

Do I Really Understand Negative Pressure Wound Therapy?

Heal on Beal
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Disclosure: Ahearn is the Director of Clinical Operations for Prospera.

Objectives

- Define NPWT and acknowledge its evolution.
- Identify NPWT Indications, Contraindications and Precautions.
- Acknowledge influential NPWT Research.
- Define three basic components of NPWT and PROS/CONS of each.
- Identify NPWT protocols.
- Discuss Reimbursement criteria for NPWT.
- Discuss customized NPWT therapy for different wound types.

The Initial Questions

Exploring the Disparity between Science and Current Practice*

Lack of evolution

- Gold Standard
- Previous research: wet-to-dry gauze controls

Compelling evidence

- Intermittent NPWT vs. continuous therapy
- Lower negative pressure – (< -125 mmHg)

Review published research

- Mechanisms of action
- System factors and functions
- Patient comfort and quality of life

More questions than answers

* (*Ostomy Wound Management*, June 2009)

Definition & History

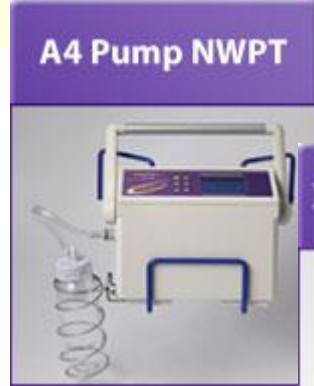
- ****FDA approval for 'vacuum assisted drainage' (VAD) ****
- **Definition: 'the application of sub-atmospheric pressure either continuously or intermittently to an open wound'**
 - Morison, MJ et.al. Chronic Wound Care a Problem Based Learning Approach (2005) Mosby London (pg 154).
- **1908 Dr. Meyer and Prof. Schmieden** note a hyperemic response of tissue when exposed to suction under a glass cup. Better healing with intermittent.
- **1952 German** patent illustrating the use of NPWT with various dressings such as sponge, foam, plastic and gauze.
- **1976** Dr. Paul Svedman develops the Svedman Wound Treatment System with "Svamp Foam".
- **1986-91 "The Kremlin Papers"**, a compilation of 5 studies by Russian clinicians demonstrating the effectiveness of NPWT using gauze and lower pressures.
- **1989 Chariker-Jeter** clinical case studies revolutionizing the effectiveness of cutaneous fistulae management by using NPWT and gauze dressings.
- **1990** Dr. David Zamierowski files patent for Wound Dressing and Treatment Method. Later 1993 submits a fastening system over the wound.
- **1993** Dr. W. Fleischman study for Vacuum Sealing as Treatment for Soft Tissue Damage in Open Fractures.
- **1994** KCI enters the market with the "VAC" foam system.



KCI



S & N



A4 Pump NWPT

Genedyne



XLR8 Pump NWPT



Engenex



Prospera
Negative Pressure Wound Therapy



MobiVac



MIT



Medela



Svedman



Featured Product

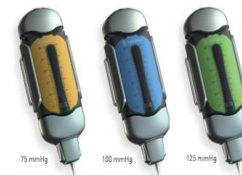
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Click for details

Talley

SNaP® Product Information

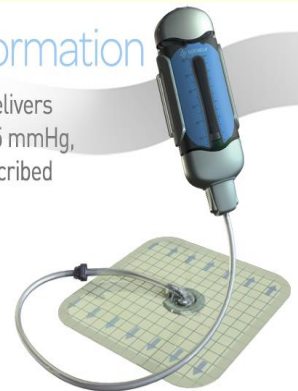
The SNaP® Wound Care System delivers continuous negative pressure at 75 mmHg, 100 mmHg, or 125 mmHg, as prescribed by the clinician.



75 mmHg

100 mmHg

125 mmHg



Indications

- May promote wound healing by:
 - removing excess fluid (infectious and non-infectious)
 - stimulating granulation by increasing vascular perfusion
 - encouraging wound contraction
 - protecting the wound from microbe imbalance
 - maintaining a moist wound environment
- Acute and Chronic wounds
 - Pressure ulcers
 - Diabetic/Neuropathic ulcers
 - Venous Insufficiency ulcers
 - Traumatic
 - Post-operative and Dehisced surgical
 - Explored fistulas
 - Skin Flaps and Grafts
 - Full thickness and partial thickness wounds
 - Partial thickness burns

