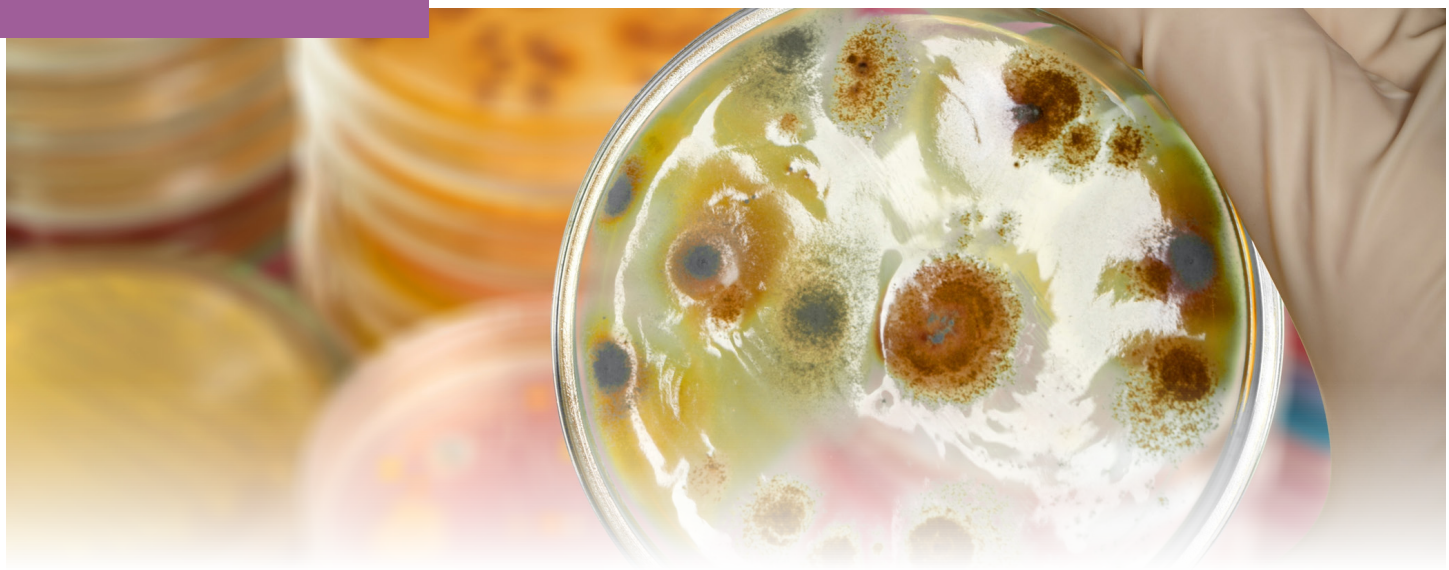
CASE REPORT



Healing Without Harm: Advancing Antimicrobial Stewardship In Canada with Gentian Violet Methylene Blue Dressings

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Antimicrobial resistance (AMR) represents a rapidly escalating global health crisis that threatens the foundations of modern medicine. Recognized by the United Nations as a critical global priority, AMR is responsible for an estimated 4.95 million deaths annually, with global targets aimed at reducing this toll by 10% by 2030.[1] Despite high-level commitments, progress remains fragmented, and Canada has yet to establish wound care-specific strategies within its national antimicrobial stewardship (AMS) framework.

International bodies, including the World Health Organization and United Nations, have called for urgent action to curb AMR (WHO, 2020). In Canada, progress has been slower. One in four antimicrobial prescriptions in Ontario is unnecessary,[2] and over 90% of human antibiotics are prescribed in the community, not hospitals.[3] Public Health Ontario has documented significant regional variability in prescribing, suggesting inconsistent adherence to stewardship principles. In wound care, the misuse of antimicrobials persists despite clear guidance on product selection and usage.[4] This gap between evidence and practice calls for not only better education, but also access to safe, effective topical alternatives that reduce bioburden without harming host tissue.

