Advancing Clinical Management of Negative Pressure Wound Therapy

PRESENTED BY TAMI SIEWINSKI, RN, BSN, M.ED

Speaker Disclosure Statement

Tami Siewinski, RN, BSN, M.Ed is employed and paid as the Western Director of Medical and Sales Training by Spiracur, Incorporated.
Course Description

- This program is designed for any clinician who participates in the treatment of wounds including RN’s, LVN’s, LPN’s, APN’s, PT’s, MD’s.

- Participants will be able to differentiate appropriate use of Electrically Powered Negative Pressure Wound Therapy and Mechanically Powered Negative Pressure Wound Therapy and optimize clinical management using either system.

Successful Completion Requirements

You must:
- Complete the entire educational activity
- Complete and submit the Course Evaluation Form
Course Objectives

- Pair NPWT Mechanisms of Action (MOA’s) with clinical goals of therapy.
- Understand FDA safety warning on NPWT
- Differentiate EP-NPWT and MP-NPWT
- Identify appropriate therapy selection criteria

References:
4. Ogawa et al., Heit et al., data unpublished.
Mechanism of Action

- Active removal of exudate from interstitial spaces results in:
  - Decreased interstitial pressures
  - Removal of foreign debris/pathogen

Clinical Goal of Therapy

- Remove debris
- Control and optimize interstitial fluid volume balance
- Prepare wound base for tissue tension-stress effects
Mechanism of Action

- Tissue tension-stress effect
  - Similar to tissue expansion
  - Increases mitotic activity

Clinical Goal of Therapy

- Increased rates of granulation tissue formation
  - 50% faster wound healing than use of Modern Wound Care

References:
4. Lerman, B. Retrospective Evaluation of Treatment with the Shal® Wound Care System vs. Modern Dressing Protocols.
Mechanism of Action

- Peripheral contraction
  - Results in decreased length and width of deficits
- Macrodeformation

Clinical Goal of Therapy

- Minimize closure requirements
- Allow for reepithelialization
- ↓ Size of grafts or bioengineered tissues
- Allow for potential reapproximation and delayed primary closure
**Mechanism of Action**

- **Neoangiogenesis**

**Clinical Goal of Therapy**

- Revascularization of superficial capillary perfusion
- ↑ transport, access and utilization of cellular components

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4. Ogawa et al., Heit et al., data unpublished.
Mechanism of Action

Cellular proliferation results in:
- Mobilization of fibroblasts
- Localized control of wound healing components
- Enhanced epithelial migration
- Early wound closure

Clinical Goal of Therapy

Cellular Proliferation

- Reestablish active healing to meet closure requirements

References:
FDA Safety Notice for NPWT

- Bleeding
- Foam adherence
- Dressing retention
- Toxic Shock Syndrome
- Tripping hazard
- Pressure spikes
- Loss of peri-wound tissue
- Extension of wound damage
- Dessication of wounds/bone
- Patient non-compliance

**Negative Pressure Wound Devices Draw**

**FDA Notice, Advice**

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**What You Need to Consider...**

<table>
<thead>
<tr>
<th>Electrically Powered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bleeding</strong></td>
</tr>
<tr>
<td><strong>Dressing retention</strong></td>
</tr>
<tr>
<td><strong>Tripping hazard</strong></td>
</tr>
<tr>
<td><strong>Pressure spikes</strong></td>
</tr>
<tr>
<td><strong>Loss of periwound integrity</strong></td>
</tr>
<tr>
<td><strong>Patient non-compliance</strong></td>
</tr>
<tr>
<td><strong>Dessication of wound/bone</strong></td>
</tr>
</tbody>
</table>
## Interventions

