v.a.c. veraflo™

Negative Pressure Wound Therapy with Instillation

Updating the way you treat open wounds

3M + KCI™

The solution to pollution is dilution.

V.A.C. VERAFLO™ Therapy

Can help facilitate the following in open wounds:

Cleanse ▶ Treat ▶ Heal

A consensus panel of surgeon experts provided the following examples of clinical situations in which V.A.C. VERAFLO™ Therapy could be used in conjunction with appropriate wound care such as debridement and systemic antibiotics:[2]

- Wounds that require a revision ("second look") surgery
- Wounds that cannot easily be closed
- Severe traumatic wounds
- Wounds in which healing progression has "stalled" following traditional NPWT therapy
- Diabetic foot wound infections
- Exposed or infected bone (with or without traumatic defects)
- Ischemic wound beds
- Necrotizing fasciitis
- Wounds complicated by invasive infection or extensive biofilm

Physician consensus panel members recommended V.A.C. VERAFLO™ Therapy for:[2]

- Patients with complex wound characteristics.
- Patients with comorbidities that impair wound healing
- American Society of Anesthesiologists physical status classification of ≥2[3]

Goals for using V.A.C. VERAFLO™ Therapy are varied and include:[2,3]

- Cleansing
  - Remove infectious materials
  - Reduce risk of compromised wound healing due to contamination or bioburden
  - Decrease viscosity and volume of exudate
- Granulation tissue formation
  - Increase granulation formation
  - Decrease wound volume

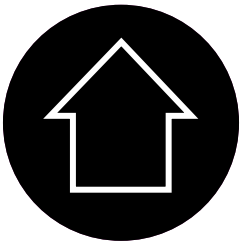
Day 0: Presentation of an open fracture of the lateral malleolus of the left ankle1. V.A.C. VERAFLO™ Therapy with **Normal Saline** applied at **10 minute dwell, -125mmHg NPWT for 6 hours** with V.A.C. VERAFLO™ Dressing. Dressings were changed every 3 days.

Day 9: Rapid development of homogeneous granulation tissue with a clean appearance of the wound[1]

As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition

V.A.C. VERAFLO™ Therapy effect on granulation tissue formation[5]

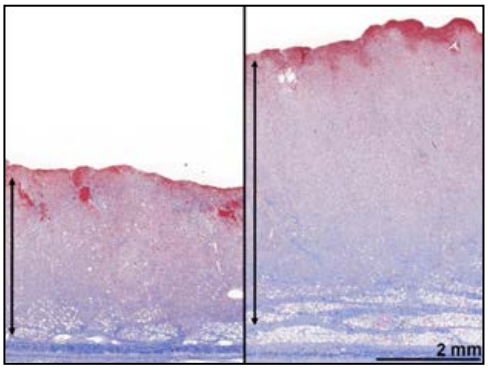
An ***in vivo*** **porcine full-thickness wound model** (n=12) by Lessing et al (2013) was used to evaluate granulation tissue thickness following the use of NPWT with Instillation. Each animal received contralateral 5cm diameter full-thickness excisional dorsal wounds that were treated with either V.A.C. VERAFLO™ Therapy using the V.A.C. VERAFLO™ Dressing or V.A.C. Therapy using the V.A.C. GRANUFOAM™ Dressing. V.A.C. VERAFLO™ Therapy was set to **instill 20ml** of normal saline, soak for **5 minutes** and apply negative pressure of **-125mmHg continuously for 2.5 hours for 10 cycles per day**. V.A.C. Therapy was set at **-125mmHg** continuous pressure. After 7 days, tissue samples were processed for histology and stained with Masson's tri-chrome. Granulation tissue thickness was measured from the base of the wound to the surface of the wound.



A significant increase in granulation thickness

44% (p<0.05)

These results have not been confirmed in human studies.



Histological images from swine study showing a difference in granulation tissue thickness between V.A.C. Therapy with the V.A.C. GRANUFOAM™ Dressing (left) and V.A.C. VERAFLO™ Therapy with the V.A.C. VERAFLO™ Dressing (right) after 7 days of therapy.

V.A.C. Therapy vs. V.A.C. VERAFLO™ Therapy in the management of infected wounds[6]

An independent, retrospective study conducted at MedStar Georgetown University Hospital evaluated the impact of V.A.C. VERAFLO™ Therapy with PRONTOSAN Wound Irrigation Solution (PHMB/Betaine) initiated at initial debridement compared to V.A.C. Therapy.

