial/Full Thickness* – all other ulcerations

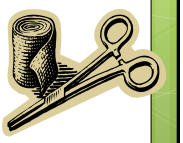
Dressings

Dressings do not heal ulcers…

they enhance the body's ability to heal itself!

Appropriate Dressings

- Specific requirements of the ulcer
- Goals and objectives of treatment
- Comfort and ease of use for the patient
- Decreases infection
- Balance between cost and benefit



Ulcer Management History

- Various products have been used throughout history to promote ulcer healing, manage moisture, and protect the body from infection.
  - Cotton and wool have been used to absorb drainage
  - Egyptians used gauzes soaked in wine vinegar or honey
  - Greeks and Romans used metals as antiseptics
  - Greeks used fig latex to decrease infection
  - South American Indian tribes used ant mandibles as suture

Source: Ovington, L.G. The evolution of wound management: ancient origins and advances of the past 20 years. Home Healthcare Nurse. 2002.

Ulcer Management History

Remember…

…Maalox and heat lamps? (dries out ulcer)

…"Betadine fudge"? (cytotoxic and drying!!)

More recent, but still out-dated…

…Normal Saline wet-to-dry dressings!
(drying, painful, contribute to ulcer infection)

…Dakin's or Clorpactin -soaked gauze dressings!
(cytotoxic, painful, drying)

Appropriate Dressing Selection

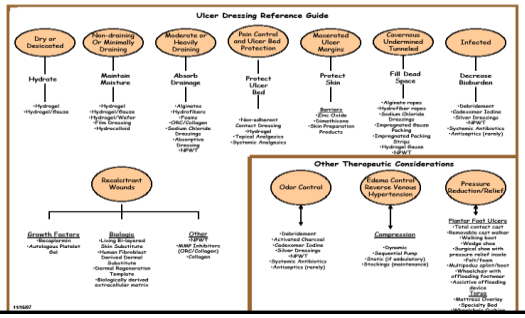
- Address requirements of the ulcer and the patient
  - Maintain appropriate hydration
  - Protect ulcer from external contamination
  - Control odor, bio-burden and ulcer pain
  - Promote debridement of necrotic tissue
- Meet goals and objectives of treatment
- Provide balance between cost and benefit

Dressings do not heal ulcers…
they enhance the body's ability to heal itself

Appropriate Dressing Selectio

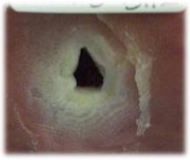
- Helps create the optimal ulcer healing environment
- Increases healing rates
- Reduces pain
- Decreases infection rates
- Provides cost effective care

Dressing Reference Guide



Inappropriate dressings can cause

- Compromised peri-ulcer integrity
  - Maceration
  - Contact dermatitis
  - Tape tears



Maceration

Contact Dermatitis

Inappropriate dressings can cause

- Wound bed injury
- Tissue dehydration
- Hypertrophic granulation
- End Results:
  - Increased pain
  - Increased risk of infection
  - Delayed healing
  - Higher overall costs

Dehydration

Hypertrophic Granulation

Key to Success

Accurate and ***frequent*** assessment of the ulcer's needs is a key component in appropriate dressing selection!

Ulcer Considerations

- Tissue type
- Exudate levels
- Bacteria levels
- Size and Depth

Ulcer Considerations

Granulation and Epithelium

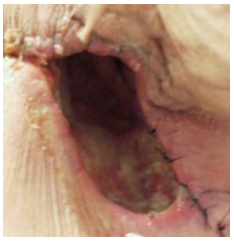
- Protect
- Preserve Moisture

Ulcer Considerations

Necrotic Devitalized Tissue

- Remove these tissues
- Promote autolysis

Ulcer Considerations



Dead Space

- Eliminate dead space
- Do not pack tightly

Ulcer Considerations

- No Exudate – add moisture
- Low Exudate – preserve moisture
- Moderate Exudate – absorb excess Exudate
- Significant Exudate – absorb & manage Exudate