Precautions & Contraindications

- Active bleeding or anticoagulant therapy
- Difficult wound hemostasis
- Unstable underlying medical conditions
- Close proximity of blood vessels, organs, muscle, and fascia (requires adequate protection)
- Irradiated vessels and tissue
- Bony fragments
- Untreated malnutrition
- Non-compliant or combative patients
- Wounds containing malignant tissue
- Untreated osteomyelitis
- Necrotic tissue such as slough or eschar
- Unexplored or non-enteric fistulas
- Exposed organs, blood vessels

Evidenced-based Scientific Clinical Research

- **1997 Argenta PhD. and Morykwas MD** first published article proving intermittent pressure provides optimal blood flow patterns at 5 minutes on and 2 minutes off and prove rates of granulation under intermittent pressures out performs continuous pressure 103.4% to 63.3%.
- **2003 Dr. Isago** finds no significant differences in the reduction of the wound area with pressure of -50, -75 or -125mmHg and proves reducing the negative pressure to -50 to -75 mmHg relieves pain and does not affect the therapeutic effect.
- **2004 Dr. Wackenfors** finds lower negative pressure (-50 to -75mmHg) maximizes blood flow in soft tissue, muscle tissue requires slightly higher pressures. Identifies a zone of hypo-perfusion directly related to the degree of pressure and concludes intermittent therapy as significant.
- **2008 Dr. Malmsjo** concludes gauze and foam are equally effective at delivering pressure transduction and wound contraction, mechanical deformation stimulates new tissue formation and foam and gauze to be equally effective in delivering blood to the wound.

Evidenced-based Scientific Clinical Research

- **2009 Dr. Malmsjo** concludes lower and variable negative pressures improve mechanical deformation of the wound edge, wound fluid removal and wound edge micro-vascular blood flow. There is an optimal balance offered by tailoring increasing and decreasing negative pressures (-75 to -80 mmHg/100% blood flow; - 40 to -45 mmHg/50% blood flow).
- **2010 Dr. Borgquist** concluded the effects of intermittent and variable negative pressure wound therapy on blood flow at the wound edge are directly related to the degree of pressure transduction.
- **2011 Dr. Malmsjo** concluded tissue trauma during NPWT is directly related to the amount of negative pressure applied and force of removal when the wound filler is removed. This trauma causes release of Substance P and CGRP pain markers.
- **2012 Dr. Gustafsson** expansive research looking at effects of variable, intermittent, and continuous negative pressure wound therapy, using foam or gauze, on wound contraction, granulation tissue formation, and in-growth into the wound filler.

NPWT Ethics Influences Protocols

- Patient Comfort/Quality of Life
 - Less Pain
 - Less Narcotic Use and its Consequences
- Nursing Utilization
 - Time Management
 - Continued Education and In-servicing
- Cost Effectiveness
 - Profitable management within the Financial/Reimbursement parameters.
- Efficacious wound closure
 - Patient Comfort, Nursing management, Cost, Healing

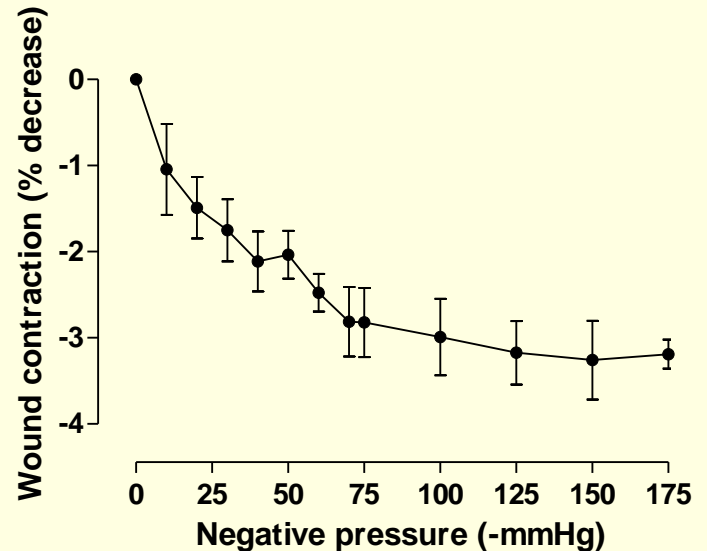
Understanding Components before Protocols

Basic Components of NPWT

- **Pressure**
 - High or low or in-between
- **Filler**
 - Foam, gauze, other
- **Mode**
 - Continuous, Intermittent, Variable