Hard-to-heal wounds are skin lesions that do not follow a normal healing trajectory and their prevalence is increasing due to the high rates of cardiovascular disease, obesity and aging in the population. While current national data are limited,

estimates suggest that hundreds of thousands of Canadians are living with, or at risk of, developing wounds such as diabetic foot ulcers, pressure injuries or complex surgical wounds—many of whom are vulnerable to infection.[5] Based on international data, lifetime prevalence may be as high as 1–2% of the population in developed countries, which would correspond to approximately 380,000–760,000 Canadians.[6]

This growing burden of wounds is closely linked to the overuse of systemic antibiotics. A significant proportion of wounds exhibiting bacterial colonization are treated with antibiotics even when clinical signs of infection are absent, driving unnecessary use and resistance.[7,8] In wound care, overuse of systemic antibiotics is often driven by diagnostic uncertainty and limited non-antibiotic options, enabling microbes to adapt and develop resistance.[9,10] Stronger infection control strategies, including judicious use of evidence-based antimicrobial dressings, are essential to reduce this risk. Amplifying this concern is the continued widespread use of topical antibiotics in wound care, despite their known risks, such as cytotoxicity, limited antimicrobial spectrum and potential for allergic reactions.[9] Their excessive use, especially mupirocin and fusidic acid, has been directly linked to resistance in *Staphylococcus aureus*.[11] A recent systematic review confirms that inappropriate or prolonged topical antimicrobial use can contribute to AMR. In response, a 2025 consensus panel recommended restricting topical antimicrobials to clinically indicated cases, ideally guided by cultures and always combined with standard wound care.[12]

Amid these challenges, antimicrobial-based wound dressings offer a promising alternative to systemic and topical antibiotic misuse by targeting biofilm and pathogen proliferation directly at the wound site. Common antimicrobial agents used in dressings include gentian violet and methylene blue (GVMB), silver, iodine, chlorhexidine, polyhexamethylene biguanide and honey.[13] This article focuses specifically on GVMB dressings, marketed as Hydrofera Blue® (Hydorfera LLC/Essity), as a clinically viable and non-cytotoxic option within the antimicrobial dressing toolbox.

Hydrofera Blue® (HFB®) is a foam dressing bound with GVMB antibacterial agents [hence referred to as the GVMB dressing or GVMB]. While GV exerts broad-spectrum antimicrobial effects by altering redox potential, inhibiting protein synthesis and interfering with bacterial cell wall formation, MB targets pathogens via oxidative stress mechanisms. A particular advantage is its effectiveness against a wide spectrum of microorganisms found in wounds, including methicillin-resistant staphylococcus aureus (MRSA), vancomycin-resistant enterococcus VRE and Candida.[9] Additionally, it is non-cytotoxic and does not impede tissue regeneration, offering a significant advantage over many other commonly used topical treatments such as iodine-based dressings and topical antibiotics, which are often associated with cytotoxic effects.[4, 7, 8, 9]

There are two types of HFB® foam dressings: CLASSIC polyvinyl alcohol (PVA) foam and READY polyurethane (PU) foam. (See company website for more details: https://hydrofera.com/hydrofera-blue/.)

GVMB is one of very few antibacterial dressings that can be used in conjunction with enzymatic debriding agents, growth factors, or hydrogels without inhibiting their actions.[14, 15]

To examine the clinical performance of GVMB dressings, we reviewed five published studies. In a prospective, non-randomized trial, 29 patients treated with GVMB for four weeks showed significant improvements in tissue quality, wound size, exudate, and infection scores, with no need for systemic antibiotics.[8] A quality improvement initiative analyzing 6,300 home care clients found GVMB reduced healing time by 50% and costs by over 75%.[10] In a retrospective case series of 53 lower extremity wounds, all achieved full re-epithelialization within 20 weeks with GVMB and ovine-based collagen extracellular matrix.[16] Another case series of five chronic wounds reported reduced infection signs and pain after four weeks of GVMB.[17] More recently, a prospective open-label trial of 20 patients showed a 53% mean reduction in wound size, four complete

