

Transforming Local Wound Care into a Limb Preservation Strategy

Creating a Better Wound Environment for Healing, Biofilm Management, and Amputation Prevention

Darlene E. McCord, PhD

Executive Summary

Despite remarkable advances in wound care over the past several decades, chronic wounds remain among healthcare's most expensive and devastating clinical problems. Every year, hundreds of thousands of Americans develop lower-extremity wounds that place them at risk for infection, osteomyelitis, hospitalization, loss of mobility, and ultimately amputation. Diabetes, peripheral arterial disease, pressure, impaired perfusion, recurrent infection, and non-healing wounds create a clinical burden that extends across hospitals, outpatient wound centers, skilled nursing facilities, long-term care, podiatry practices, home health, and other settings where difficult wounds are treated.

Current standards of care appropriately emphasize vascular assessment, debridement, pressure redistribution or off-loading, metabolic control, nutrition, infection management, and multidisciplinary care. Yet one essential component of successful healing is sometimes underestimated: the ability to rapidly establish and then maintain a local wound environment favorable to tissue repair.

Viniferamine® Wound Dressing was developed around this challenge. Rather than viewing a wound dressing as merely a means of covering a wound or maintaining moisture, the Viniferamine approach aims to make the dressing an active component of local wound management. The underlying objective is to support a biologically favorable wound environment through antimicrobial activity,

management of microbial burden and biofilm, sustained topical protection, tissue compatibility, and intimate conformity to the wound surface.

The future of wound care should not be defined simply by keeping a wound moist. It should be defined by whether local therapy helps move the wound toward healing while protecting viable tissue and reducing the biological conditions that allow chronic wounds to persist.

The Problem: Chronic Wounds Can Progress Toward Limb Loss

Every chronic wound represents a race between healing and deterioration. Following tissue injury, microorganisms can colonize the wound surface. When local conditions remain unfavorable, microbial communities may organize into biofilm, prolong inflammation, increase proteolytic activity, impair cellular function, and contribute to progressive tissue damage.

As this cycle continues, the risk of deeper infection, osteomyelitis, hospitalization, surgical intervention, and amputation can increase. Importantly, this progression frequently occurs over weeks or months. That interval creates repeated opportunities for clinicians to intervene before tissue loss becomes irreversible.

This changes the central question in wound management. It is no longer enough to ask whether a wound has adequate moisture. Clinicians must also ask how effectively the local wound environment is being moved from chronic inflammation and microbial persistence toward conditions that support repair.

Beyond the Traditional Role of a Wound Dressing

Traditional hydrogels and wound dressings have often been designed primarily around moisture management. Moisture remains essential to wound healing, but hydration alone does not address the biological complexity of many chronic wounds.

Modern wound-care facilities increasingly need local therapies capable of addressing several wound-environment objectives simultaneously:

- Reducing microbial burden;
- Helping manage the conditions that support biofilm persistence;
- Protecting viable healing tissue;
- Maintaining useful activity between dressing changes;
- Conforming closely to irregular wound architecture; and
- Supporting a stable local environment for tissue repair.

A wound dressing should therefore be evaluated not only by what it absorbs, donates, or covers, but by what it contributes to the biology of the wound environment.

The Viniferamine® Wound Dressing Philosophy

Viniferamine® Wound Dressing is based on a different philosophy of local wound management. Development begins with the wound itself: What conditions are preventing this wound from progressing? What can be done locally to reduce biological obstacles while protecting the cells and tissues responsible for repair?

This philosophy is organized around four fundamental objectives.

1. Protect Viable Healing Tissue

Successful wound healing depends upon fibroblasts, keratinocytes, endothelial cells, immune cells, extracellular matrix, and the developing microvasculature. Local wound

management should therefore seek to control harmful microbial conditions without unnecessarily damaging the viable tissue required for repair. Protecting healthy tissue is not secondary to antimicrobial management; it is fundamental to healing.

