

Enhancing Outpatient Wound Care: Applying AI to Optimize Treatment of Patients with Diabetic Foot Syndrome – The EPWUF-KI Project

Annika WEGGEN^{a,1}, Dirk HOCHLENERT^b, Mira MERTENS^b, Kevin CREMANN^c,
Cosku GÜNDODGU^c, Lars GIER SCHNER^a, Timo TROMP^a and Hubert OTTEN^a

^a Hochschule Niederrhein, University of Applied Sciences, Faculty of Healthcare,
Krefeld, Germany

^b CID GmbH, Cologne, Germany

^c PI Probaligence GmbH, Augsburg, Germany

Abstract. Diabetes mellitus (DM) is a significant public health issue in Germany, affecting 8 million individuals, with projections suggesting a substantial increase in the following years. Diabetic Foot Syndrome (DFS), leading to mobility issues and limb amputations, challenging healthcare due to resource shortages and the need for specialized care. The EPWUF-KI project seeks to support outpatient caregivers by incorporating artificial intelligence (AI) into DFS wound care, focusing on optimizing treatment and automating documentation.

Keywords. Diabetic foot syndrome, chronic wounds, sensor-assisted wound therapy, outpatient wound care, artificial intelligence, e-health, telemedicine

1. Introduction

With the rise in Diabetes mellitus (DM) cases [1], complications like Diabetic Foot Syndrome (DFS) are also expected to increase. DFS affects approximately 250,000 individuals each year, leads to mobility issues and around 13,000 limb amputations [2]. Causally, DFS is treated with pressure-relieving dressings and its care requires substantial resources [3]. The expected and already experienced shortage of (specialized) caregivers makes it challenging to provide effective care. This emphasizes the need for more efficient use of resources like time spent to document wound assessment and treatment. The EPWUF-KI project aims to integrate artificial intelligence (AI) into DFS wound care to optimize wound treatment and automate documentation processes. This is intended to relieve nursing staff of time-consuming, non-nursing tasks such as documentation.

¹ Corresponding Author: Annika Weggen, Hochschule Niederrhein – University of Applied Sciences Krefeld, Reinartzstraße 49, 47805 Krefeld, Germany; E-mail: annika.weggen@hs-niederrhein.de.

2. Methods

We developed a system solution that includes a sensor unit for monitoring wound pressure and temperature, a smartwatch app for patient alerts, a web interface for sensor data monitoring, decision support and a mobile app for AI-based wound measurement and documentation. Notifying patients in case of exceeded pressure limits proved to be a promising approach in DFS treatment [4]. The collected sensor data and wound documentation data are analyzed by AI to provide decision support to caregivers, such as adjusting the next dressing change interval. During development and implementation, user feedback is continuously integrated. In an ongoing 16-month trial ending in November 2024, we aim to enroll 40 patients to test feasibility and effectiveness.

3. Results

Initial observations indicate that the use of modern AI algorithms used for wound measurements on standard mobile devices in outpatient wound care offers potential and can contribute to a beneficial digitalization in health care. Data analysis will be conducted after the study's conclusion, with first results expected by January 2025.

4. Discussion and Conclusions

The integration of AI into the management of DFS poses a significant opportunity in addressing the challenges of outpatient wound care. Furthermore, user-centered development and continuous support are key factors for successful implementation of digital solutions in everyday treatment by outpatient caregivers.

Combining data sources using AI can play a crucial role in alleviating healthcare resource constraints and improving DFS care quality in the future.

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