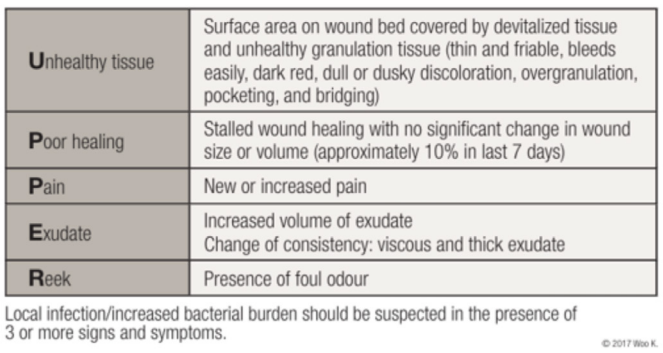
closures and marked bacterial load reduction after four weeks of GVMB with debridement.[18] Collectively, these findings highlight GVMB's role in accelerating healing, reducing bacterial burden and supporting AMS in wound care.

To illustrate our experience using HFB in a diverse population of Northwestern Ontario (NWO), including people in remote and rural areas (e.g., Indigenous) and Southeastern Ontario (SEO) we selected representative case studies that demonstrate its clinical utility and contribution to advancing AMS.

Case Study Series

The following case studies from our advanced wound-care practices illustrate how GVMB dressings can reduce reliance on systemic and topical antibiotics and support healing at all stages of the wound-care continuum, ultimately contributing efforts to mitigate antimicrobial resistance. Table 1 provides an overview of the selected case studies, detailing patient demographics (living area, sex and age), wound characteristics (type, initial size, duration before HFB treatment, time to wound closure), the use or absence of systemic antibiotics according to UPPER (unhealthy tissue, poor healing, pain, exudate, and reek) and LOWER (larger size, osseous tissue and /or deep structure, warmth, edema and redness) tools as described in Figures 1 and 2.

Figure 1: UPPER criteria card



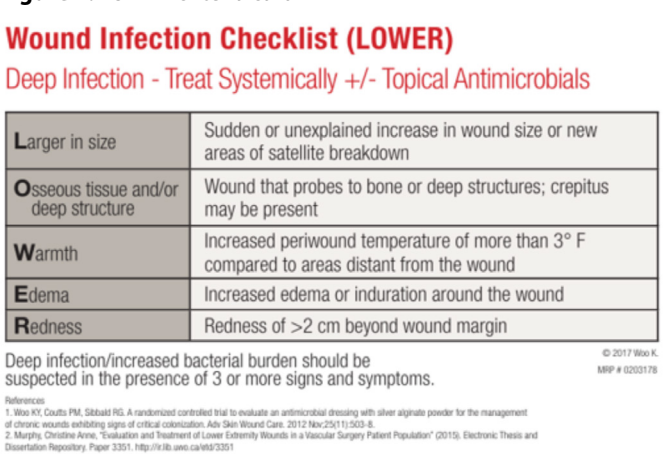
Wound Infection Checklist (UPPER)

Local / Superficial Infection - Treat with Topical Antimicrobials

Unhealthy tissue	Surface area on wound bed covered by devitalized tissue and unhealthy granulation tissue (thin and friable, bleeds easily, dark red, dull or dusky discoloration, overgranulation, pocketing, and bridging)
Poor healing	Stalled wound healing with no significant change in wound size or volume (approximately 10% in last 7 days)
Pain	New or increased pain
Exudate	Increased volume of exudate Change of consistency: viscous and thick exudate
Reek	Presence of foul odour

Local infection/increased bacterial burden should be suspected in the presence of 3 or more signs and symptoms.

Figure 2: LOWER criteria card



Wound Infection Checklist (LOWER)

Deep Infection - Treat Systemically +/- Topical Antimicrobials

Larger in size	Sudden or unexplained increase in wound size or new areas of satellite breakdown
Osseous tissue and/or deep structure	Wound that probes to bone or deep structures; crepitus may be present
Warmth	Increased periwound temperature of more than 3° F compared to areas distant from the wound
Edema	Increased edema or induration around the wound
Redness	Redness of >2 cm beyond wound margin

Deep infection/increased bacterial burden should be suspected in the presence of 3 or more signs and symptoms.

