Complex Surgical Wound Care

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Carolyn Lund has been a Neonatal Clinical Specialist in the NICU at Children's Hospital Oakland for over 30 years, and is also an Associate Clinical Professor at the University of California, San Francisco. As the science team leader for the evidence-based practice project on neonatal skin care for the Association of Women’s Health, Obstetrics and Neonatal Nurses and the National Association of Neonatal Nurses, the Neonatal Skin Care Guideline was first developed and then evaluated in 51 nurseries in the US in 2001. She also served as team leader on the revision of guidelines in 2007, and the current revision which is due for completion. She has contributed to knowledge of neonatal skin care through original research in the areas of skin maturation, skin integrity and adhesive damage, and how bathing affects the newborn’s skin barrier function and the skin microbiome.

Annual Quality Congress Breakout Session, Sunday, October 4, 2015
Complex Surgical Wound Care
Objectives: Compare and contrast 2 key strategies used by quality improvement teams to improve outcomes for infants requiring surgical intervention.
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Goals of the Presentation
• Wound Care Terminology
• Common wounds encountered in the NICU
• Appropriate wound treatment options, considerations for neonatal patients
• Best current evidence in care of neonatal wound and ostomy issues
• Management options for children/newborns with ostomies and strategies for pouching complicated stomas.

Disclosures
• Member task force developing consensus statements for Medical Adhesives and Patient Safety; funded by an unrestricted educational grant from 3M
• Member of professional advisory panels for Johnson & Johnson Consumer Companies, Inc. and 3M.
• Sponsored by 3M to provide professional education to nurses
• Consultant to Nonin Inc. for development of neonatal near infrared spectroscopy sensor that is “skin friendly”

Wound Care Terms
• Dehiscence: separation of surgical incision or a closed wound
• Exudate: leakage of blood or plasma into wound, can be serous, sanguinous or sero-sanguinous
• Eschar: thick, black, leathery, dry necrotic tissue
• Slough: stringy, moist, loose necrotic tissue, usually tan, yellow or gray; attached to wound bed

Wound Care Terms
• Debridement: removal of debris and necrosis
  – Autolytic: body’s own enzymes liquefy necrotic tissue
  – Chemical: applying enzymes that break down necrotic tissue without injuring viable tissue
  – Mechanical: physical force to remove necrotic tissue, such as wet-to-dry gauze
  – Surgical or sharp: requires special skills
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Wound Closure Terms
• Primary: surgical incision restores tissue continuity directly without granulation
• Secondary: skin edges do not approximate, close by granulation tissue from outer edges and base of wound cavity
• Delayed primary closure: when wound is too contaminated to close
• Drains: facilitate healing by providing an outlet for fluid accumulation
• Undermining: wound extends beneath skin, usually involves significant portion of wound edge
• Tunneling: tissue destruction extends from wound base into tissue, may be several areas; may require “packing” these areas to prevent abscess formation

Some Wound Healing Principles
• Wounds heal faster with less involvement of epithelial tissue, and thus less scar tissue, when kept moist
• Three phases: inflammatory, proliferative, maturation
• “Never put anything on a wound that you wouldn’t put in your eye”
• Avoid use of disinfectants, cleansers in wound

Wound Care Dressing Categories
• Absorption dressings
• Alginates
• Debriding agents
• Foams/composites
• Gauze
• Honey
• Hydrocolloids
• Hydrogels
• Silicone
• Transparent films

Excellent article:

Wound Dressings
- Hydrocolloid
  - Duoderm GCF or Thin
  - Tegaderm
- Hydrogels
  - Duoderm Gel
  - Vigilon Sheets
- Hydrofibers
  - Aquacel
  - Acticoat
  - Biofilm
- Foams
  - Mepilex Transfer
  - Allevyn Foam
- Transparent Film
  - OpSite
  - Tegaderm
- Contact Layer
  - Mepitel Soft Silicone
  - Mepitac
  - Mepiform
- Antimicrobial
  - Acticoat
  - Aquacel Ag
  - Allevyn Ag
- Composites
  - Allevyn
  - Tegaderm Absorbent
- Gauze
  - Plain
  - Petrotakum

Wound Dehiscence
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Irrigate Wound  
Protect Surrounding Skin