Patient population:

- Patients with infected wounds (ischemic, neuropathic, decubitus, surgical, venous, traumatic)
- Patients requiring hospitalization and more than one surgical debridement
- Patients treated with systemic culture-specific antibiotics

Length of Stay

23%
reduction
(14.9 vs 11.4 days)
p=0.034

Or Visits

20%
reduction (3.0 vs 2.6 visits)
p=0.003

Time to Final Surgical Procedure

18%
reduction (9.2 vs 7.5 days)
p=0.002

(6-min dwell time)[3]

94% (n = 34) vs. **62%** (n = 74)

wounds closed at discharge

p=0.0004

V.A.C. VERAFLO™ Therapy can potentially save the hospital money

Potential per patient cost saving Illustrations based on MedStar Georgetown University Hospital Study Results[5] and Cost Modeling Assumptions [6,A,B]

	INFOV.A.C.™ Therapy System n=74	V.A.C. VERAFLO™ Therapy 6 minute dwell time n=34	V.A.C. VERAFLO™ Therapy 20 minute dwell time n=34
Length of Stay (days)	14.9	11.9	11.4
Daily Cost of an Inpatient Stay	$2,326	$2,326	$2,363
Total Inpatient Cost (daily rate x days)	$34,657	$27,679	$26,516
Trips to OR for Debridement	3.0	2.4	2.6
Mean cost of an OR Debridement	$3,393	$3,393	$3,393
Total OR Debridement Cost (trips x cost)	$10,179	$8,143	$8,822
Time to Final Surgical Procedure (days)	9.2	7.8	7.5
Length of Therapy (days)	7.2	5.8	5.5
Daily Cost of Therapy	$94.93	$187.03	$193.57
Total Therapy Costs (days x daily cost)	$683.50	$1,084.75	$1,064.65
Total Cost per Patient	$45,520	$36,907	$36,403
Potential savings due to LOS reduction		**$6,978 USD**	**$8,141 USD**
Potential savings due to fewer trips to the OR		**$2,036 USD**	**$1,357 USD**
Additional therapy costs		**$401 USD**	**$381 USD**
Potential savings per patient		**$8,613 USD**	**$9,117 USD**

Costs shown are in U.S. dollars.

Patient results with V.A.C. VERAFLO™ Therapy

V.A.C. VERAFLO™ Therapy - Adjunctive treatment to surgical intervention for large basal cell carcinoma[C]

Day 0: Posterior shoulder view at initial presentation

Day 1: Application of non-adhering silicone dressing to protect exposed structures followed by V.A.C. VERAFLO™ Therapy

Day 7: Week 1 V.A.C. VERAFLO™ Therapy; granulation tissue formation

Day 14: Week 2 V.A.C. VERAFLO™ Therapy; increased granulation tissue and new epithelial tissue formation; switch to non-adherent dressing

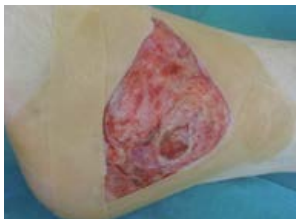
Day 21: Week 3, V.A.C. VERAFLO™ Therapy discontinued; application of PROMOGRAN PRISMA™ Matrix

V.A.C. VERAFLO™ Therapy was initiated using a V.A.C. VERAFLO™ Dressing, **normal saline** was instilled with a **20-minute dwell time**, followed by **2 hours of continuous negative pressure at –125mmHg**.

NOTE: Following V.A.C. VERAFLO™ Therapy, the ACTIV.A.C.™ Therapy System was used for two additional weeks, then STSG was applied.

V.A.C. VERAFLO™ Therapy - Trauma of the ankle[1]

Day 0: Presentation of an open fracture of the lateral malleolus of the left ankle



Day 3: A thin hydrocolloid dressing applied around the wound edges for extra skin protection

Day 9: Rapid development of homogeneous granulation tissue with a clean appearance of the wound

Day 18: Complete wound closure post application of STSG on Day 10

V.A.C. VERAFLO™ Therapy was initiated using a V.A.C. VERAFLO™ Dressing, **normal saline** was instilled with a **10 minute dwell time**, followed by **6 hours of continuous negative pressure at -125mmHg**.

