

How Does AI Support Wound Care Management?

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Abstract

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Introduction

Wound care is a critical and often complex aspect of healthcare, with a significant impact on patient quality of life and healthcare system resources. Traditional wound management relies heavily on the subjective judgment of healthcare professionals, which can lead to inconsistencies in assessment and treatment. The rising prevalence of chronic wounds, particularly among the aging population, further exacerbates these challenges, creating a need for more objective, efficient, and accessible solutions. The integration of Artificial Intelligence (AI) into wound care management has emerged as a transformative approach, offering the potential to revolutionize how we diagnose, monitor, and treat wounds.

AI-Powered Wound Assessment

One of the most significant contributions of AI in wound care is the enhancement of wound assessment. AI-powered tools, often utilizing computer vision and deep learning algorithms, can analyze images of wounds to provide objective and standardized measurements. These tools can accurately determine wound size, depth, and surface area, as well as classify different tissue types within the wound bed, such as granulation, slough, and necrotic tissue. This automated and precise assessment helps to eliminate the variability inherent in manual measurements, leading to more consistent and reliable data for tracking wound healing progress. For instance, studies have shown that AI-driven wound assessment can achieve measurement consistency of up to 99%, regardless of the clinician's experience level [1].

Predictive Analytics for Healing Trajectories

Beyond assessment, AI is also being used to predict the healing trajectory of chronic wounds. Machine learning models can analyze a multitude of data points, including wound characteristics, patient demographics, and clinical history, to forecast the likelihood of healing within a specific timeframe. This predictive capability allows clinicians to identify patients at high risk of delayed healing early in the course of treatment. By identifying these at-risk patients, healthcare providers can intervene proactively with more aggressive or alternative therapies, potentially preventing complications and improving patient outcomes. Research in this area has demonstrated that machine learning models can accurately predict chronic wound healing times, providing a valuable tool for clinical decision-making [2].

Personalized Treatment Recommendations

AI algorithms can also assist in formulating personalized treatment plans. By analyzing the vast amount of data collected from wound assessments and patient records, AI systems can identify patterns and correlations that may not be apparent to the human eye. This enables the system to recommend the most appropriate dressings, debridement techniques, and other interventions based on the specific characteristics of the wound and the patient's overall health status. This data-driven approach to treatment selection has the potential to optimize healing outcomes and reduce the incidence of complications.

Remote Monitoring and Telehealth

The application of AI in wound care is particularly beneficial for patients in remote or underserved areas. AI-powered mobile applications allow patients or their caregivers to capture images of their wounds at home and securely transmit them to healthcare providers for assessment. This remote monitoring capability, a key component of telehealth and AgeTech, reduces the need for frequent in-person visits, which can be burdensome for patients with mobility issues or those living in rural and northern communities. The use of AI-driven wound care management has been shown to enhance access to care and streamline the care process for aging populations in these areas [3].

Conclusion

The integration of AI into wound care management represents a paradigm shift in how we approach this complex clinical challenge. From objective assessment and predictive analytics to personalized treatment and remote monitoring, AI-powered solutions are empowering healthcare professionals to provide more efficient, effective, and equitable care. As these technologies continue to evolve and become more widely adopted, they hold the promise of improving patient outcomes, reducing healthcare costs, and transforming the future of wound care.

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