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Table 1: Demographics And Wound Characteristics

Cases	Living Area*	Sex	Age	Types of Wounds	Initial Wound Size (LxWxD/Cm)**	Wound Duration	Systemic Antibiotics*** (Yes/No)	Healing Achievement
1	NWO	F	62	Chronic Venous Leg Ulcer	3.5 x 4.0 x0.0	6y	No	6m (healed)
2	NWO	M	25	Post-Flap Surgical Wound	16 x 12.5x 0.0	32d	No	2m, 2d (healed)
3	NWO	M	54	Post-Traumatic Wound	9 x 6.5 x 1.9	7d	No	2m, 18d (healed)
4	SEO	F	67	Chronic Venous Leg Ulcer	6x4x0	Unknown	No	4 weeks (reduced at half size)
5	SEO	F	77	Inguinal abscess	7X4X2	Unknown	No	7 weeks considerable improvement

* NWO = Northwestern Ontario; SEO = Southeastern Ontario; ** L= Length; W = Width; D = depth (if applied); Cm = Centimeters

*** Systemic Antibiotics used after HFB treatment was initiated.

Case Study 1: Use of GVMBin a Chronic Venous Leg Ulcer

A female in her 60s had been living with a chronic venous leg ulcer on her right leg for over six years. She denied a history of diabetes and venous insufficiency was confirmed in the affected limb. Her ankle-brachial index (ABI) was under 0.78. The wound had previously been managed with iodine-based dressings in a community setting and deemed a "maintenance wound" due to its lack of healing progress. After a new referral to the wound care clinic the initial assessment identified friable tissue along with pain, exudate and odour. UPPER and LOWER tool showed score of 5/5 and 3/5 respectively, suggesting localized infection. A new treatment regimen was initiated using the Classic™ formulation and compression therapy. Over a six-month period, HFB contributed to a marked reduction in friable tissue, exudate, pain and decrease in wound size (Figure 3), contributing to enhancing her overall quality of life (Figure 3).

Case Study 2: GVMB In A Post-Flap Surgical Wound

A male in his 20s presented with a post-flap surgical wound on his right arm following a self-inflicted injury. He reported no underlying health conditions but disclosed smoking 6–7 cigarettes per day. On initial assessment, the wound exhibited dried blood on surgical site and slough on open areas, with an UPPER score of 4/5 and a LOWER score of 2/5, suggesting localized infection. After mechanical cleansing, the application of GVMB (Classic™ formulation) supported autolytic debridement, moisture balance and bioburden management. By day 55, the flap site had progressed significantly toward complete healing (Figure 4), and the patient was discharged from in-person care to continue wound care at a remote nursing station close to his hometown in NWO, with virtual guidance provided by the first author. Complete wound closure was

Figure 3: Initial photograph showing friable tissue. Subsequent images illustrate progressive improvement following treatment with GVMB dressings. The final image was taken just days prior to complete wound closure.