V.A.C. VERAFLO™ Therapy - Diabetic foot infections with ulceration[7]

Day 0: Wound appearance prior to V.A.C. VERAFLO™ Therapy

Day 2: Surgical debridement (including second toe amputation) and reapplication of V.A.C. VERAFLO™ Therapy

Day 5: Wound after sharp bedside debridement at V.A.C. VERAFLO™ Therapy dressing change.

V.A.C. VERAFLO™ Therapy was initiated using the V.A.C. VERAFLO™ Dressing, **normal saline** was instilled with a **10-minute dwell time**, followed by **3 hours of continuous negative pressure at –125mmHg**. V.A.C. VERAFLO™ Dressing changes were performed three times a week.

During hospitalisation, patient was treated with broad spectrum intravenous antibiotics.

As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition

Why wait weeks when you could see results in days?

V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with V.A.C. VERAFLO™ Therapy

Can facilitate the following with regards to thick wound exudates such as non-viable tissue:[9]

Soften ▶ Separate[8] ▶ Solubilize

A consensus panel of surgeon experts provided the following examples of clinical situations in which V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with V.A.C. VERAFLO™ Therapy could be used in conjunction with appropriate wound care such as debridement and systemic antibiotics:[8]

- Presence of fibrin, slough, or non-viable tissue
- Surgical debridement may be delayed or not possible
- Bed side debridement can not be tolerated
- Patient chooses not to have surgery

V.A.C. VERAFLO CLEANSE CHOICE™ Dressing recommended wound characteristics:[8]

- Majority area of nonviable tissue and have heavy bioburden, and/or are difficult to granulate
- All wound types indicated for NPWTi-d.
- Wounds being prepared for definitive closure or coverage (eg, split-thickness skin graft [STSG], full-thickness skin graft [FTSG], or flap)

Goals for using V.A.C. VERAFLO CLEANSE CHOICE™ Dressing are varied and include:[8]

- Cleanse wounds when areas of slough or non-viable tissue remain present on the wound surface
- Remove thick exudate and infectious materials
- Promote granulation tissue formation
- Help provide a bridge to a defined endpoint for a clinical plan of care

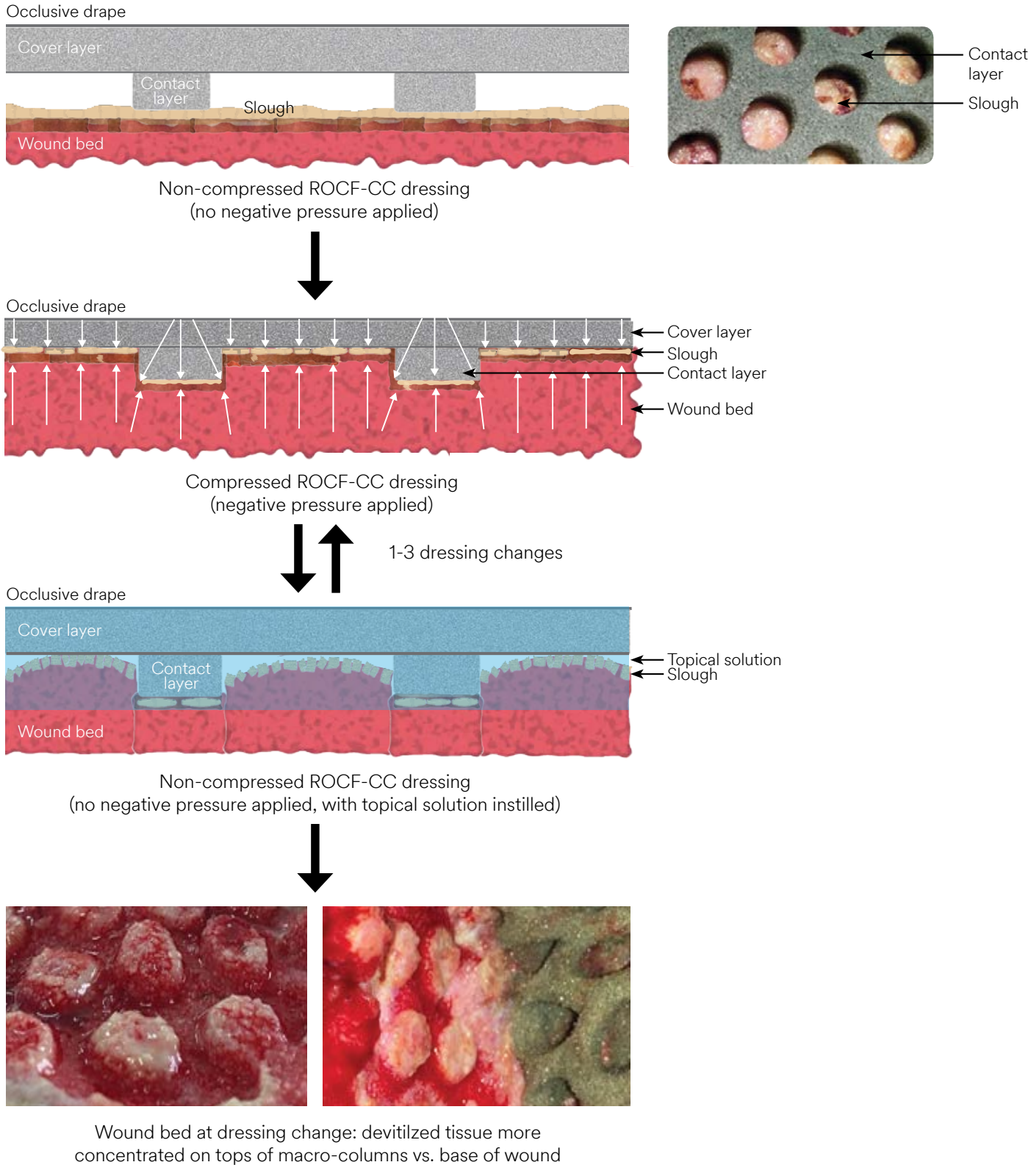
Day 1: A 63-year-old female presented with a pressure ulcer to the left shoulder following a fall. Patient comorbidies included diabetes mellitus, poor nutritional status, obesity, acute encephalopathy, and a suspected cerebrovascular accident.[D]