Inappropriate Dressing: Heavily Exudative Ulcer



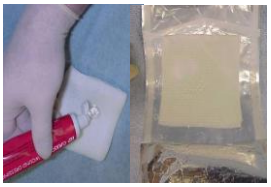
- Strikethrough of Exudate
- Peri-ulcer maceration
- Skin stripping secondary to dressing adhesives

Ulcer Considerations

- Contaminated ulcers
  - Cleanse with saline
- Colonized ulcers
  - Control surface bacteria with antimicrobial dressings
- Infected ulcers
  - Control surface bacteria with antimicrobial dressings
  - Manage odor with activated charcoal dressings

Inappropriate vs. Appropriate Dressing

Hydrogel



Photographs downloaded on 11/21/08 from http://jan.ucc.nau.edu/~daa/woundproducts/products.html on

Photographs compliments of Johnson and Johnson

Hydrogel

Characteristics

- Maintains clean, moist ulcer environment (macerates if applied outside the ulcer margins)
- Non-adherent to ulcer base when applied correctly
- Cooling and soothing = decreased pain
- Promotes autolytic debridemen

Indications

- Dry partial thickness or full thickness ulcers
- Minimally draining ulcers

Hydrocolloids

Photograph compliments of Johnson and Johnson

Photograph downloaded on 11/21/08 from http://jan.ucc.nau.edu/~daa/woundproducts/products.html on

Hydrocolloids

Characteristics

- Maintains a clean, moist ulcer environment
  - Reduces ulcer contamination
  - Promotes autolytic debridement
- May reduce pain and protect ulcer

Indications

- Partial or full thickness

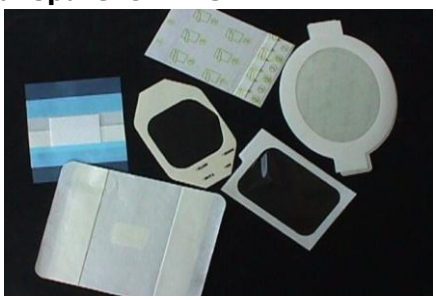
Precautions

- Caution in acutely infected ulcers
- Contraindicated with dry eschar in presence of arterial insufficiency

Hydrocolloids: Special Considerations

- When applying dressing should extend 1 ½- 2 inches past ulcer edges
- Peri-ulcer tissue must be intact
- Utilize a skin sealant under adhesive products to protect the peri-ulcer skin
- Hydrocolloid wear-time is typically 4-7 days; early removal contributes to peri-ulcer skin stripping.
- Wound may have a mild odor and tan exudate when hydrocolloid is removed; cleanse thoroughly before assessing for infection

Transparent Films



Photograph compliments of Johnson and Johnson

Transparent Films

Characteristics

- Permeable to oxygen and water vapor
- Slow moisture loss through evaporation
- Maintains moisture
- Non-absorbent
- Protects from bacteria and other contaminants
- Creates a "second skin" to protect against friction

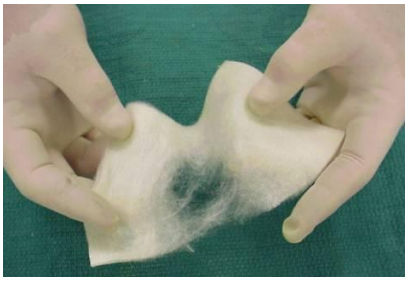
Indications

- Partial thickness ulcers with minimal ulcer drainage
- High shear areas

Transparent Films: Special considerations

- Peri-ulcer tissue must be intact
- Dressing should extend 1 ½ to 2 inches past ulcer edges
- Utilize a skin sealant to protect the peri-ulcer skin
- Avoid use of transparent dressings on patients with fragile epidermis.

