Case Report

Journal of Surgery and Surgical Procedures

Clinical Evaluation of the Imitomeasure App for Digital Wound Assessment

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Submitted : 20 Dec 2024 ; Published : 17 Jan 2025

Citation: Chittoria, R. K. et al., (2025). Clinical Evaluation of the imitoMeasure App for Digital Wound Assessment. *J Sur & Surgic Proce.,3*(1):1-4.

Abstract

Chronic wounds, such as diabetic foot ulcers, pose significant challenges in clinical management, necessitating accurate and reliable methods for monitoring wound healing. Traditional measurement techniques, including ruler-based methods, often lack precision, particularly for irregularly shaped wounds, leading to overestimations of wound size. Advancements in technology have introduced digital tools that enhance wound assessment, among which the imitoMeasure app offers a smartphone-based, non-contact digital planimetry solution.

This study, conducted at a tertiary care center in South India, utilized the imitoMeasure app to assess and monitor a chronic, non-healing ulcer in a 69-year-old diabetic patient over the course of various regenerative therapies. The app enabled accurate wound measurements by tracing wound margins on captured images. Regular use demonstrated a consistent reduction in wound size, aligning with expected healing benchmarks.

The app's features, including its portability, precision, and ability to standardize wound documentation, made it a valuable point-of-care tool. However, limitations such as the inability to measure three-dimensional wound characteristics were noted, suggesting opportunities for future innovation. Overall, the imitoMeasure app presents a significant advancement in wound monitoring, offering clinicians an accessible and reliable method to improve patient outcomes.

Keywords: Digital planimetry, imitomeasure, diabetic foot ulcer, wound assessment, wound measurement.

Introduction

Diabetes mellitus affects about 425 million individuals globally, with developed countries reporting an annual incidence rate of 6.7–7 cases per 1,000 people (Forouhi & Wareham, 2014). Those with diabetes have a significant lifetime risk, estimated at 15–25%, of developing diabetic foot ulcers (Amin & Doupis, 2016). Monitoring and assessing these wounds is crucial to determine the progress of healing or signs of deterioration. For chronic wounds, accurate measurement of wound size is essential for tracking healing and evaluating treatment outcomes. However, many assessment methods rely on subjective judgment and the expertise of clinicians, making reliable measurement a persistent challenge. To improve wound evaluation, the Photographic Wound Assessment Tool (PWAT) was introduced in 2000, providing a more systematic method for assessment (Thompson et al., 2013). In recent years, advancements in technology have led to the development of precise tools and techniques for wound monitoring, including manual and digital planimetry, simple ruler measurements, mathematical models, digital imaging, and three-dimensional (3D) technologies (Jørgensen et al., 2016). Among these innovations is imitoMeasure, a smartphone-based application designed for non-contact digital planimetry, which serves as a convenient tool for assessing chronic wounds at the point of care (Wang et al., 2017).

Methodology

This study was conducted in the Department of Plastic Surgery at a tertiary care center in South India. The patient, a 69-year-old diabetic, presented with a chronic, non-healing ulcer of one year's duration. The condition persisted despite previous debridement and treatment with negative pressure wound therapy (NPWT). Upon admission, the wound was assessed using the imitoMeasure application.

The following steps were followed to use the imitoMeasure application for obtaining digital wound measurements:

1. The imitoMeasure app was installed on a smartphone. The app provides two usage modes: Calibration Mode and Manual Mode.
2. In Manual Mode, the wound was photographed for digital assessment.
3. The wound margins were outlined directly on the smartphone and then clicked 'measure'. The area of wound assessment is done digitally.

During the hospital stay, various regenerative therapies were administered, including autologous platelet-rich plasma (APRP), low-level laser therapy (LLLT), amniotic membrane scaffold therapy, and autologous skin cell suspension (ASCS) therapy, followed by full-thickness skin graft (FTSG) placement. The wound was regularly monitored for improvement using the imitoMeasure app throughout the course of treatment.

Results

The imitoMeasure app demonstrated a consistent reduction in wound size, with the improvements objectively recorded by the application. The patient expressed satisfaction with the outcome.

