Multimodal Imaging for Point-of-Care Wound Assessment and Clinical Decision-Making

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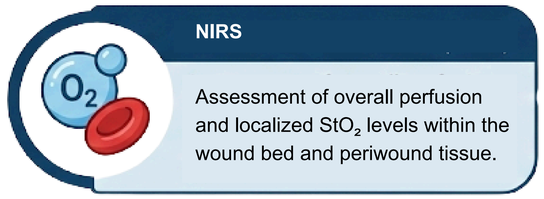
Introduction

Chronic and acute wounds require etiology-specific assessment to guide timely interventions.[1] While traditional macro-vascular assessments, such as the Ankle-Brachial Index (ABI), are standard practice, they often fail to capture localized micro-perfusion deficits or early inflammatory changes. Multimodal point-of-care imaging, including near-infrared spectroscopy (NIRS) for tissue oxygenation (StO_2),[2] thermography for skin surface temperature, and digital photography, offers non-invasive, real-time insights into perfusion, ischemia, and surrogate markers of infection.

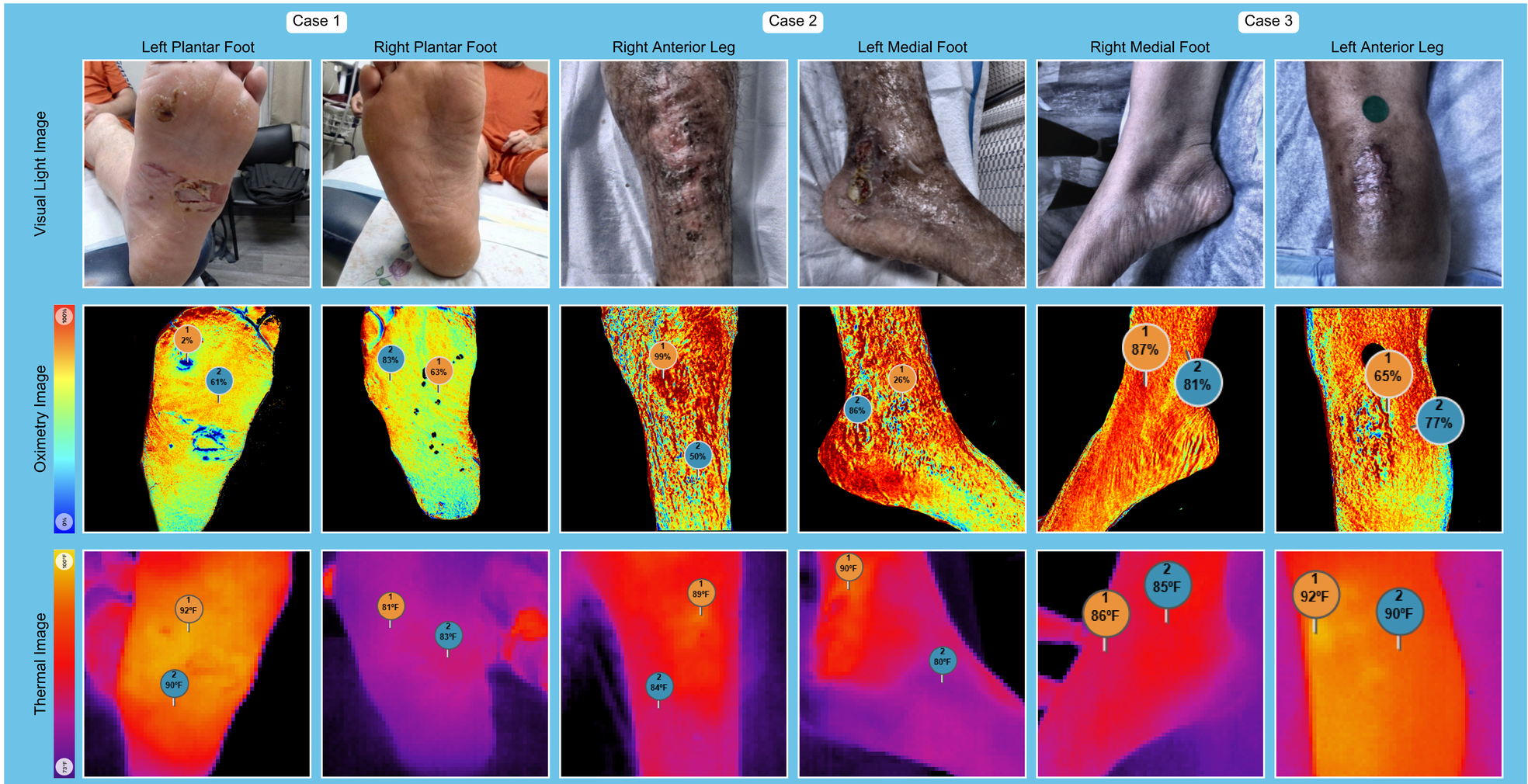
Methods

A case series was conducted to evaluate the clinical utility of multimodal point-of-care imaging in patients presenting with various lower extremity wounds. Assessments were performed using a handheld device (MIMOSA Pro, MIMOSA Diagnostics Inc.) capable of capturing NIRS, thermography, and digital photography.



Clinical Assessment Methodologies Using Multimodal Point-of-Care Imaging. *StO_2: Tissue Oxygen Saturation (or Tissue Oxygenation)*

Results



Case 1 - diabetic foot ulcer (DFU): A 46-year-old male with type 2 diabetes presented with a left plantar DFU and normal bilateral ABIs (1.2). NIRS confirmed sufficient periwound perfusion with bilateral StO_2 > 50%, but identified a localized wound bed deficit (StO_2 < 39%) indicating a need for debridement. Thermography showed minor elevation in the wound bed (92°F) versus surrounding tissue (90–91°F), indicating no active infection.

Case 2 - pyoderma gangrenosum (PG): A male patient presented with PG on the right anterior leg and medial foot with active infection and normal ABIs (1.3). NIRS showed hyperperfusion (StO_2 > 70%) overall, but identified localized ischemic zones (StO_2 down to 0%). Thermal imaging confirmed infection via significant gradients exceeding 4°F.