Alginates



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Alginates

Characteristics

- A natural seaweed polysaccharide
- Biodegradable, highly absorbent
- Converts into viscous, hydrophilic gel maintaining moist ulcer environment
- Some autolytic debridement and hemostatic properties

Indications

- Partial and full thickness ulcers
- Moderate to heavy ulcer drainage

Foam Dressings

Photograph compliments of Johnson and Johnson

F

Characteristics

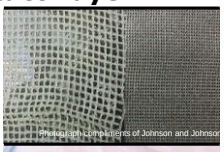
- Insulating
- Absorptive
- Maintains moist ulcer environment
- Promotes some autolytic debridement
- Generally non-adherent to ulcer base
- Extremely versatile
  - May be used as "padding"
  - Spot compression

Indications

- Partial and full thickness ulcers
- Moderate to heavy drainage

Non-Adherent Contact Layer

Characteristics
- No adherence to ulcer bed
- Protects the ulcer bed
- Decreases pain with dressing changes



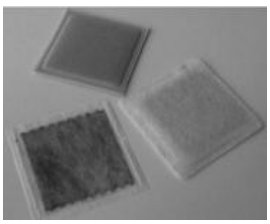
Photograph Compliments of Johnson and Johnson

Indications
- Healthy red granulated ulcer bed
- Pain with dressing changes
- Secure biologic product in place
- Skin tears

Palliative Dressings

Considerations
- Product choice should be based on ulcer moisture characteristics
- Maintain peri-ulcer integrity
- Non-adherent to decrease pain

Charcoal dressings



Characteristics
- Odor absorption
- Exudate absorption
- May also provide anti-microbial action if combined with silver

Photograph compliments of Johnson and Johnson

Remember the goal…

Maintain Moisture
- Transparent film
- Hydrocolloid
- Hydrogel Sheet

Add Moisture
- Amorphous hydrogel
- Impregnated hydrogel gauze

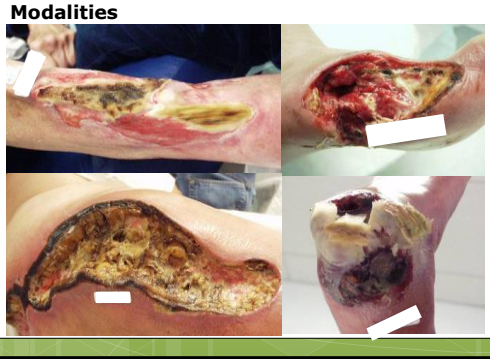
Protect ulcer surface
- Contact layer
- Impregnated hydrogel gauze

Absorb Moisture
- Foam
- Alginate
- Hydrofiber
- Composite dressing

Control Bacteria
- Silver
- Slow release iodine

Control Odor
- Activated charcoal

Complex ulcers require Active Treatment Modalities



Appropriate dressing selections…

Achieve Desired Goal:
- Enhance ulcer healing process as part of a comprehensive multidisciplinary ulcer healing plan of care.

Outcomes:
- Rapid healing
- Decreased morbidity
- Decreased recurrence
- Decreased costs

HBO Therapy

Hyperbaric Oxygen Therapy

- Utilizes 100% oxygen breathed at increased atmospheric pressures
- Most Common Diagnosis: Diabetic Foot Ulcer
- Typical pressure is 2.0-2.5 atmospheres below sea level at least 5 times per week
- Typical treatment length is 2 to 2.5 hours
- Single or Monoplace chambers available

Approved Uses:

- Air or Gas Embolism
- Carbon Monoxide
- Gas Gangrene
- Acute Traumatic Ischemias
- Decompression Sickness
- Blood Loss Anemia- severe
- Intracranial Abcess
- Necrotizing Soft Tissue Infections
- Refractory Osteomylitis
- Delayed Radiation Injury
- Compromised Skin Grafts

Potential Side Effects

- Barotrauma
  - Ears, sinus, teeth, chest, GI
- Temporary vision changes
- Fatigue
- Seizures
- Claustrophobia
- Paresthesia

HBO Effects on Hypoxic Wounds

- Physiological Effects:
  - Improved leukocyte function and bacterial killing
  - Enhanced collagen synthesis and cross-linking
- Pharmacological Effects:
  - Direct antimicrobial effects, toxin synthesis suppression
  - Blunting of systemic inflammatory response
  - Prevention of leukocyte activation and adhesion
  - Intermittent correction of tissue hypoxia
  - Vasocontriction/prevetion of ischemic/reperfusion injury syndrome
  - Stimulation/support of tissue growth

HBO Summary:

- Few complications
- Adjunctive therapy
- Limb Salvage
- Improve outcomes for healing
- Satisfied patient and physician!

Any Questions?? Thanks!

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