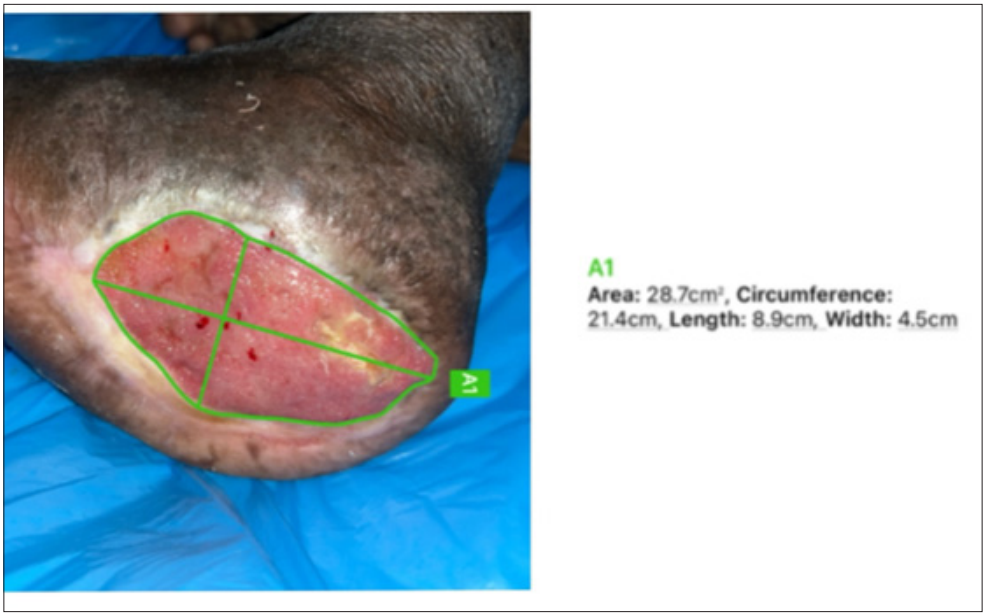

Figure 1: Wound assessment at the time of admission

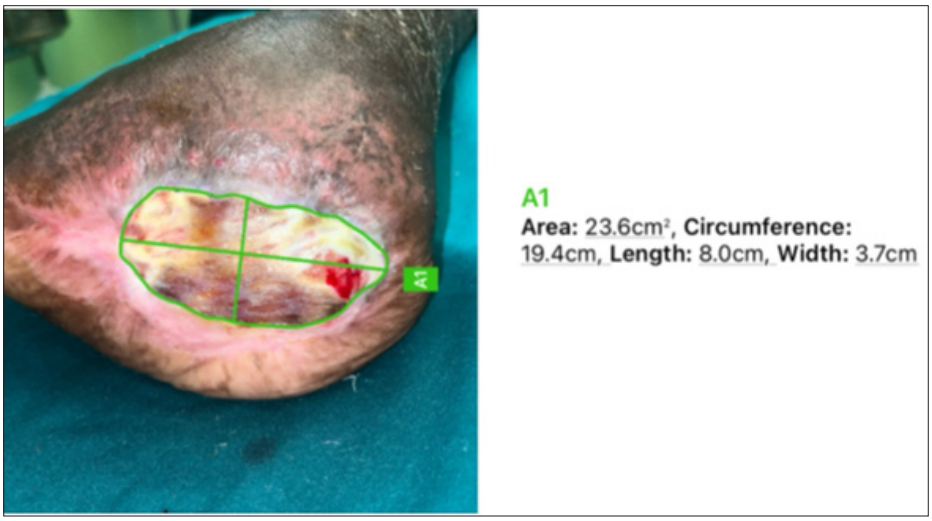

Figure 2: Review assessment (post FTSG placement) two months later

Discussion

Effective wound monitoring is fundamental to patient care, as it provides baseline measurements and helps clinicians evaluate the healing process. Accurate wound assessment is essential not only for tracking wound progression but also for predicting the likelihood of successful healing. Research indicates that, under normal healing conditions, the wound area should reduce by approximately 20–40% within the first 2–4 weeks of treatment (Rijswijk, 1993). This reduction serves as a reliable indicator of treatment efficacy and healing potential.

The ruler-based method, commonly used in clinical practice, involves measuring the longest length and width of a wound. While simple and accessible, this method has significant limitations, particularly for wounds with irregular shapes. Studies have shown that this technique can overestimate wound areas by at least 44%, leading to inaccuracies in monitoring (Langemo et al., 2008; Keast et al., 2004; Haghpanah et al., 2006). In contrast, digital photography provides a more precise method of wound measurement, although traditional approaches—such as tracing wound edges on a computer—are often time-consuming, and expensive.

The advent of smartphones equipped with high-definition cameras has transformed wound care practices. These devices are not only portable and cost-effective but also offer the convenience of on-the-spot assessments (Tsai et al., 2004). Among the available digital tools, the imitoMeasure app stands out as a non-contact planimetry application. It enables clinicians to calculate wound area by tracing the wound using a point-to-point line. The app's manual mode, combined with an amplified image, allows for smaller gaps between points, leading to more accurate and detailed outlines of wound borders. This method ensures minimal differences between measurements taken by trained medical photographers and those by less experienced clinicians, thereby enhancing its practical utility (Thompson et al., 2013).

Moreover, the imitoMeasure app enables clinicians to standardize wound documentation, providing objective data that can be easily compared over time. This standardization not only improves clinical decision-making but also facilitates communication among multidisciplinary teams. By leveraging this tool, we achieved precise and reliable wound photography at the point of care using a smartphone, offering a significant advantage over traditional methods.

However, despite its many benefits, the imitoMeasure app has certain limitations. It is unable to assess the three-dimensional aspects of wounds, such as depth or volume, which are critical in evaluating complex or deep wounds. Future advancements in app development could address these gaps, further enhancing its utility in wound care.

Conclusion

The imitoMeasure app offers a practical, accurate, and reliable solution for wound assessment, enabling precise monitoring at the point of care. While its inability to measure three-dimensional wound aspects remains a limitation, its ease of use and portability make it a valuable tool for improving wound care outcomes and clinical efficiency.

Conflicts of Interest

None.

Declarations

None.

Authors' Contributions

All authors made contributions to the article.

Availability of Data and Materials

Not applicable.

Financial Support and Sponsorship

None.

Consent for Publication

Not applicable.

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