# Improving the Benefits of Disposable NPWT with Methylene Blue/Gentian Violet Antibacterial PVA Foam Dressings

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**INTRODUCTION:** Negative Pressure Wound Therapy (NPWT) is an established wound closure technique available in both canister and disposable formats.[1] Despite its many benefits, disadvantages remain with the traditional canister type units including; cost, complexity of application, patient reported pain and reduced quality of life.[2]

**OBJECTIVE:** This case review examines early stage evidence that Methylene Blue Gentian Violet (MBGV) polyvinyl alcohol (PVA)[>] foam can augment the clinical benefits of disposable NPWT (dNPWT) by increasing the scope of use to include wounds with depth, undermining or tunneling, biofilm, devitalized tissue and where antibacterial treatment, or improved exudate management would prove beneficial.

**METHOD:** Eight patients with clinically challenging wounds that would not historically fit the criteria for use of dNPWT: two were started on dNPWT and six were transitioned from canister-based NPWT. MBGV foam was applied to part of the wound bed or over the entire wound bed and then was covered with the standard dNPWT.

**RESULTS:** The absorption and wicking properties of the MBGV PVA foam dressing provided optimum moisture balance in wounds ranging from low to high exudate levels as well in low evaporative environments.[3] MBGV foam holds exudate up to 12x its own weight allowing for the combination of MBGV and dNPWT to manage a great amount of exudate. Using MBGV to address undermining and tunneling situations permitted the use of dNPWT when it would not have been possible otherwise. In addition, it aided in the disruption of biofilm and debridement without causing trauma to exposed bone or tendon, and high-risk patients remained free of deep tissue infection.[4] While being treated with this combination, patients reported a decrease in pain, odor and increased mobility, while nurses reported less complexity of care and no urgent visits related to loss of seal.

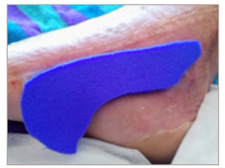
## COST SAVINGS†

| | Canister NPWT | | dNPWT | | Savings using dNPWT |
|---|---|---|---|---|---|
| Parameters | #'s | Cost | #'s | Cost | |
| Nursing visits/month ($70/visit) | 12 | $840 | 4 to 8 | $560 | **$280** |
| NPWT Dressing kits Estimate at $60/each | 12 | $720 | 4 x $240** | $960 | |
| Other supplies needed* | 12 x $15 | $180 | 8 x $4 | $32 | |
| Canister - $20 | 12 | $240 | 0 | – | |
| Total Cost Supplies | – | $1,140 | – | $992 | **$148** |
| Rental ($60/day) | – | $720 | 0 | 0 | **$720** |
| Total Cost Nursing + Supplies + Rental | | $2,700 | | $1,552 | **$1,148** |

†Assumptions for one month of treatment

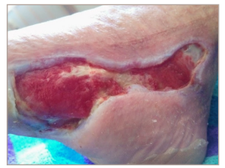
**CASE 1: Diabetic Foot Ulcer:** Fifth digit amputation complicated with Severe Arterial Disease

**Dec 12:** Transition from canister NPWT to GVMB and dNPWT.
**Wound size:** 13 x 6cm, depth 2.5cm. The 2.5cm tunnel was addressed with GVMB as the base was was still necrotic and tunneled to bone.
**Pain:** 5/10 Tramadol/Acetaminophen ii q4hrs



**Jan 20:** MBGV was used under dNPWT to address depth, provide antibacterial treatment and to aid in absorption and wicking of the large amount of discharge that the dNPWT would not be able to manage on its own.

**Jan 20:** No signs or symptoms of infection occurred during the treatment with MBGV and dNPWT.



**Jan 30**
**Wound Size:** 11cm x 4.4cm x .3cm.
Tunnel started at 2.5cm, now 1.1cm. 42% healing in surface area at week 6.5 with MBGV & dNPWT
**Pain:** 1/10. All pain medication was discontinued

**Feb 13:** MBGV wicked exudate into the dNPWT dressing that manages exudate via evaporation. On average 80% of the wound fluid is evaporated.[5]

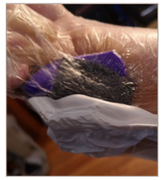
**Feb 13**
**Wound Size:** 9.8cm x 3.3cm x 0.3 cm and the tunnel is closed.
Treatment continues dNPWT with MBGV foam, changing 2x/wk.

**March 21**
**Wound Size:** 3.4cm x 2.5cm x 0.2cm.
Discontinued dNPWT and continued treatment with MBGV PVA foam and cover dressing until wound closure.

**CASE 2: Diabetic Foot Ulcer:** Patient returned home from a two-week hospital stay following a fifth digit amputation related to severe infection and necrosis. IV antibiotics and traditional negative pressure wound therapy were initiated in hospital.

