Wound Care Priorities: ESP + E

- Correct etiologic factors
- Provide systemic support
- Provide principle-based topical tx
- Evaluate progress on routine basis

Management Goals

- Three potential goals
  - Comfort
  - Maintenance
  - Healing
- Comfort goal
  - End of life care
  - Focus is on minimizing wound related discomfort (pain, odor, etc.)

  - Inability to correct underlying pathology
  - Inability to provide systemic support (perfusion, nutrition, etc.)
  - Terminally ill patient
  - Necrotic uninfected heel ulcer in bedbound pt
  - Healing

- Healing
  - Goal whenever etiologic factors can be corrected and patient has ability to heal
Principle-Based Topical Therapy

• Eliminate impediments
  • Necrotic tissue
  • Excess bioburden
  • Excess or “trapped” exudate
  • Closed wound edges
• Maintain optimal environment for healing: moist, insulated, protected

Topical Therapy Acronym

• D = Debride necrotic tissue
• I = Identify and treat infection
• W = Wick fluid from tunneled/undermined areas
• A = Absorb excess exudate
• M = Maintain moist wound surface
• O = Open wound edges
• P = Protect healing wound
• I = Insulate healing wound

Monitor Response to Therapy

• Expectations: consistent progress toward healing
  • Inflammatory stage: establishment clean wound bed
  • Proliferative stage: granulation/epithelial resurfacing
• Evidence of trouble
  • No progress for 2 consecutive weeks
  • Deterioration
• Indications for change in topical therapy
Wound Cleansing

- Acute traumatic wounds (e.g., laceration)
  - X-ray if needed to R/O retained foreign body
  - Thorough cleansing to remove all debris
  - Surfactant + soft sponge
  - Pulsed irrigation
  - Tetanus?

Wound Cleansing Guidelines

- Clean Wounds
  - Gentle flushing
  - Noncytotoxic solution

- Dirty Wounds
  - Irrigation with 8 – 15 psi force (pulsed lavage one option)
  - Antiseptics sometimes used for cleansing/packing
  - Hydrogen peroxide???

Management Necrotic Wounds

- Two Major Questions:
  - Should this wound be debrided?
  - If so, what is the best approach to debridement of this wound?
    - Instrumental?
    - Non-instrumental?
Indications for Debridement

- Anytime the goal is repair
- Anytime the wound is already open (necrotic tissue in an open wound increases risk of infection)
- When wound is clinically infected (even if goal is comfort or maintenance): to reduce pain and odor

Contraindications to Debridement

- Wound in which goal is comfort or maintenance and
- Wound is closed and covered by necrotic tissue
- Necrotic tissue is dry; there is no drainage or seepage
- There are no signs of clinical infection (erythema, induration)
- Dry necrotic uninfected heel ulcer in bedbound patient (why?)

Options for Instrumental Debridement

- Surgical Debridement
  - Sterile excision all necrotic tissue
  - Converts chronic wound to acute wound
  - Good option for wound with large amount of necrotic tissue or wounds with bone/joint involvement
  - Must consider risk associated with surgery
    - Overall patient condition
    - Coagulation disorders and active infection usual contraindications
Options for Instrumental Debridement

• Conservative Sharp Wound Debridement
  • Removal loose avascular tissue at bedside with sterile instruments
  • Good option for loose necrotic tissue in uninfected wound
  • Must have qualified practitioner (consider state nurse practice act)
  • Used in conjunction with other approaches to debridement

Instrumental Debridement: Guidelines

• Pre-procedural assessment
  • R/O contraindications
    • General contraindications (dry closed uninfected wound when goal is comfort or maintenance)
    • Adherence of eschar
    • Clotting disorders (unless avascular tissue very loose so no risk of vascular access)
    • Systemic or soft tissue infection (unless no risk of vascular access)

Instrumental Debridement: Guidelines for CSWD

• Critical skills for safe performance CSWD
  • Ability to identify viable structures that must be avoided (e.g., tendons)
  • Ability to establish plane of dissection between viable and non-viable tissue
• Procedure
  • Prep area with antiseptic
  • Remove necrotic tissue
  • Flush thoroughly
Non-Instrumental Debridement

