Wound Management
OBGYN
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Conflicts Of Interest?
Financial Disclosures?
•NONE

Wound Care
Principles of Practice
• 1-2.5% of industrialized population suffers from “problem wound”
• 67 million people
• Problem wound and chronic wound are wounds that have failed to progress through normal healing process
• Acute wounds proceed through healing cascade through a timely and uncomplicated manner
• Recalcitrant wound >2-4 weeks despite multiple interventions

Wound Care
Principles of Practice
• Only 15% of wound care interventions are supported by solid evidence
• Examples: no RCTs for turning patients every 2 hrs
• Mandeville Hospital in England during WWII

Wound Care
Principles of Practice
• Multidisciplinary team
• Patient and family, Nurses, OT, PT, Speech, Dentician, Social Services, Wound care specialist, Physicians.
• Always get permission before managing wounds, changing dressings, debriding wound.

Principles of Practice
• Wounds need to be assessed at least weekly. More frequently as necessary
• Look at the overall patient: ie. nutrition, diabetes, PVD, social situation, language barriers, mobility, IRR/IT, immunotherapy

Skin and Underlying Structures
• Epidermis and Dermis
• Epidermis: mostly sheets of dead cells (keratinized squamous epithelium)
• Dermis: nerves, sweat glands, sebaceous glands, hair follicles, ECM, fibroblasts, etc
• Separated by basement membrane

Two types of wounds
• Partial thickness involves epidermis and dermis***
• Full thickness goes into subcutaneous tissue***

4 Stages of Wound Healing
• Hemostatic: Immediate—Stop bleeding
• Inflammatory: 1-4 days—Clean up
• Proliferation: 3-14 days—Filling with connective tissue
• Maturation: 2+ years—Wound remodeling

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Wound Description
- Descriptive documentation:
  - Location, wound measurements, wound base, periwound tissue, shape, undermining and tunneling, sinus tract, odor, color, transillumination, undermining, base, characteristics
- Wound: Necrotic, eschar, healthy (loosely, firmly adherent), slough, non-viable, viable, granulation tissue, exudate, drainage, serous, sanguinous, purulent, yellow, green, none, scant, small, moderate, large, copious
- Skin edges: defined, undefined, attached, unattached

Descriptive Example
- There is a 4x4x0.2 cm oval full thickness (stage 3) sacral pressure ulcer. The wound base is healthy with almost 100% beefy red granulation tissue. There is scant exudate. The skin is mostly attached between two and nine o'clock but unattached between nine and two o'clock with 0.3 cm of undermining. The periwound skin is dry, hyperpigmented and indurated.

Types of Wound Closure
- Primary Intention
- Secondary Intention
- Tertiary Intention (Delayed Primary Intention or secondary closure)

Wound Healing
- Wounds needs to fill and contract
  - GRANULATE AND EPITHELIALIZE

Wound Healing
- Wound factors that can impede healing:
  - Slough
  - Hypergranulation
  - Epibole
  - Infection

Theory Of Modern Wound Management
- Mixed Wound Healing
  - Autolytic
  - A trip cell is a dead cell
- Temperature Effects:
  - Maintain normal body temperature
  - Avoid cooling and vasodilation
  - Do not leave wounds open for long periods of time
  - Gauze is not good for temperature control

Tactile Pressure Considerations
- Wounds respond to pressure
- Don't pack tight

Wound Bed Preparation
- Create an environment optimal for healing
  - Remove necrotic tissue
  - Moisture Balance-Control Exudate-Avoid Dryness
  - Control Bio-burden: Treat infection
  - Epithelial Edge Advancement

Protect Peri-wound Skin
- Wound pouches
- Skin Sealant
- Moisture Barrier Ointments
- Barrier Wafers

Debridement
- Selective
- Autolytic
- Enzymatic
- Bio-surgical/biological debridement
- Non-Selective
  - Mechanical
  - Irrigation
  - Site of entry
  - Sharp Debridement
**Sharp Debridement**
- This is really what separates physicians from other wound care team members.
  - Not everything is allowed to do this.
  - Hospital has to train and designate.