2. Rapidly Reduce Microbial Burden

Pathogenic microorganisms can perpetuate inflammation and interfere with orderly tissue repair. Reducing the microbial burden is therefore an important component of restoring a wound environment that is more favorable to healing. The Viniferamine wound-care approach is designed around active management of this local microbial environment rather than passive wound coverage alone.

3. Provide Sustained Topical Antimicrobial Activity

A wound does not remain biologically static between dressing changes. Microorganisms can survive, recover, and recolonize. For this reason, the treatment interval matters. Sustained topical antimicrobial activity is intended to help suppress microbial recovery and reduce the opportunity for rapid recolonization between dressing changes.

4. Create Intimate Contact with the Wound Surface

Irregular wound beds contain contours, cavities, and surfaces that may be difficult for conventional dressings to contact uniformly. A conforming wound interface can improve contact between the wound-management technology and the wound surface while helping maintain a stable local environment.

Together, these objectives redefine the wound dressing from a passive covering into an active component of local wound resolution.

A Different Approach to Biofilm Management

Biofilms are among the most important obstacles encountered in chronic wound care. Once a mature biofilm develops, microorganisms become more difficult to eradicate and may

continue contributing to chronic inflammation and delayed healing.

Viniferamine® Wound Dressing is intended to be incorporated into a comprehensive local wound strategy. Following appropriate cleansing and debridement, reducing the microbial burden and maintaining topical antimicrobial activity may limit opportunities for surviving organisms to repopulate the wound rapidly.

This approach is especially important because biofilm management should not be thought of as a single event. Debridement may remove or disrupt existing biofilm, but the wound remains vulnerable to microbial recovery. Effective local wound management, therefore, requires attention not only to what happens at the moment of treatment, but also to what happens during the hours and days that follow.

The objective is a more stable wound environment throughout the treatment interval—one that supports the clinician's broader efforts to move the wound toward healing.

From Wound Management to Limb Preservation

For wounds of the foot and lower extremity, the consequences of failure can extend far beyond delayed closure. A non-healing wound may progress to deep infection, osteomyelitis, tissue destruction, hospitalization, surgical resection, and amputation.

This is why limb preservation should not be considered a specialty objective reserved only for advanced cases. It should influence wound-care thinking from the beginning. Every lower-extremity wound in a patient with diabetes, vascular disease, neuropathy, impaired mobility, recurrent infection, or other significant risk factors deserves careful attention to the possibility of progression.

Successful limb preservation requires comprehensive multidisciplinary care. Depending on the patient, that may include

vascular evaluation, debridement, pressure redistribution or offloading, metabolic management, nutritional support, infection assessment, appropriate systemic therapy when clinically indicated, and effective local wound management.

No wound dressing can independently prevent an amputation. However, technologies that help establish a local environment more favorable to healing can become meaningful components of a comprehensive limb-preservation program. The earlier a wound progresses toward closure, the less opportunity there may be for progressive tissue destruction and complications.

Why Viniferamine® Wound Dressing Matters

The value of Viniferamine® Wound Dressing lies in the broader role it is envisioned to play in local wound therapy. Rather than functioning simply as a covering or moisture-management product, it is intended to support several important wound-care objectives:

- Rapid reduction of wound bioburden;
- Management of the local microbial environment;
- Biofilm-focused wound management;
- Sustained topical antimicrobial protection;
- Preservation of viable tissue;
- Optimization of the wound microenvironment
- Support of comprehensive wound-healing and limb-preservation strategies.

This represents an evolution in the role of topical wound care. The dressing becomes part of the clinical strategy to change the wound environment, rather than merely managing the consequences of a chronic wound.

A Better Standard for Wound-Care Facilities

Hospitals, wound centers, skilled nursing facilities, long-term care communities, podiatry practices, home-health organizations, and other

wound-care providers face a common challenge: patients are often older, medically complex, and at increased risk for wounds that fail to heal normally.

For these facilities, a successful wound-care program must do more than respond to deterioration. It should seek to prevent deterioration. That means identifying wounds early, correcting underlying causes when possible, protecting viable tissue, controlling the local microbial environment, managing biofilm, and creating conditions that give the patient the best possible opportunity to heal.