<table>
<thead>
<tr>
<th></th>
<th>Electrically Powered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bleeding</strong></td>
<td>1. Monitor PT, PTT, INR</td>
</tr>
<tr>
<td></td>
<td>2. Wide-meshed non-adherent over vascular structures &amp; organs</td>
</tr>
<tr>
<td><strong>Dressing retention</strong></td>
<td>1. Count &amp; document # of pieces of foam in every wound</td>
</tr>
<tr>
<td></td>
<td>2. Verify # removed &amp; document</td>
</tr>
<tr>
<td><strong>Tripping hazard</strong></td>
<td>1. Secure tubing for mobile patients</td>
</tr>
<tr>
<td></td>
<td>2. Run tubing laterally not medially</td>
</tr>
<tr>
<td><strong>Pressure spikes</strong></td>
<td>1. Wide-meshed non-adherent over vascular structures &amp; organs</td>
</tr>
<tr>
<td></td>
<td>2. NEVER place over newly sutured vessels</td>
</tr>
<tr>
<td><strong>Loss of periwound integrity</strong></td>
<td>1. Skin prep</td>
</tr>
<tr>
<td></td>
<td>2. Protective barrier like a hydrocolloid</td>
</tr>
<tr>
<td><strong>Patient non-compliance</strong></td>
<td>1. Not a candidate for EP-NPWT</td>
</tr>
<tr>
<td><strong>Dessication of wound/bone</strong></td>
<td>1. Wide-meshed non-adherent</td>
</tr>
<tr>
<td></td>
<td>2. White PVA foam</td>
</tr>
</tbody>
</table>

### Differentiating EP-NPWT & MP-NPWT:

“How is Mechanically Powered NPWT (MP-NPWT) different from Electrically Powered NPWT (EP-NPWT)’?’
Government Differentiation

**FDA**
- Separates MP & EP through definition
- Separates MP & EP through dressing change
- Same IFU's
- Same Contraindications
- Same Precautions

**CMS**
- Separates MP & EP through distinct codes
- Separates MP & EP through dressing change schedule
- Same IFU's
- Same Contraindications
- Same Precautions

Both Agree That EP-NPWT & MP-NPWT provide the same therapy

**Defining MP-NPWT**

- Electricity or Battery Required
- NO electricity/battery required
Structural Differences

<table>
<thead>
<tr>
<th>MP-NPWT</th>
<th>EP-NPWT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exudate amounts</td>
<td>0 – 1,000 mLs</td>
</tr>
<tr>
<td>0 – 300 mLs/week</td>
<td></td>
</tr>
<tr>
<td>-75, -100, -125 mmHg</td>
<td>-25 to -200 mmHg</td>
</tr>
<tr>
<td>Pressure options</td>
<td></td>
</tr>
<tr>
<td>No programming, pre-set,</td>
<td></td>
</tr>
<tr>
<td>simple application</td>
<td></td>
</tr>
<tr>
<td>Ease of use</td>
<td>Must program, lock-out</td>
</tr>
<tr>
<td></td>
<td>pts, complex applications</td>
</tr>
<tr>
<td>Weight</td>
<td>2.4 lbs to 12.3 lbs</td>
</tr>
<tr>
<td>2.2 oz</td>
<td></td>
</tr>
<tr>
<td>Access to electricity</td>
<td>Required</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Dressing change schedule</td>
<td>3 x’s/week if non-infected</td>
</tr>
<tr>
<td>2 x’s/week</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>Multiple issues which</td>
</tr>
<tr>
<td></td>
<td>resulted in an FDA</td>
</tr>
<tr>
<td></td>
<td>warning</td>
</tr>
</tbody>
</table>

Wound Characteristic Differences

**Indications**
- Acute, chronic, subacute, ulcer, traumatic, dehisced, surgical, flaps, grafts, partial-thickness burns
- Eschar, exposed organs or vessels, active bleeding
- > .5 cm depth
- No maximal size (Get those BIG boys!!)
- No real limitations on amount of exudate
- After 30 days of MWT w/> .5 cm depth & before closure

**Contraindications**
- Acute, chronic, subacute, ulcer, traumatic, dehisced, surgical, flaps, grafts, partial-thickness burns
- Eschar, exposed organs or vessels, active bleeding
- > .5 cm depth
- No minimal depth < 18 cm x 18 cm