Day 3: V.A.C. VERAFLO™ Therapy, using V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was initiated. Polyhexanide and betaine wound cleansing solution **(Prontosan® Wound Irrigation Solution) (10mL)** was instilled into the wound with a **dwell time of 2 minutes** followed by **2 hours of continuous negative pressure at -125mmHg**. Wound was ready for a sharp debridement at the bedside.

Patient data and photos of case study above courtesy of Kimberly D. Hall, DNP, RN, GCNS-BC, CWCN-AP, COCN and Jessica Patterson, BSN, RN, CWOCN

V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with V.A.C. VERAFLO™ THERAPY proposed Mechanism of Action

Proposed mechanisms of action of reticulated open-cell foam dressing with through holes (ROCF-CC) combined with negative pressure wound therapy with instillation and dwell time. (A) Noncompressed ROCF-CC dressing with no negative pressure applied; (B) compressed ROCF-CC dressing with negative pressure applied; (C) instillation of topical solution with no negative pressure applied; and (D) wound bed with macrocolumns after dressing removal.[8]



Wound bed at dressing change: devitilzed tissue more concentrated on tops of macro-columns vs. base of wound

The use of V.A.C. VERAFLO CLEANSE CHOICE™ Dressing in a clinical setting[9]

A retrospective data analysis on 21 patients with 21 large complex chronic wounds that contained substantial areas of devitalized tissue and/or yellow fibrinous slough and who were treated in one hospital by several surgeons.

- The V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was applied to all wounds using two foam layers: a wound contact layer with 1.0cm diameter through holes and a cover layer without holes.
- Dressings were changed every 3 days at the bedside (personal communication). The wounds were washed with saline before a new dressing was applied.
- V.A.C. VERAFLO™ Therapy with saline was delivered with the following settings:
  - Soak time: 10 minutes
  - V.A.C. Therapy phase time: 3.5 hours
  - Target Pressure: -125mmHg

Patient Population:

- 18/21 (85.7%) wounds were pressure ulcers (ishicial, sacral and trochanter); 1/21 (4.8%) wounds was a burn wound and 2/21 (9.5%) wounds had necrosis after skin excision.
- 15/21 (71.4%) patients had a confirmed and treated bone infection.
- 11/21 (52.4%) patients were paraplegic or quadriplegic.
- Comorbidities included diabetes, vascular insufficiency, renal insufficiency, Parkinson's disease and cardiac insufficiency.