Component PROS & CONS

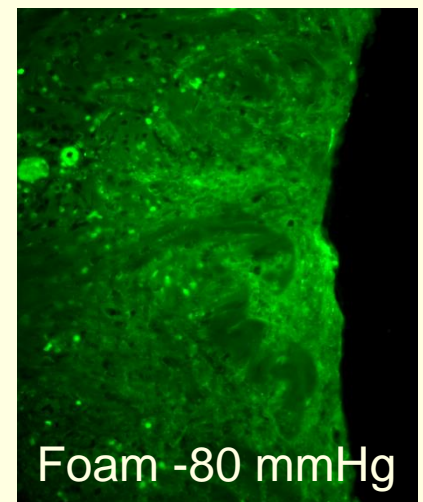
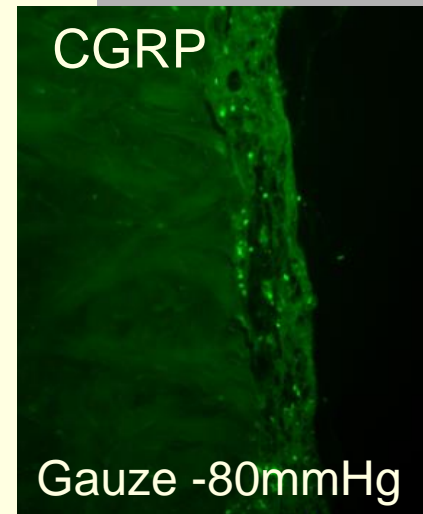
- **Pressure**
 - **High versus Low Pressure**
 - Gold Standard
 - Easy Compression
 - Hypo-perfusion Halo
 - Tissue Color
 - Contraction and Volume Reduction
 - Exudate Removal
 - Edema Reduction



Component PROS & CONS

■ Filler

- Pressure Transduction
- Hydrophobic vs. Hydrophilic
- Bacterial Load
- Pain
 - In-growth vs. non-in-growth
 - Force of removal
 - Neuropeptide markers
- Filler color (black, green, silver, white)
- Tissue Histology
 - Quantity vs. Quality
- Two hour limit for NPWT interruption
- Wear time = cost effectiveness



Component PROS & CONS

■ Mode

■ Continuous

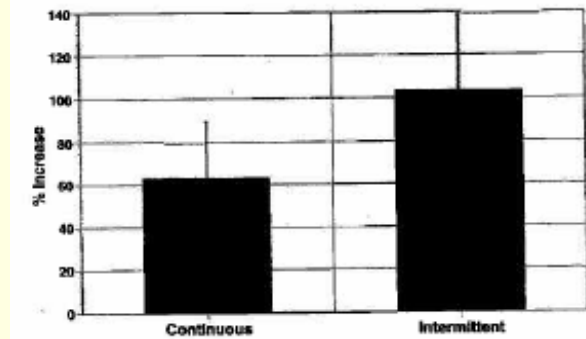
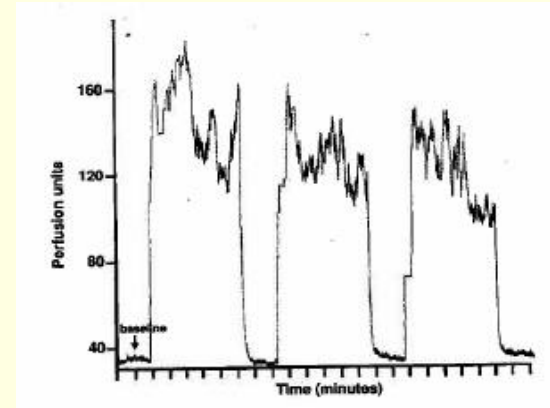
- Standard

■ Intermittent

- Improved granulation
- Dressing leaks
- Pain

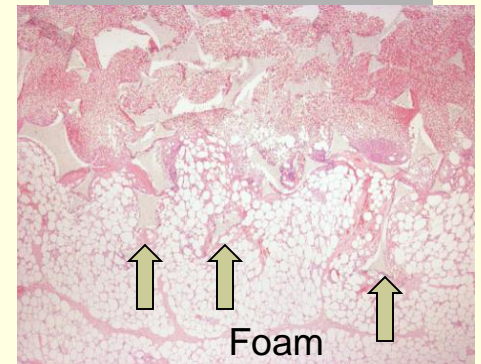
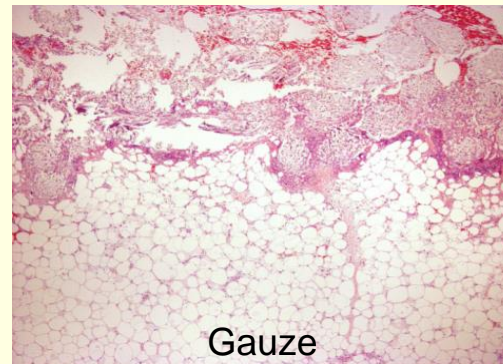
■ Variable