**Wound Size**
- No real limitations on amount of exudate
- ≤ approximately 300 mL’s/week
- NOTE: Foam dressings hold approximately 10-250 mL’s

**Exudate Amounts**
- ≤ approximately 300 mL’s/week
- ≥ 18 cm x 18 cm

**Initiation & Cessation of Therapy**
- At wound onset
- To wound closure
Safety Considerations

<table>
<thead>
<tr>
<th>Safety Consideration</th>
<th>Mechanically Powered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeding</td>
<td>Blue foam allows for immediate discovery of sudden-onset bleeding. 150 mL therapy cartridge minimizes volume loss</td>
</tr>
<tr>
<td>Dressing retention</td>
<td>Blue foam is easily visualized</td>
</tr>
<tr>
<td>Tripping hazard</td>
<td>Tubing can be cut or trimmed</td>
</tr>
<tr>
<td>Pressure spikes</td>
<td>Pre-set pressures do not allow for manipulation</td>
</tr>
<tr>
<td>Loss of periwound integrity</td>
<td>Secondary dressing is CMC based</td>
</tr>
<tr>
<td>Patient non-compliance</td>
<td>Not a candidate for NPWT</td>
</tr>
<tr>
<td>Dessication of wound/bone</td>
<td>Low MVTR does not allow for external air egression</td>
</tr>
</tbody>
</table>

Clinical Management Strategies for NPWT

- Wound cleansing agents
- Pressure selection considerations
- Primary interface considerations
- Secondary interface considerations
- Dressing change schedule
- Wound closure goals
**Wound Cleansing Agents**

- Initial cleansing
  - Non-selective cytotoxic
- Interim cleansing (day 2-7)
  - Selective cytotoxic
- Late cleansing (after initiation of active healing)
  - Selective cytotoxic depending upon bioburden
  - Non-cytotoxic if colonized

**Pressure Selection Considerations**

- **Volumes/Exudate**
  - Gross edema/exudate,
  - ↑ viscosity of drainage
  - 125 mmHg – 200 mmHg
 Pressure Selection Considerations

**Phases of Healing**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury Occurs</td>
<td>Hemorrhage, platelet activation</td>
</tr>
<tr>
<td>Hemostasis</td>
<td>Histamine, serotonin, kinins, arachidonic acid metabolites, xanthine oxidase, cytokines, catecholamines phagocytosis, and debridement</td>
</tr>
<tr>
<td>Inflammatory</td>
<td>Cytokines, bioactive mediators, cell growth / activation &amp; re-epithelialization</td>
</tr>
<tr>
<td>Proliferative</td>
<td>Neovascularization, granulation tissue formation, wound contraction</td>
</tr>
<tr>
<td>Maturation</td>
<td>ECM remodeling and wound closure</td>
</tr>
<tr>
<td>Normal Healing</td>
<td></td>
</tr>
</tbody>
</table>

 Interface Considerations

**Primary**

- Foam
- Gauze
- Wide meshed non-adherent
- Active

**Secondary**

- Drape
- Hydrocolloid
- Ioban
Dressing Change Schedule

- Q 24°  |  Infected wounds
- Q 48°  |  Non-infected, compromised host/wound
- Q 72°  |  Non-infected
- Q 7 Days  |  Grafts, flaps, OR placements

Wound Closure Goals

- Delayed primary closure
- Secondary intention
- Graft, flap
Critical Thinking Exercise

- Appropriate use of EP-NPWT d/t:
  - Exudate amounts
  - Size of wound
  - May require higher levels of pressure

Critical Thinking Exercise

- Appropriate use of MP-NPWT d/t:
  - Immediate initiation of therapy after reconstruction
  - Exudate amounts
  - Size of wound
  - Goal of complete epithelialization post-graft
Critical Thinking Exercise

- Wound cleansing agents
- Pressure selection considerations
- Primary interface considerations
- Secondary interface considerations
- Dressing change schedule
- Wound closure goals
- MP or EP NPWT?
Critical Thinking Exercise

- Wound cleansing agents
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