Mean duration of V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was 8.7 days with an average of 2.9 dressing changes.

Most of the non-viable tissue was removed at the first dressing change after 3 days of therapy

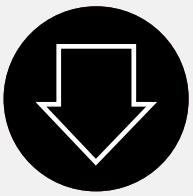
Within 9 days of therapy, wound outcomes observed included:

Rapid Granulation

95.2%

observed in 20/21 of wounds

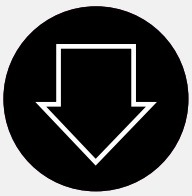
≤10% percent surface area of black devitalized tissue



85.7%

in 18/21 after 9 days of therapy

≤10% percent surface area of yellow fibrinous slough tissue

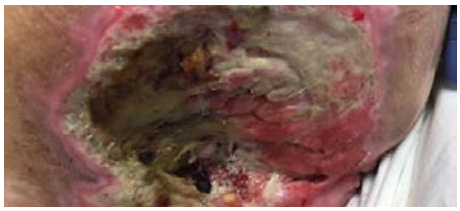


57.1%

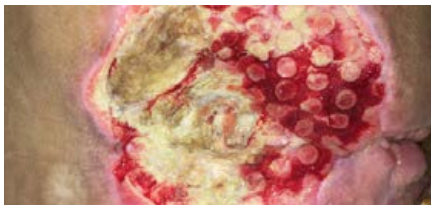
in 12/21 after 9 days of therapy

Patient results with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing

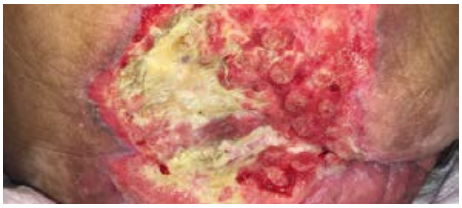
V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with V.A.C VERAFLO™ Therapy – Stage 4 Pressure Ulcer of the Sacrum[E]



Day 0: The wound had been previously treated with V.A.C. Therapy, offloading, silver dressings, air mattress use, hydrofiber dressings, alginate dressings, and wound debridement. Bedside sharp debridement was performed but limited by inability to achieve adequate hemostatsis.



Day 3: The wound showed improvement after V.A.C. VERAFLO™ Therapy, using V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was initiated. **Saline (22ml)** was instilled into the wound followed by a **1 minute dwell time** and **30 minutes of negative pressure at -150mmHg**. Due to the difficult wound location, ostomy paste was used to help ensure a complete seal around the wound.



Day 7: V.A.C. VERAFLO™ Therapy was discontinued. The wound underwent sharp debridement to remove the tip of the coccyx and non-viable slough/adipose tissue, followed 2 days later by colostomy surgery. Three days post surgery, V.A.C. VERAFLO™ Therapy with V.A.C. VERAFLO CLEANSE CHOICE™ Dressing was re-started instilling **Saline (22ml)** followed by a **1 minute dwell time** and **30 minutes of negative pressure at -150mmHg** (Day 12). A silver alginate dressing was placed over the left buttock partial thickness area.

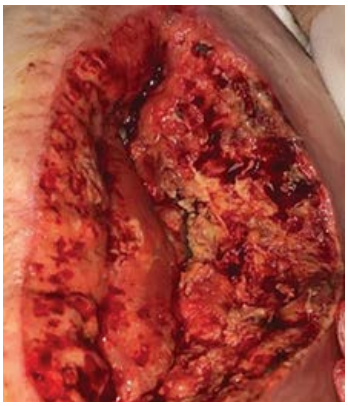
V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with VERAFLO™ Therapy – Venous Stasis Ulcer[9]

Day 0: Venous statis ulcer measured 22cm x 16cm and 85% fibrinous tissue.

Day 10: Wound after negative pressure wound therapy with instillation of **50ml normal saline** with **3-minute dwell time** followed by **2 hours of -125mmHg NPWT**.

V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with VERAFLO™ Therapy – infected donor site wound after harvest of gracilis flap[F]

Day 0: Flap donor site wound at presentation



Day 0: wound after bedside debridement

Day 0: Application of V.A.C. VERAFLO CLEANSE CHOICE™ Dressing with V.A.C. VERAFLO™ Therapy: instillation of 4**4ml of 0.125% hypochlorite solution** with **3-minute dwell time**, followed by **2 hours of -125mmHg NWPT**

Day 5: wound appearance.