Apply Skin Barrier

Absorbent Polyurethane Dressing

Dressing Before and After

Beware: the Use of Silvadene Cream in Neonates
- Toxicity reported due to topical absorption
- Kernicterus
- Neutropenia
- Leukopenia
- Agyria

What????????
Initial Nonoperative Management and Delayed Closure for Treatment of Giant Omphaloceles

- 22 giant omphaloceles treated over 21 years (19 containing liver)
- Silver sulfadiazine dressings, loose elastic bandage
- No complications associated with use of silver sulfadiazine
- Mortality rate 9.1%

Aquacel Ag Dressing

Dehiscence with Wound Vac

How Does the Wound Vac Work?

- Negative pressure produces macrostrain and microstrain
  - Macrostrain: visible stretch, occurs when negative pressure contracts the foam
  - Microstrain: microdeformation at cellular level, leads to cell stretch
    - Decreased edema, better perfusion, promotes granulation by facilitating cell migration and proliferation
- www.kci1.com/KCI1/sciencebehindthetherapy/howitworks
Ostomy Care in Neonates

- Gastrostomy
- Tracheostomy
- Jejunostomy
- Ileostomy
- Colostomy

“Button Buddies”

Gastrostomy with Breakdown

- Antimicrobial ointment
- Silicone dressing

End Stoma with Hartman’s Pouch

Double-Barrel Ostomy
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Double-Barrel Ostomy Eversion of Stoma

Multiple Stomas

Loop Stomas

Ileostomy with Breakdown

Products: Skin Protectant, Paste, Powder, Barrier and Pouch
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Finished!

Ileostomy with Prolapse, Hernia

One Piece Pouch

Severe Excoriation

Silicone Barrier Films

Silicone Barrier Films

Plastic polymers sprayed or wiped on skin to protect from trauma
Alcohol-free products less irritating to skin
Cavilon is FDA approved in infants >30 days as diaper dermatitis treatment
Other manufacturers do not need FDA label, covered under the original patented product
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**Adhesive Removers**
- Alcohol/organic-based solvents
  - Contain hydrocarbon derivatives or petroleum distillates
  - Toxicity
    - Case report of skin injury and hemorrhage in premature infant after exposure to Detachol Oil-based solvents
    - Paraffin based (mineral oil), some citrus-based
      - Leave oily residue, cannot replace adhesive
    - Silicone-based removers
      - Safest medical adhesive remover

**Silicone Adhesive Removers**

**Severe Excoriation**

**Stoma Construction**
- Stoma within a laparotomy incision
  - Not matured, retracted proximal stoma, intubated mucous fistula

**Pouching Difficult Stomas**
- The Dreaded Stoma Retraction

**Pouching Difficult Stomas**
- Flush Stomas & Fungal Infections
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Pouching Difficult Stomas
Multiple Stomas

Distal Stoma Refeeding

Case Study with Distal Stoma Refeeding
• 25 weeks male infant
• at 3 weeks 90 cm distal small bowel resected
• at 9 weeks removed another 5-8 cm
• jejunostomy, ascending colostomy

Distal Stoma Refeeding

Normal Bowel Segment Length based on Gestational Age

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>Total Bowel</th>
<th>Small Bowel</th>
<th>Jejunum</th>
<th>Ileum</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-27 weeks</td>
<td>142 cm</td>
<td>115 cm</td>
<td>45 cm</td>
<td>70 cm</td>
</tr>
<tr>
<td>27-35 weeks</td>
<td>218 cm</td>
<td>170 cm</td>
<td>70 cm</td>
<td>100 cm</td>
</tr>
<tr>
<td>&gt; 35 weeks</td>
<td>304 cm</td>
<td>250 cm</td>
<td>100 cm</td>
<td>150 cm</td>
</tr>
</tbody>
</table>
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Case Study
- Distal stoma refeeding started 6 weeks after 2nd surgery
- Off TPN by 12 weeks
- Reanastomosis 2 weeks later
- Developed RSV pneumonia, encephalitis!

Case Study: Success!

Oops!

Bottom Line
- Use every effort to pouch with as few products as possible
- The easier the system, more likely it will be followed by multiple caregivers
- When it comes to ostomy and wound care, you have to be flexible in your approach