- General Concepts
  - Should be used when debridement needed but instrumental debridement not an option (clotting issues, infection, care setting issues)
  - Slower but safer than instrumental
  - Sometimes used in conjunction with instrumental
  - Options: enzymatic; chemical; autolytic; hydrotherapy; larval therapy; ultrasonic

Non-Instrumental Debridement

- Enzymatic
  - Selective and noninvasive
  - Must follow manufacturer’s guidelines for use
    - Nickel thick layer
    - Moist cover dressing
    - Daily application
    - Cannot use with silver or iodine
  - Must crosshatch dry eschar
  - Must consider cost

Non-Instrumental Debridement

- Autolytic
  - Uses body’s own WBCs to debride
    - Requires moist wound bed
    - Requires adequate numbers WBCs
  - Indications:
    - Limited necrotic tissue
    - Dry adherent eschar
  - Good dressing options
    - Dry wound: hydrogel; transparent adhesive; honey-based gel, etc.
    - Wet wound: alginates; hydrofibers, etc.
Non-Instrumental Debridement

• Chemical Debridement (e.g., sodium hypochlorite solutions)
  • Actions: antimicrobial; odor elimination; breakdown necrotic tissue (limited data re: debridement properties)
  • Good choice for necrotic infected wound
  • Inexpensive but must change Q 12 – 24 hrs
  • D/C when wound clean
  • Options: Dakin’s 0.025 – 0.0125%; Didaksol; Anasept; Microcyn; Puracyn; Vashe, etc

Non-Instrumental Debridement

• Hydrotherapy
  • Used to soften and loosen necrotic tissue
  • Recommended pressures: 8-15 psi
  • Pulsed lavage more commonly used
  • Need personal protective equipment (private room)
  • Avoid blood vessels and graft sites; monitor pt on anticoagulants for bleeding
  • Avoid pressures >15 psi

Non-Instrumental Debridement

• Ultrasound Debridement
  • Use of ultrasound-powered saline mist to remove slough, fibrinous exudate, bacteria
  • Contact vs non-contact; contact ultrasound may be more effective for debridement
  • More costly than other methods but less painful than instrumental debridement
Options for Debridement

• Wet to dry gauze (put gauze in wound wet; allow to dry; remove)
  • No longer recommended; should use moist to moist (autolytic)
  • New “debriding sponges/swabs” helpful in removing thin layers of slough and hyperkeratotic skin around wound

• “Larval therapy” (aka “maggot debridement therapy” – MDT)
  • Being used in many centers esp for difficult wounds
  • Action restricted to necrotic tissue
  • Available “free range” and “contained”
  • Antimicrobial benefit + debridement
  • More data needed

Management of Infected Wounds

• General considerations
  • All open wounds contaminated by bacteria
  • Contamination vs colonization vs critical colonization (surface infection)
  • Negative effects high bacterial loads
• Implications for management
  • Contamination/colonization: no treatment
  • Critical colonization (surface infection): topical vs
  • Invasive infection: treat systemically
Management Infected Wounds

• Surgical incisions
  • Preventive care: preop measures; occlusive dressing immediately postop
  • Treatment: drainage if needed; antibiotics
  • Chronic wounds: tx dependent on tissues involved
    • Bone (osteomyelitis)
    • Soft tissue (cellulitis)
    • Wound surface

Infected Wounds

• Infection involving bone
  • Clinical S/S: visible or palpable bone; nonhealing tunnel
  • Diagnosis:
    • MRI is “gold standard”
    • Alternatives: bone scan, bone biopsy, labs
  • Treatment
    • Orthopedic (and possibly ID) consults
    • May need to excise infected bone
    • Longterm antibiotics; HBOT???