As with any case study, the results and outcomes should not be interpreted as a guarantee or warranty of similar results. Individual results may vary depending on the patient's circumstances and condition

V.A.C. VERAFLO™ Therapy tips and tricks[2,7,8]

Preventing a seal loss

- Place the foam in the wound (do not pack the foam into the wound)
- Prepare the periwound adequately (dry the skin, apply 3M™ Cavilon™ skin prep, and allow 3M™ Cavilon™ to get sticky) (3M Cavilon is a trademark of 3M Company)
- Windowpane the periwound with the drape provided in the dressing kit
- Take your time during the initial drape placement and apply drape as uniformly as possible, minimizing the amount of wrinkles, folds, or kinks
  - Consider gently rubbing the skin prep over any wrinkles or folds to seal any microleaks that may compromise the seal
- Select adequate volume of fluid to instill— use the Fill Assist feature to avoid overfilling
- Reduce fill volume from Fill Assist by 10% to 30%
- For V.A.C. VERAT.R.A.C.™ Pad application, take into account the wound size, anatomical position, and the wound's relation to gravity
- Minimize patient activity during instillation with dwell time

Always refer to the instructions for use and safety information.

Specifications and Fill Volumes

	V.A.C. VERAFLO CLEANSE CHOICE™ Medium Dressing	V.A.C. VERAFLO CLEANSE CHOICE™ Large Dressing
		
DRESSING SPECIFICATIONS	**SKU: ULTVCC05MD (5 Pack)** L x W x D1 or D2 or D3 18.0cm x 12.5cm x D1 or D2 or D3 - 4x V.A.C. Advanced Drape - 1x V.A.C. VERAT.R.A.C.™ Pad - 4x 3M™ Cavilon™ No Sting Barrier Film	**SKU: ULTVCC05LG (5 Pack)** L x W x D1 or D2 or D3 25.6cm x 15.0cm x D1 or D2 or D3 - 6x V.A.C. Advanced Drape - 1x V.A.C. VERAT.R.A.C. DUO™ Tube Set - 5x 3M™ Cavilon™ No Sting Barrier Film
	D = Layer Thickness D1 = 0.8cm Thin Cover layer D2 = 1.6cm Thick Cover layer D3 = 0.8cm Wound Contact layer (1.0cm circular holes; 5mm spacing)	
FILL VOLUME START POINTS	85mL (1.6cm Cover Layer); 42mL (0.8cm Cover Layer); 24mL (0.8cm Wound Contact Layer)	150mL (1.6cm Cover Layer); 75mL (0.8cm Cover Layer); 42mL (0.8cm Wound Contact Layer)

V.A.C.ULTA™ System ordering information for V.A.C. VERAFLO™ Therapy

RV-ULTA	V.A.C.ULTA™ Therapy Unit
ULTVFL05SM	V.A.C. VERAFLO™ Small Dressing, 5-pack
ULTVFL05MD	V.A.C. VERAFLO™ Medium Dressing, 5-pack
ULTVFL05LG	V.A.C. VERAFLO™ Large Dressing, 5-pack
ULTVCC05MD	V.A.C. VERAFLO CLEANSE CHOICE™ Medium Dressing, 5 pack
ULTVCC05LG	V.A.C. VERAFLO CLEANSE CHOICE™ Large Dressing, 5-pack
ULTLNK0500	V.A.C. VERALINK™ Cassette with 38mm Spikeable Cap Adaptor, 5-pack
ULTDUO0500	V.A.C. VERAT.R.A.C. DUO™ Tube Set, 5-pack
M8275063/5	V.A.C.ULTA™/INFOV.A.C.™ 500ml Canister with Gel, 5-pack
M8275063/10	V.A.C.ULTA™/INFOV.A.C.™ 500ml Canister with Gel, 10-pack
M8275093/5	V.A.C.ULTA™/INFOV.A.C.™ 1000ml Canister with Gel, 5-pack

