Financial and Other Disclosures

- None

- Name-brand specific products in use at ANMC and other local facilities will be discussed

- I receive no financial compensation for the products used at this or any other facility

- There is no intent to advertise for any of these products or manufacturers
Objectives

- Identify principles of wound healing
- Identify modern topical wound therapies and guidelines for their use
- Identify advanced wound therapies available at ANMC
Epidemiology and Impact

- 15% of Medicare beneficiaries
- 6.5 Million patients in the US (as of 2009)
- Annual cost estimate $50 billion
- Majority of chronic ulcers are lower extremity ulcers
  - 1% of global population (18-64yo)
  - U.S. 10-35% with venous disease, 4% of those with active ulcers (>65yo)
  - Annual cost to treat a venous ulcer is $10,563
  - Loss of 4.6 million work days
Principles of Wound Healing - DIWAMOPI

- Debride
- Identify and treat infection
- Wick or fill dead space
- Absorb excess exudate
- Maintain a moist wound surface
- Open or excise closed wound edges
- Protect from infection/trauma
- Insulate
Debride

- Only if the goal is healing
- Surgical / Sharp - bedside or in the OR
- Enzymatic - collagenase
  - Deactivated by many advanced dressings (Jovanovic, 2012)
  - Must be applied nickel thick
  - Moist wound bed or cross hatch
- Autolytic - occlusive cover dressing
- Mechanical - packing removal, irrigation/lavage
  - Not wet-to-dry, more on that in a minute
- Biological - “Maggot therapy”
Dry gangrene
Maggot Therapy, 1 application
Identify and Treat Infection

- Culture
  - Tissue sample
  - Levine Technique

- Systemic antibiotics
- Topical therapy
  - Bactroban for MRSA
  - Cadexomer Iodine
  - Acetic Acid (Vinegar)
  - Dakin’s / Sodium Hypochlorite (Bleach)
Wound Culture - Levine Technique

- Clean the wound surface after dressing removal
- Debride necrotic tissue if indicated
- Re-clean wound surface
- Pick 1cm² of viable tissue
- Rotate culture swab with enough pressure to elicit drainage or bleeding
Cadexomer iodine paste - 1 week of tx
Recipes

**Dakin’s 0.025%**
- 5mL bleach in 1 L distilled water
- 1 tsp bleach in 4 ¼ cups DW
- Hospital basin ½ filled with a capful of bleach

**Commercial 0.25% Dakin’s**
- “Half Strength” at our pharmacy
- 1:10 ratio

**Acetic Acid 0.25%**
- 3 Tbsp white vinegar in 1 qt DW
- 2¼ tsp white vinegar in 1 cup DW
- Available in the Pharmacy
DIWAMOPI

- Debride
- Identify and treat infection
- Wick or fill dead space
- Absorb excess exudate
- Maintain a moist wound surface
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- Protect from infection/trauma
- Insulate
Wet to Dry/Damp

- Have been used for thousands of years
  - Sumerian clay tablet describes washing wounds with beer
  - Ancient peoples used lint as a dressing
- Supported by guidelines as “expert opinion”
- Lack of knowledge about advanced dressings
- Wounds will heal, but at what cost?

- Does not provide a moist wound healing environment
- Becomes hypertonic and desiccates wound tissue
- Prolonged inflammatory phase
- Drop in wound temp, vasoconstriction
- Increases chance of infection
- Painful
- Expensive and time consuming
- Disperses bacteria into the air
Cost Comparison

- 1/8 the time to change.
- True cost is in the time to heal and patient outcome
  - How valuable is being able to leave the house with a reliable, comfortable dressing?
  - What is the cost of less ER visits? Decreased rate of infection? Being healed two months sooner? Less scarring? Less pain?

<table>
<thead>
<tr>
<th></th>
<th>Saline and Gauze</th>
<th>Advanced Dressing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dressing change frequency</strong></td>
<td>BID</td>
<td>3 x/wk</td>
</tr>
<tr>
<td>Price of dressing</td>
<td>$0.75</td>
<td>$10.00</td>
</tr>
<tr>
<td>Price of gloves</td>
<td>$0.10</td>
<td>$0.10</td>
</tr>
<tr>
<td>Price of irrigation syringes</td>
<td>$0.86</td>
<td>$0.86</td>
</tr>
<tr>
<td>Price of saline</td>
<td>$1.12</td>
<td>$0.56</td>
</tr>
<tr>
<td>Price of tape</td>
<td>$0.08</td>
<td>$--</td>
</tr>
<tr>
<td><strong>Cost per dressing change</strong></td>
<td>$2.91</td>
<td>$11.52</td>
</tr>
<tr>
<td><strong>Materials cost/wk</strong></td>
<td>$40.74</td>
<td>$34.56</td>
</tr>
<tr>
<td>Cost of 1 nursing visit</td>
<td>$100.00</td>
<td>$100.00</td>
</tr>
<tr>
<td>Costs of 1 wk of visits</td>
<td>$1,400.00</td>
<td>$300.00</td>
</tr>
<tr>
<td><strong>Weekly labor costs</strong></td>
<td>$1,400.00</td>
<td>$300.00</td>
</tr>
<tr>
<td><strong>Weekly costs: labor + materials</strong></td>
<td>$1,440.74</td>
<td>$334.56</td>
</tr>
<tr>
<td>Amount of progress after 4 wks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Wound size reduction in 4 wks</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Costs for 4 wks of care</td>
<td>$5,762.96</td>
<td>$1,330.24</td>
</tr>
<tr>
<td><strong>Cost per 1% reduction</strong></td>
<td>$15.26</td>
<td>$13.38</td>
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<tr>
<td><strong>Supply cost per 1% healing with pt doing self-care</strong></td>
<td>$3.26</td>
<td>$1.30</td>
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</tbody>
</table>
## Dressing Selection Grid