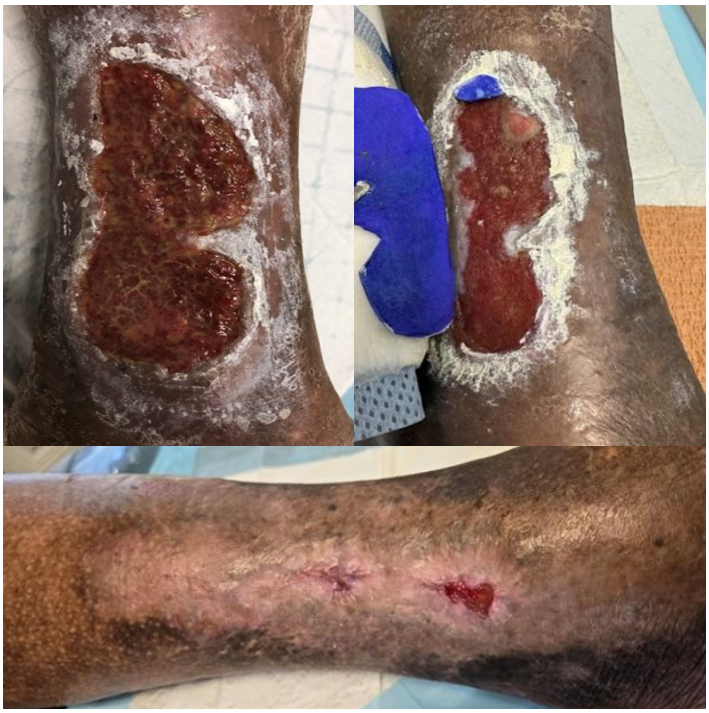
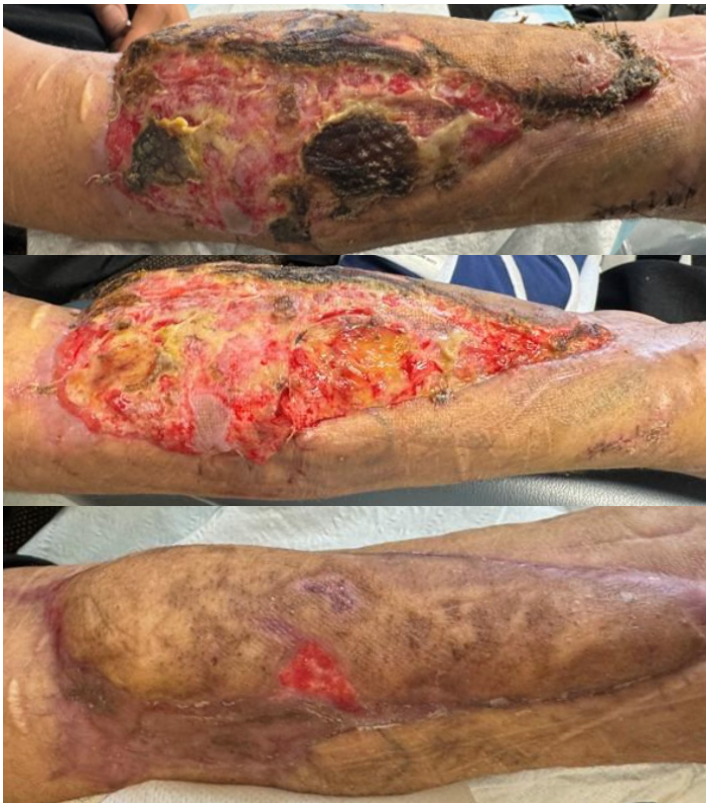


Figure 4: The initial photograph shows necrotic and slough tissue. Subsequent images demonstrate progression following the application of GVMB dressings, with near-complete closure (right) and full epithelialization achieved by day 62.

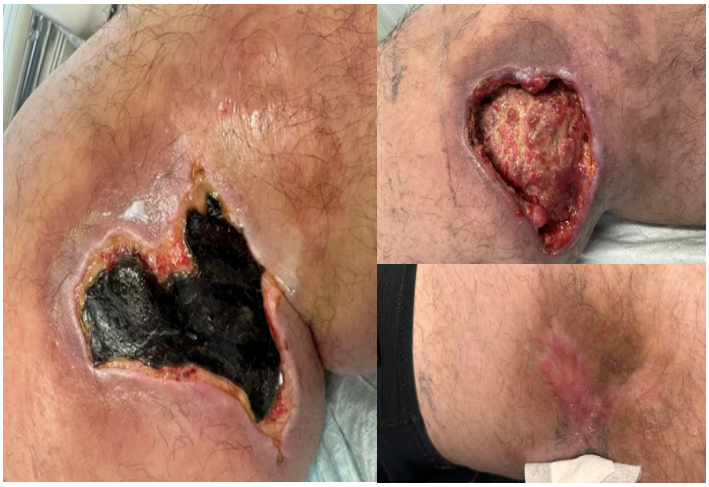


achieved by day 62 (Figure 4).