**Contraindications**
- Bleeding disorders
- Ischemic wounds
- Severe Arterial Insufficiency (ABI<0.5)
- Dry Gangrene (distal intact heel/artery/feet)

**Wound Healing Delays**
- Hypoxia
- Diabetes
- Immunosuppression
- Infection
- Poor Nutrition
- Obesity
  - Fat is poorly vascularized

**Foams:**
- Gauze
- 4x4's
- Hospital

**Not**
- Is used to dry
- är
- Kerlix
- Xeroform
- Polyurethane

**Hydrocolloids**
- Poor Infection
- Immunoproliferation
- Diabtes
- Hypoxia

**Dressings**
- Transform
- Change
- Occlusive
- Available
- Don't change
- Used very little

**Occlusive**
- Available
- Used
- Very little
- Change

**Dressing Categories**
- Gauze dressing
  - Soft, quick, bacterial and subcutaneous (unintegrated)
  - Most widely used
  - Whether dry or moistened have little value for optimal wound management (no other)
  - Major use for wet to dry is debridement

**Dressing Categories**
- Alginites
  - Dressings with calcium and sodium fibers made from seaweed
  - Transform into a mucoid gel consistency when in contact with moisture/epithelial
  - Very absorptive
  - Used in wounds with moderate to heavy exudate
  - Change 1-2/day
  - Soft/cm in relatively dry wounds

**Dressing Categories**
- Hydrocolloids
  - Water dressing containing gel forming agents in an adhesive compound laminated into flexible water resistant outer layer
  - Available in pre-cut shapes for sacral, elbows, heels.
  - Adhesive dressing to good for areas with incontinence
  - Change every 1-7 days, not appropriate for daily change
  - Tends to lose adhesiveness with dressing changes

**Dressing Categories**
- Hydrogel
  - 95% water in a gel base
  - Donates moisture to wound
  - Available in amorphous gel, impregnated, and sheet
  - Promotes moist healing environment, granulation tissue, epithelialization, and accelerates detachment
  - Best for dry or slightly moist wounds
  - Use daily to every 4 days

**Dressing Types**
- Primary
  - Therapeutic or protective covering applied directly to wounds or lesions
- Secondary
  - Serve protective or therapeutic function and are needed to secure primary dressing

**Dressing Categories**
- Collagen: Freeze dried sheets of bovine collagen
  - For dermis, granulated non-healing wounds
- Composites: Combination of 2 or more physiologically distinct products
  - Can be dressing that usually allows multiple debridement
  - Contact Layer: 1/4" non-adherent sheets placed directly on wound to protect tissue. They are porous to allow fluid to be absorbed by overlying dressing
  - 20 grafts, or base of wounds getting negative amount/days
  - Does not need to be removed with each dressing change
### Dressing Categories
- **Specialty Absorptive Dressings (Hydrofiber)**
  - Multi-layered dressings that consist of highly absorptive fiber layers
  - Used for wounds with heavy drainage
- **AQUACEL Ag**
  - Do not use with the collagenases

### Dressing Categories
- **Transparent Films**
  - Semipermeable thin transparent polyurethane coated with an adhesive
  - Provides moist healing environment
  - Useful as a secondary dressing
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### Topical Antiseptics
- **Betadine**
  - Good for Gram+, Gram-, MRSA, fungus
- **Dakins Solution** (hypochlorite solution—bleach)
  - Virtually effective in killing all microorganisms in burns
- **Acetic Acid** (vinegar)
  - Especially used for Pseudomonas
  - Used TID for limited duration
- **Hydrogen Peroxide**
  - Cytotoxicity to healing tissue, try not to use

### Topical Antibiotic Dressings
- **Aquacel Ag**
  - Fibers form a gel when in contact with wound fluid
  - Creates a fluid absorptive capacity
  - Reduces dead space
  - Ionic Silver kills bacteria

### Topical Antibiotic Dressings
- **Silver Sulfadiazine (Silvadene, Flamazine, Thermazine)**
  - Used mostly in burns and partial thickness wounds
  - Does not hinder epithelialization but does slow down fibroblasts so granulates slower.