References

1. V.A.C.ULTA™ Negative Pressure Wound Therapy System Monograph, 2016 KCI Licensing. LIT#29-A-215 (Rev. 5/16)
2. Kim PJ, Attinger CE, Crist BD, et al. Negative pressure wound therapy with instillation: review of evidence and recommendations. *Wounds*. 2015;27(12):S1-S20.
3. Gupta S, Gabriel A, Lantis J, Teot L. Clinical recommendations and practical guide for negative pressure wound therapy with instillation. *Int Wound J* 2016;13:159-17.
4. Fitz-Henry J. The ASA classification and peri-operative risk. *Ann R Coll Surg Engl*. 2011;93:185-87.
5. Lessing MC, James RB, Ingram SC. Comparison of the effects of different negative pressure wound therapy modes-continuous, noncontinuous, and with instillation-on porcineexcisional wounds. *Eplasty*. 2013; 13: e51.
6. Kim PJ, Attinger CE, Steinberg JS, et al. The impact of negative pressure wound therapy with instillation compared with standard negative-pressure wound therapy: a retrospective, historical, cohort, controlled study. *Plast Reconstr Surg*. 2014; 133:709-716.
7. McKanna M, Geraci J, Hall K et al. Clinician panel recommendations for use of negative pressure wound therapy with instillation. *Ostomy Wound Manage* 2016;3-14.
8. Kim PJ, Applewhite A, Dardano AN et al. Use of a novel foam dressing with Negative Pressure Wound Therapy and Instillation: Recommendations and clinical experience. *Wounds* 2018;30:S1-S17.
9. Teot L, Boissiere F, Fluieraru S. Novel foam dressing using negative pressure wound therapy with instillation to remove thick exudate. *Int Wound J* 2017;14:842-848.

Footnotes

A. V.A.C. VERAFLO™ Therapy System daily cost - approximately 7 cycles per day. $187.03 (based on customer daily rental and disposable rates; assumes 5.8 rental days, 1 canister daily for five days, three medium dressings, one cassette, 700ml Prontosan, 1l saline plus spike) V.A.C. Therapy daily cost: $94.93 (assumes 7.2 rental days, three medium V.A.C. GRANUFOAM SILVER™ Dressings, two canisters). Total therapy days equals Time to Final Surgical Procedure Days - 2 days; NPWT and NPWTi typically applied 1-3 days after admission.

B. V.A.C. VERAFLO™ Therapy System daily cost - approximately 10 cycles per day. $193.57 (based on customer daily rental and disposable rates; assumes 5.5 rental days, 1.5 canisters daily for five days, three medium dressings, one cassette, 700ml Prontosan, 1l saline plus spike). V.A.C. Therapy daily cost: $94.93 (assumes 7.2 rental days, three medium dressings and two canisters). Total therapy days equals Time to Final Surgical Procedures minus 2 days.; NPWT and NPWTi typically applied 1-3 days after admission.

C. Patient data and photos courtesy of Brian Bradow, MD, Peoria, IL DSL#15-0450.US.3 (12/15)

D. Patient data and photos courtesy of Kimberly Hall, DNP, RN, GCNS-BC, CWCN-AP

E. Patient data and photos courtesy of Kimberly D. Hall, DNP, RN, GCNS-BC, CWCN-AP, COCN

F. Patient data and photos courtesy of Lindsey Waddell, RN, MSN, WHNP-BC

V.A.C. VERAFLO CLEANSE CHOICE™ Dressing – Large for use with V.A.C. VERAFLO™ Therapy

Ideal for use on large wounds that could benefit from cleansing and the removal of infectious material, such as exudate, slough and fibrin and NPWT

Provides a wound cleansing option for clinicians when surgical debridement must be delayed, not possible or appropriate

Each kit contains:

- 3 pieces of V.A.C. VERAFLO CLEANSE CHOICE™ Dressing
- 6 sheets of V.A.C. Advanced
- 1 foam quantity label
- 5 packets of 3M™ Cavilon™ No Sting Barrier Film
- 1 V.A.C. VERAT.R.A.C. Duo™ Pad and Tubing Set
- 1 disposable ruler

For more information, contact your 3M+KCI representative or call Customer Service on **1300 524 822.**

NOTE: This document is intended for patient self-care as guided by their HCP and is not intended to replace the Instructions for Use.

NOTE: Specific indications, contraindications, warnings, precautions and safety information exist for these products and therapies. Please consult a clinician and product instructions for use prior to application. Rx only.

3M + KCI™