Case Study 3: GVMB in a Post-Traumatic Wound

A male in his 50s sustained a traumatic leg injury that was further complicated by comorbidities, including obesity and atrial fibrillation. Initial necrotic tissue was managed with sharp debridement, which resulted in the development of tunneling and undermining. An UPPER score of 4/5 with a LOWER score of 2/5 suggested local infection. Therefore, GVMB Classic™ dressing was selected and initiated for its high tensile strength, ability to pack tunnels and undermining and ability to flatten rolled wound edges. Over the course of 78 days, GVMB promoted progressive granulation, maintained moisture balance, and supported edge advancement. The patient was able to resume work by Day 25, and by Day 78, complete wound closure was achieved (Figure 5).

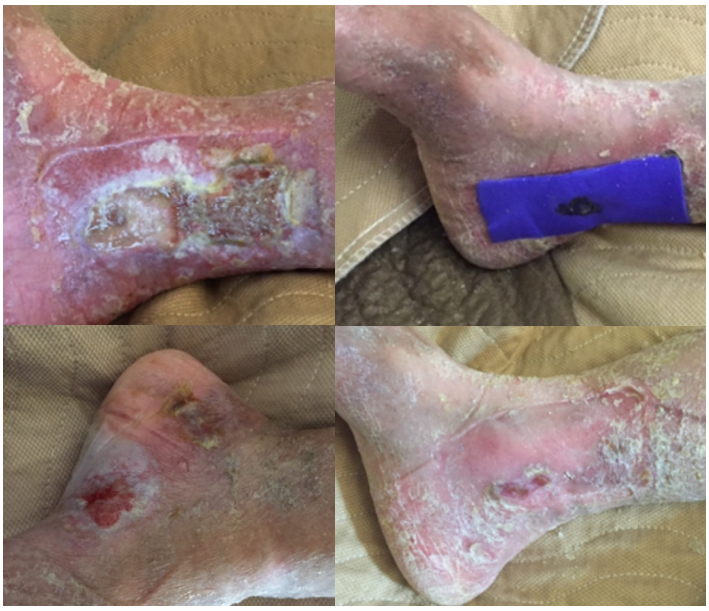
Figure 5: Initial photograph showing necrotic tissue at the site of a traumatic leg injury. Following sharp debridement and the application of GVMB dressings, the wound demonstrated progressive healing, with complete closure achieved by day 78.



Case Study 4: GVMB in a Venous Leg Ulcer

A female in her 60s with diagnosis of venous stasis disease, Duchenne muscular dystrophy, osteoporosis, hyperthyroidism, diabetes and a body mass index (BMI) of 38 developed a hard-to-heal ulcer on the right medial malleolus. Her ankle-brachial index (ABI) was 0.76. The wound measured 6 × 4 cm and was associated with pain, exudate and odor. Initial management with iodine-based dressings failed to improve the wound, and an UPPER score of 5/5 with a LOWER score of 2/5 suggested local infection. A new regimen was initiated with GVMB (Classic™ formulation) as the primary dressing and compression as the secondary therapy. Pain improved almost immediately, and with dressing changes every 2–3 days, the wound reduced to 3 × 3 cm after four weeks and 2 × 1 cm after a further two weeks, with marked improvement in local symptoms

Figure 6: Initial photograph showing friable tissue with slough on left venous leg. Following application of GVMB dressings and compression, the wound healing improved within 2 weeks.