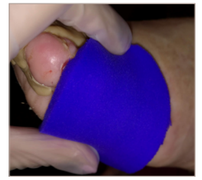
**Feb 26**
**Wound Size:** 9 x 7cm.
**Wound bed:** 40% necrotic, 60% red granular.
**Drainage:** moderate sero-purulent. Periwound intact.

**Feb 26:** MBGV foam used on the necrotic tissue and to cover the tendon. This is used where you might typically use the denser white foam or a mesh dressing to protect the tendon.



**Feb 26:** Traditional canister NPWT used for approximately 3 wks.

**Apr 4:** Initiated MBGV PVA foam and dNPWT. Dressing was changed every 3-4 days.



**Apr 4**
MBGV PVA foam was used in combination with the dNPWT to aid in moisture balance (through absorption and wicking action), debridement, and decreasing the risk of infection. To aid in maintaining a seal for 3-4 days strip paste was used between the toes.

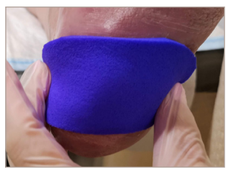
**May 6**
**Wound size:** 5 x 4cm x 0.3cm
**Percentage of healing:** 39% at 4.5wks after initiating MBGV and dNPWT.

**July 18**
**Wound size:** 2.5 x 1.5 x .2cm.
A 94% reduction in wound size over 16 weeks.
**Drainage:** Small to moderate sero-sanguineous.

**CASE 3: Diabetic Heel Ulcer:** Traditional canister negative pressure wound therapy was initiated following surgical debridement of heel down to the calcaneus bone. Patient was residing in the community during treatment period.


**Dec 6**
**Wound size:** 9 x 4 x 2cm.
**Drainage:** moderate to large sero-purulent. Transitioned to MBGV & dNPWT.

**Dec 20**
**Wound size:** 9 x 3.3 x 1.5cm
**Base:** 85% pink, 15% slough. The PVA foam provided a means to address the tunneling to the bone.



**Dec 20:** PVA foam in combination with the dNPWT allowed the dressings to manage a greater fluid capacity than dNPWT would on its own, providing optimal moisture balance to the wound bed.

**Dec 20**

**Feb 4**

**Feb 4**

With traditional canister NPWT it was not uncommon for nurse to receive emergency call in the night due to loss of seal. Guideline states that black foam needs to be removed once NPWT has stopped for > 2-4 hours. MBGV dressing in combination with dNPWT can be left up to 3 days even if seal is lost resulting in NO emergency calls. MBGV provided broad spectrum antibacterial protection to a high risk patient[6]. During treatment with dNPWT and MBGV, the wound did not show any signs or symptoms of infection.

**Feb 19**
**Wound size:** 6.5 x .8cm x .3cm
50% healing in surface area. Discontinued dNPWT and continued on with MBGV and cover dressing. Wound went on to heal without incident.

**CONCLUSION:** The higher absorption and continuous wicking properties of the MBGV foam enabled an earlier transition to dNPWT from a traditional canister system. The dNPWT / MBGV dressing combination led to improvements for the patient, clinician and healthcare payer. The dNPWT system is quicker and easier to apply, saves in nursing time and costs 30-45% less than the traditional canister NPWT.

Through this review, the author shows the dNPWT/MBGV dressing combination should be considered for further evaluation in wound care treatments.

References:
1. Hurd T, Rossington A, Trueman P, Smith J. A Retrospective Comparison of the Performance of Two Negative Pressure Wound Therapy Systems in the Management of Wounds of Mixed Etiology. Adv Wound Care (New Rochelle). 2017;6(1):33-37.
2. Isaac AL. Addressing Complications With Negative Pressure Wound Therapy Use. Podiatry Today, 2019;32(7), 44-49.
3. Solano-Kiedaisch S, Jeff C, Ramsay S, Aust D, Roche E. Activity against wound pathogens and absorbency for silver dressings and a PVA sponge containing organic pigments. Presented at WUWHS Congress, 2008.
4. Edwards K. New Twist on an Old Favorite: Gentian violet and methylene blue antibacterial foams. Adv Wound Care 2016;5(1):11–8.
5. Malmsjö, M., Huddleston, E., & Martin, R. (2014). Biological effects of a disposable, canisterless Negative Pressure Wound Therapy system (in-vitro). Eplasty, 14: e15.*
6. Woo KY, Heil J. A prospective evaluation of methylene blue and gentian violet dressing for management of chronic wounds with local infection. Int Wound J. 2017; doi: 10.1111/iwj.12753

* Other Supplies required: For one dressing change for Traditional NPWT - 2 thin hydrocolloid dressings, normal saline, dressing tray, skin, prep wipes, sterile gloves (estimate $15).
For one dressing change for dNPWT - normal saline, dressing tray, skin prep and sterile gloves (estimate $4).

** 2 dressings per kit plus one pump, all disposable, 4 kits/month

> PVA: Hydrofera Blue CLASSIC dressing

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