Case 3 - burn: An 84-year-old female presented with a traumatic burn on the left anterior leg and normal bilateral ABIs. NIRS imaging showed overall StO_2 > 50%, while small areas of decreased perfusion (StO_2 < 39%) were detected in the wound bed, they did not necessitate debridement. Thermography showed no significant gradients (>2°F), suggesting an absence of infection.

ABI: Ankle-Brachial Index; DFU: Diabetic Foot Ulcer; NIRS: Near-Infrared Spectroscopy; PG: Pyoderma Gangrenosum; PVD: Peripheral Vascular Disease; StO_2: Tissue Oxygen Saturation (or Tissue Oxygenation)

Discussion and Key Takeaways

Multimodal point-of-care imaging facilitates etiology-specific assessment for chronic and acute wounds by integrating perfusion data and thermography as a surrogate for infection, thereby enhancing clinical decision-making. By combining NIRS and thermography, clinicians can objectively evaluate wound bed preparation requirements, such as identifying the specific need for debridement in areas of StO_2< 39% or, conversely, avoiding unnecessary intervention. This approach confirms perfusion adequacy to support healing across diverse conditions—including diabetic foot ulcers, pyoderma gangrenosum, and burns—even when macro-perfusion markers like ABI appear normal. Furthermore, the integration of temperature gradients allows for the real-time detection of infection by identifying localized heat elevations (e.g., >4°F) relative to surrounding tissue or the contralateral limb. Ultimately, this multimodal framework enables a more precise, data-driven strategy for managing complex wound etiologies.

1. Kelso, M. R. et al. Use of near infrared spectroscopy in post-acute care: analysis of real-world clinical decision-making. J Wound Care 34, S6–S14 (2025).
2. Oropallo, A. et al. Advancing chronic wound care with near-infrared spectroscopy imaging: clinical applications, measurement parameters, and insights into healing dynamics. Wounds 37, 384–392 (2025).