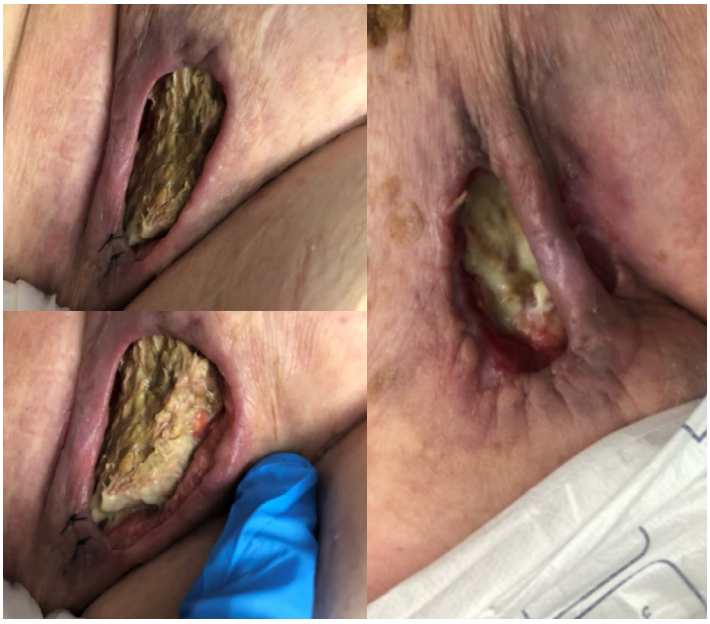


(Figure 6).

Case Study 5: GVMB in an Abscess of a Inguinal area

A female on her 70s with hypertension, ischemic heart disease, depression and chronic kidney disease presented with an abscess in the inguinal area following surgical incision and drainage. The wound measured 7 × 4 cm with a depth of 2 cm and contained heavy slough, fibrinous tissue, drainage, and odour. UPPER and LOWER scores were 4/5 and 3/5, respectively, suggesting local infection. The patient declined sharp debridement, so GVMB (Classic™ formulation) was initiated to promote autolytic debridement and address bacterial burden. After three weeks, early granulation was observed. Treatment continued, and by week seven the wound measured 5 × 3 cm with a depth of 3 cm, showing a thin layer of soft slough, 30% granulation tissue, reduced drainage, no odor and improved UPPER (2/5) and LOWER (0/5) scores (Figure 7).

Figure 7: Initial assessment identified heavy slough, fibrinous tissue, drainage, and odor, which decreased considerably by week seven after GVMB dressing was implemented.



Discussion

The gentian violet and methylene blue (GVMB) dressings used in these case studies demonstrated unique non-cytotoxic antibacterial properties, contributing to decreased bioburden, enhanced granulation and progression of stalled wounds—all without reliance on systemic or cytotoxic agents. These outcomes are consistent with previous studies. For instance, Woo and Heil (2017) reported successful wound management in 29 patients using GVMB dressings without systemic antibiotics. Another study involving 6,300 home care patients also highlighted GVMB as a primary dressing option.

Clinical frameworks such as UPPER/LOWER tool[8] and the Wound Bed Preparation Paradigm.[19] were applied to guide assessment and treatment. These tools helped demonstrate the effectiveness of GVMB dressings in supporting all four factors of local wound care: **D**ebridement, managing local **I**nfection and inflammation, **M**aintaining moisture balance and advancing wound **E**dges (DIME). The following case analyses illustrate how GVMB dressings contributed to meaningful clinical progress across various stages of healing and in wounds deemed maintenance.

Tissue Debridement: In all cases, patients presented with devitalized tissue at baseline. In Case 3, slough was evident and followed by sharp debridement, while Cases 1 and 2 also exhibited slough, with dried blood noted in Case 2. In each case, GVMB dressings facilitated autolytic debridement, effectively preparing the wound bed without systemic antibiotic use. This aligns with existing literature showing that GVMB dressings support gentle autolytic debridement while preserving cell viability. For example, one case involving an amputation site treated with GVMB dressings demonstrated an 18% wound size reduction within two weeks.[20] The presence of slough and devitalized tissue on the removed dressing further confirmed non-traumatic debridement. These findings are consistent with a separate case series involving six wounds treated with GVMB by an advanced clinician.[21] The broader literature supports these findings. GVMB dressings reduce oxidative stress and inflammation while promoting fibroblast viability, allowing effective wound bed preparation without damaging healthy

tissue.[22]

Infection and Inflammation Control (UPPER/LOWER Criteria): Infection control was a primary concern in all cases, and the use of GVMB dressings allowed clinicians to manage bioburden locally—without resorting to systemic antibiotics. Clinical signs aligned with the UPPER and LOWER criteria, indicating local critical colonization without systemic involvement.