### Topical Antibiotic Dressings
- **Hydrofera Blue**
  - Foam sheets moistened with water or NaCl
  - Organic pigments (Methylene Blue and Gentian Violet)

### Topical Antibiotic Dressings
- **Impregnated Gauzes**
  - Meet (KCl)
  - Iodoform Gauze
  - Iodoform (bismuth)
- **Kerlix AMD (Polyhexamethylene biguanide)**

### Negative Pressure Dressing
- **Sub-atmospheric pressure**
  - Mitosis is stimulated, new matrix formed, wound drawn closed
- **Contraindication**
  - Fistulas
  - Necrotic tissue
  - Osteomyelitis
  - Malignancy
  - Exposed vessels and nerves
  - Exposure site
  - Exposed organs
  - Beware in patients on anticoagulants or platelet aggregation inhibitors

### Nutrition Nutrition Nutrition
- **30-35 kcal/kg/day**
- **Albumin**
  - <3.5 g/dL is at risk
  - Half-life 18-21 days
- **Pre-Albumin**
  - <15mg/dL is at risk
  - Half-life 1-2 days
Gynecologic Surgical Wound Complications

- Infection
  - Staph epidermidis, E. coli, Proteus, Ureaplasma, Mycoplasma
- Dehiscence
- Seroma
- Hematoma

Hypergranulation Tissue

- Granulation that forms above the surface of the surrounding epithelium
- Delays epithelialization
- Treated with silver nitrate application (chemocautery)

Wound Seroma

Treatment of Seroma

- Infection rate of 3.9% for open hysterectomy
- 28.8% of all readmissions after hysterectomy
- 2x as likely to die, 60% more likely to be in ICU
- Potential pathogenic microorganisms from skin, vagina, and endocervix

Prevention

- Preservative Showers
- Not shaving before the procedure (use clippers)
- Preoperative antibiotics
  - 1-2h minutes prior to incision by anesthesia
  - As needed
  - If infected bone/soft tissue
  - Cephalosporin in other
- Intraoperative normothermia 36.5°- 37.5°
- Blood loss
- Forced air warm (hair warm)
- Room temp is 60-70° F

Prevention

- Skin preparation
- Perioperative
- Irrigation/irrigation
- Cephalosporin or van com
- MRS/A history
- Intraoperative: preoperative antibiotics
- Skin cleansing prior
- Adhering risk factors
- Smoke cessation
- Diabetes
- Postoperative care
- Infection
- Seeding

Prevention

- Hand washing, sterilization of instruments, proper surgical attire
- Post operative instructions
- Proper care of operative site and dressings
- Moisture control (foulures)
- Activity limitations
- Home care resources
- Signs and symptoms of infection and pathway to seek attention
Prevention

- Team huddles
- Time outs
- Clear delineation of responsibilities
- Systems to monitor outcomes, identify problems, initiate change
- Adherence
- Data Collection
- Reporting
- Multidisciplinary reviews

Prophylactic Negative Pressure Surgical Dressing

- PICO dressing
  - 80mm Hg
  - 200 ml absorptive capacity

"Ultimately determined that iNPWT reduced rate of wound infection, seroma, and exudate compared with standard dressing. However, the diversity in clinical and methodological aspects implies that the results should be interpreted with caution, and no absolute or general recommendations can be made"
30 patients undergoing elective or emergent open abdominal surgery
- 25 to PICO
- 5 to Standard dressing
- 4.3% in PICO group
- 32% in standard dressing group

**Prophylactic Negative Pressure Dressing for Closed Incisions**

**Why Not Wet To Dry?**
- Can cause pain
- Non-selectively debride healthy tissue
- Do not provide optimal moisture
  - Dry out wounds via evaporation and absorption from saline
- Does not provide warmth
  - Wounds get cold → vasoconstriction → hypoxia
- Do not support optimal granulation
- Are more labor intensive

**Prevention Summary**
- Consider systems to ensure prevention practices
- Clear pre-op and post-op instructions
- Implement non-stereoidal anti-inflammatories
- Use clamps for hemostasis
- Use Steri-Strips
- Prevent alkali injuries to incision
- Prevent hypothermia
- Control ventilation
- Maintain neutral
- Gowns restricted
- Chlorhexidine and F7 soap if sterile
- Prescribe if closed incision negative pressure therapy to beneficial

**Wound Care Tips**
- Keep wounds moist and warm
- Goal is to achieve healthy granular bed and skin edges with appropriate debridement and dressings
  - After wound is healthy assist wet to dry dressing changes and try to achieve infrequent changes
- Treat hypergranulation tissue with silver nitrate
  - **TAKE PICTURES AND LOAD THEM TO THE CHART!**
- Consider negative pressure wound therapy to decrease healing time
- Consider secondary closure when wound is healthy and granular to decrease healing time