Infected Wounds

• Infection involving soft tissue:
  • Clinical S/S: redness, heat, edema, pain, exudate, induration*
  • Diagnosis
    • Clinical dx
    • Wound cultures obtained to direct treatment
  • Treatment: systemic antibiotics

*Note impact immunosuppression or diminished perfusion on clinical presentation
Culture Guidelines

- Aerobic vs anaerobic
- Qualitative vs quantitative
  - Swab provides qualitative data (what)
  - Punch biopsy provides qualitative and quantitative (colony counts) (what and how many)
  - Colony counts > 100,000 org/ml = infection
  - Colony counts > 100,000 org/ml + clinical signs impaired healing: suggest surface infection
  - Any level ẞ hemolytic strip indicates infection in acute wound; in chronic wound colony counts > 10³

Infected Wounds:

- Culture guidelines:
  - Purpose: to determine infecting organism and antibiotics to which it is sensitive
  - Procedure:
    - Wound biopsy (punch culture) OR
    - Swab (Levine technique)
      - Flush with N/S
      - Swab 1 sq cm of viable tissue till exudate obtained

Infected Wounds

- Wounds with surface infection (critical colonization)
  - Clinical S/S: deterioration in quantity or quality of granulation tissue; persistent high volumes of exudate; pain; odor; recurrent formation slimy "film" on wound surface
  - Diagnosis: Clinical diagnosis (note importance serial assessments)
  - Treatment: topical therapy to reduce bacterial loads (e.g., cleansers, antimicrobial dressings, etc.)
Infected Wounds

• Wounds with surface infection at risk for biofilm formation
  • Definition: community of bacteria protected by slimy film that protects organisms against ABX, WBCs, and many antimicrobial agents
  • Pseudomonas, staph common biofilm agents
  • Process: planktonic to sessile bacteria; signaling between organisms; biofilm construction
  • End result: “gated community”; persistent inflammation
  • Dx: clinical (recurrent film one indicator)

Infected Wounds

• Management Wounds with Biofilm Formation
  • Mechanically remove/disrupt biofilm (blunt curette, debriding sponge, wet gauze)
  • Thoroughly irrigate
  • Antimicrobial dressing to kill planktonic bacteria and prevent recurrent biofilm
    • Cadexomer iodine may penetrate biofilm
    • Surfactant gel may eliminate biofilm

Management Infected Wounds

• Debride necrotic tissue/remove “biofilm”
• Use irrigation force 8 – 15 psi for cleansing
• Topical therapy for surface infections
  • Antiseptics and antimicrobial dressings most common approach (no culture needed)
• Systemic antibiotics for soft tissue infections and infections involving bone (culture driven if possible)
Topical Agents for Wounds with Surface Infection

- Antiseptics for cleansing (and packing?)
  - Use for packing remains controversial
  - Indicated only for wounds in inflammatory phase; discontinue when wound clean
  - Options
    - Dilute Dakin’s or comparable solution
    - Povidone-iodine solution (1%)
    - Acetic acid 0.25%

Topical Agents for Wounds with Surface Infection

- Antimicrobial Dressings
  - Cadexomer iodine (sustained release iodine)
    - Intended for exudative wounds
    - May penetrate biofilm
    - Consider size of wound and allergies
  - Sustained release silver
    - Available at dressing types so can match dressing to wound and get antimicrobial effects
    - Some donate silver to wound bed, others kill organisms within dressing
    - No evidence bacteria resistance to date

Topical Agents for Wounds with Surface Infection

- Antimicrobial Dressings
  - Methylene blue & crystal violet + polyvinyl alcohol or polyurethane foam
    - Available only as flat foam dressing and “pipe cleaners” for tunnels at present
    - Antimicrobial and anti-inflammatory effects
    - Some have to be premoistened
  - AMD gauze and packing strips (PHMB)
  - Manuka honey-based dressings
  - Dialkylcarbamoyl chloride (attract and trap bacteria)
Infected Wounds

• Guiding Principle: must intervene when
  • there is invasive infection of soft tissue or bone or
  • the bacterial loads on the surface of the wound are sufficient to interfere with repair

Management wounds with closed wound edges

• Impact: prevent epithelial resurfacing
• Treatment options:
  • Cauterize with silver nitrate
  • Refer for excision of wound edges

Management wounds with hypertrophic granulation tissue

• Impact: impaired epithelial resurfacing
• Causes (theorized)
  • Heavy bacterial loads at surface
  • Overly wet wound surface
• Management
  • Silver nitrate to wound surface
  • Antimicrobial foam
Management Wound Related Pain

• Assessment
  • Pain level
  • Causative factors (persistent pain vs procedural pain)

• Management
  • Persistent pain: around the clock analgesics
  • Procedural pain
    • Premedication
    • Gentle technique and nonadherent dressings
    • “Time-outs”