- Eliminate negatives
- Improve healing rates (to be formally studied)

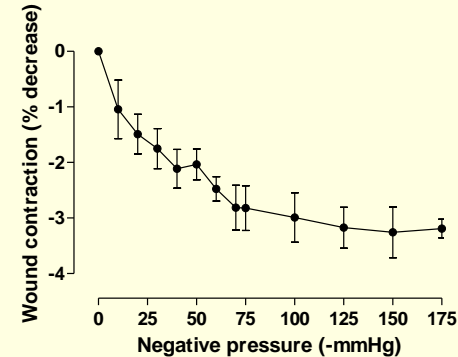


Customize the Components

- Choice of Wound **Filler**

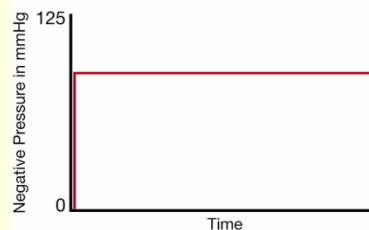


- Reduced Level of Negative **Pressure**

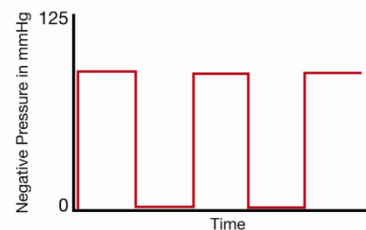


- Mode** of Therapy

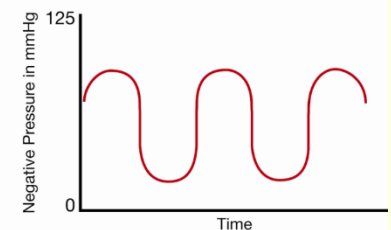
Continuous negative pressure wound therapy



Intermittent negative pressure wound therapy



Variable negative pressure wound therapy



Using your Components to make Protocol “Guidelines”

- Acute and Chronic wounds
 - Pressure ulcers
 - Diabetic/Neuropathic ulcers
 - Venous Insufficiency ulcers
 - Traumatic
 - Post-operative and Dehisced surgical

 - Explored fistulas
 - Skin Flaps and Grafts
 - Full thickness and partial thickness wounds

 - Partial thickness burns

 - ****VPT -80 high/ -40mmHg low**
 - 5 min high/2 min low**
- CPT, IPT, **VPT** / -80 to -125mmHg
 - CPT, IPT, **VPT** / -80 to -125mmHg
 - CPT, IPT, **VPT** / -80 to -125mmHg
 - **CPT** -80 to -125mmHg then VPT
 - **CPT** -80 to -125mmHg then VPT

 - CPT or **VPT** -50mmHg to -80mmHg
 - **CPT** or **VPT** -50mmHg to -80mmHg
 - CPT or **VPT** -50mmHg to -80mmHg

 - **CPT** or VPT -50mmHg to -80mmHg

 - ****Dressing changes 2-3 x per week****

NPWT Reimbursement

- E2402- Pump
- A6550- Dressing Kit
- A7000- Canister

Part B Medicare/Competitive Bidding 7/1/2013

(Austin, Texas example location)

- E2402- \$751.26/\$25.04
 - 30 days
- A6550- \$261.80/\$24.12
 - 15 kits/mo.
- A7000- \$77.60/\$7.76
 - 10 can./mo.

\$ 1090.66/month

\$ 36.36/day

■ Part B Wound Criteria

- Previous protocols
- Date/Type of debridement
- 0.5 cm or > depth
- Nutritional status
- Diabetic program
- Chronic wound >30/days
- Initial measurements
- Pressure/Chronic
 - Turned, relief, moisture
- Vascular
 - Compression, elevation

Do I Really Understand NPWT?

YES!!!!

What's My Protocol?

Diabetic Charcot Foot



Sacral Pressure Ulcer



What's My Protocol?

■ Traumatic Leg Wound



STSG Graft



What's My Protocol?

■ Neuropathic DM Toe



Transmetatarsal Amputation



What's My Protocol?

■ Exposed Structure



Open Organ



What's My Protocol?

■ Open Abdomen



Abdomen with Slough



What's My Protocol?

■ Dehisced Post Op



Foreign Body



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