This classification, developed by Woo and Sibbald (2009), supports initiating topical antimicrobial therapy in lieu of systemic antibiotics when infection remains localized. Accordingly, GVMB dressings were used to address local infection and inflammation. This strategy is consistent with antimicrobial stewardship principles and supported by Woo and Heil (2017), who found a 75% reduction in infection scores using GVMB dressings. Importantly, no systemic antibiotics were required, demonstrating how local interventions can uphold AMS principles. GVMB dressings are effective against a broad range of pathogens—including MRSA and VRE. Due to the dressing's mechanism of action, bacteria laden exudate is absorbed into the dressings where it is effectively killed with no risk of antimicrobial resistance.[9] By preventing systemic spread and supporting localized control of bioburden, GVMB dressings align with both clinical best practices and global directives to reduce unnecessary systemic antibiotic use.[23]

Moisture Balance: Moisture was successfully managed across all cases without the adverse effects often observed with other antimicrobial dressings such as iodine or silver, which can dry the wound bed and inhibit collagen production.[24] In the venous leg ulcer (VLU) case, frequent dressing changes were initially required due to heavy exudate. As drainage declined, dressing intervals were safely extended. GVMB dressings maintained moisture balance and prevented maceration through their polyvinyl alcohol (PVA) foam structure, which exerts a natural negative pressure of 71.2 mmHg and wicks bacteria-laden exudate into the dressing for neutralization (Heying, n.d.). This capillary action enhances both moisture regulation and bioburden control. Importantly, GVMB dressings are non-cytotoxic to fibroblasts and keratinocytes, allowing collagen synthesis and re-epithelialization to continue unhindered—a significant advantage over silver-based dressings (Leaper et al., 2012).

Edge Advancement: The VLU case also showed resolution of a rolled wound edge, supporting the role of GVMB dressings in promoting epithelial advancement. Research has shown that polyvinyl alcohol (PVA)-based dressings support cell proliferation and are compatible with growth factors—key contributors to effective healing[9,20] The physical characteristics of the PVA foam—including its conformability and natural negative pressure—aid in the mechanical flattening of rolled wound edges. Cutting the dressing slightly larger than the wound to overlap the margins helps advance the edge and close the wound. This approach is particularly beneficial in community settings where sharp debridement may not be available due to scope limitations, clinician confidence, or safety concerns.

Clinical and Stewardship Considerations: The case studies presented, along with supporting literature, reinforce that GVMB dressings provide an effective, non-cytotoxic and resistance-free approach to managing hard-to-heal wounds. By enabling local infection control, facilitating autolytic debridement, maintaining moisture balance and supporting edge advancement—all without systemic antibiotics—GVMB dressings align strongly with antimicrobial stewardship (AMS) principles.

Their broad-spectrum antimicrobial, non-leaching and non-cytotoxic mechanism of action allows safe use over extended periods without harming fibroblasts or interfering with growth factors. These properties make GVMB dressings particularly valuable in settings where systemic antibiotic use should be minimized, such as home care or long-term care environments.

Consistent clinical performance in both this and other case studies supports their role in reducing reliance on systemic antibiotics while advancing

healing.[9, 20] As a result, GVMB dressings offer a practical, evidence-based solution that aligns with global AMS goals and helps reduce the health-care burden associated with hard-to-heal wounds.

To translate evidence into action, the expansion of public formulary access to non-cytotoxic dressings, increased clinician education on topical AMS tools, and investment in large-scale research on antimicrobial dressings efficacy are all critical next steps. Such action will not only reduce unnecessary antibiotic use and its associated risks but can also improve healing outcomes, patient quality of life, and sustainability of the broader health-care system.

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