<table>
<thead>
<tr>
<th></th>
<th>Deep</th>
<th>Shallow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet</td>
<td>Need absorptive filler + cover</td>
<td>Absorptive dressing</td>
</tr>
<tr>
<td>Dry</td>
<td>Hydrating filler + cover</td>
<td>Add or retain hydration</td>
</tr>
</tbody>
</table>
Deep and Wet

- Filler
  - Alginate
  - Hydrofiber

- Cover
  - Gauze/tape
  - Tegaderm if exposed to contaminants
  - Surginet to protect from tape damage
Calcium Alginate
Hydrofiber
Deep and Dry

- Need a hydrating filler
  - Gel and fluff with damp gauze

- Cover
  - Gauze/tegaderm
  - Waterproof foam dressing
Shallow and Wet

- Foam dressing
  - Mepilex(Ag)/ Allevyn
  - AMD Foam - PHMB infused
  - Hydrofera Blue (Classic and Ready)
  - Polymem
- Contact layer and gauze cover
  - Mepitel
  - Adaptic
  - Silverlon
  - Acticoat
  - Xeroform/Vaseline gauze (one layer, otherwise occlusive)
- Alginate
- Hydrofiber
Foam Dressings
Contact Layers
Extra heavy drainage?

- **Superabsorbers**
  - Mextra - pouch-like and cannot be cut to fit
  - Enluxtra - can tape together to make a large dressing
  - Exudry - Similar to ABD pad with antishear layer. Not cut to fit

- **Contact / Transfer layer**
  - Use a thin contact layer and change the top dressing as needed, but leave the contact layer in place
  - Time able to stay varies by product, generally silver dressings can stay for 7 days

- **Pouching system**
Superabsorbers
Wound pouches
Shallow and Dry

- Solid hydrocolloids
  - Duoderm
    - Thin
    - Signal
      - Indicated for pressure ulcers, but I prefer multilayer bordered foam (mepilex)
- Transparent adhesive dressings
  - Tegaderm
  - Op-site
- Hydrogel
- Contact layer + gauze dressing
Hydrocolloid and Transparent Dressings
Open Wound Edges

- Silver Nitrate / AgNO3
  - Closed wound edges
  - Hypergranulation
  - Bleeding
- Sharply
Using Compression

- Ensure safety - Exam and ABI
- If + for PVD
  - Modified compression
  - Vascular referral
  - Goal is not healing without adequate blood flow
- Most wounds do better with compression, even if CVI is not primary etiology
- Continue to Elevate
  - Above the level of the heart—Recliner is not enough
- Stockings
- Unna’s boot
- Multilayer Compression Wrap
- Velcro wraps
- Ace wraps
Collagens and Tissue Substitutes

- Wounds stall in the inflammatory phase
- Increase in MMP’s which can degrade ECM
- Collagens bind and inactivate MMP’s
- Promogran Prisma
  - Hemostatic
  - Silver
- Endoform
- Grafix, Epifix, Acell, Apligraf, BTM, Integra and a number of other brands
Collagens and Tissue Substitutes
Negative Pressure Wound Therapy

- VAC Ulta (inpatient)
  - Standard
  - Veraflo “Rinser”
  - Cleanse Choice “Scrubber”

- Activac
- SNAP
- PICO
Wound Clinic at ANMC

- Staffed by an APRN and wound certified RN’s
  - 1 RN for inpatient
  - 1 RN for outpatient
- Operated out of the General Surgery Clinic
- Specialty / Referral service
  - Inpatient “Wound Care Consult”
  - Outpatient “Wound Care Referral”
- Teleconsult available for Rural providers
- Contact via phone, Cerner message, TigerText, email, AFHCAN
  - Photos are much appreciated
Wound Clinic at ANMC

- Outpatient negative pressure therapy
- Lower extremity compression therapy
- Biodebridement
- Advanced tissue substitutes
- Epidermal grafting
- Education
- Expanding therapies as able
- Venous ulcers
- Arterial ulcers
- Diabetic Foot ulcers (with Podiatry)
- Pyoderma Gangrenosum (with Derm)
- Frostbite
- Burns
- Delayed surgical wounds
- Large traumatic wounds
- Pressure ulcers
- Ostomies
- Feeding / Percutaneous tubes
  - Tube and the skin only
References

- www.woundsource.com
Contact Information

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