Viniferamine® Wound Dressing is intended to fit within that philosophy of proactive wound care.

The Human Importance of Limb Preservation

The consequences of amputation cannot be measured only in surgical costs. Limb loss can affect mobility, independence, employment, family relationships, caregiver requirements, rehabilitation, prosthetic needs, and quality of life. For older and medically fragile patients, the loss of a limb can fundamentally change the remainder of their lives.

That makes wound healing more than a clinical endpoint. Preserving a limb may mean preserving a patient's ability to stand, walk, live independently, return home, or participate in the activities that give life meaning.

This is consistent with the broader philosophy behind Viniferamine: wound care should care for the person as well as the wound. The ultimate objective is not simply a better-looking wound bed. It is a better outcome for the patient.

Limb Preservation by the Numbers

The source document identifies the magnitude of the national problem: approximately 2 million Americans are living with limb loss, and the population is projected to reach 3.6 million by 2050. It also reports nearly 200,000 new amputations annually in the United States.

The relationship between diabetic foot ulceration and amputation is particularly important to wound-care clinicians. The source

document reports that approximately 85% of diabetes-related lower-extremity amputations are preceded by a foot ulcer. It also notes that major diabetes-related amputations increased by approximately 29% between 2009 and 2015, with minor amputations increasing even more rapidly during that period.

The economic and human burden is substantial. The source document cites initial hospitalization costs of approximately \$70,000 to \$150,000, depending upon complications, high ongoing prosthetic costs, and lifetime direct medical costs for major lower-extremity amputation that can exceed \$500,000 to more than \$1 million, excluding indirect costs such as disability, caregiver burden, lost productivity, and diminished quality of life.

The same source reports mortality after major lower-extremity amputation of approximately 20% to 30% at one year and approximately 50% by five years. These figures underscore why prevention, early intervention, effective wound management, and limb preservation deserve to be treated as major healthcare priorities.

Looking Forward

The growing prevalence of diabetes, peripheral arterial disease, chronic wounds, and limb-threatening infections creates an urgent need for wound-care technologies designed around the biology of healing rather than a single physical function.

Viniferamine® Wound Dressing represents this broader approach. By supporting reduction of microbial burden, biofilm management, sustained antimicrobial activity, protection of viable tissue, and optimization of the local wound environment, the technology is intended to become an active part of comprehensive wound management.

The future of wound care should not be measured solely by whether a dressing maintains moisture or remains in place. It should be measured by whether the total treatment strategy helps wounds progress toward closure, reduces complications, preserves limbs, and allows patients to maintain their independence and dignity.

Every lower-extremity wound with meaningful risk factors should be approached with an awareness of its potential consequences. The goal is to intervene early enough—and effectively enough—that amputation never becomes inevitable.

That is the opportunity Viniferamine® Wound Dressing was designed to address.

Key Questions for Advanced Wound Dressings

- Does the dressing protect viable healing tissue without unnecessary cytotoxicity?
- Does it help reduce existing wound pathogens and microbial burden?
- Does it provide sustained activity intended to limit microbial recovery and recolonization?
- Does it contribute to biofilm-focused wound management?
- Does it conform effectively to the wound environment?
- Does it support a local environment favorable to tissue repair?
- Can it become part of a comprehensive strategy to prevent wound deterioration and preserve the limb?

Selected References

1. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. *N Engl J Med*. 2017;376(24):2367-2375.
2. Geiss LS, Li Y, Hora I, et al. Resurgence of diabetes-related nontraumatic lower-extremity amputation in the young and middle-aged adult US population. *Diabetes Care*. 2019;42(1):50-54.
3. Ziegler-Graham K, MacKenzie EJ, Ephraim PL, et al. Estimating the prevalence of limb loss in the United States: 2005 to 2050. *Arch Phys Med Rehabil*. 2008;89(3):422-429.
4. US Government Accountability Office. Limb Loss: Rehabilitation Services and Outcomes for Medicare Beneficiaries. GAO-25-106406. US Government Accountability Office; 2024.