

SUCCESS STORY



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IMPROVING THE DEBRIDEMENT OF WOUNDS – A ROBOTIC SYSTEM THAT MAY DEFINE A NEW STANDARD

A SEMI-AUTOMATED ROBOTIC IN-VITRO SIMULATION SYSTEM FOR SIGNIFICANT IMPROVEMENT OF WOUND DEBRIDEMENT PRODUCTS AND PROCEDURES

Wound debridement plays a key role in the management and healing of wounds. The debridement process involves the removal of contaminated, adherent, or necrotic tissue impeding the natural healing process of the wound. A lack of appropriate wound treatment may result in inflammation and bacterial colonization. The success of debridement is strongly related to the properties of products used combined with application skills and experience of the user.

Due to the high variability of wounds, it is a challenge to provide and reproduce defined conditions to test wound debridement strategies in a systematic and comparable way. Apart from basic debridement products and procedures, the medical personnel usually deploy some preferred products and carry out individual procedure variants. Although some approaches have been described in the literature to explore debridement using mechanized test rigs,

there is no closed loop-based solution available to date.

In the framework of ACMIT project “Advanced Planning Concepts”, a dedicated simulation and training setup for wound debridement has been developed. The primary unit comprises a tablet computer and a tablet mounting platform equipped with force sensors to record real movement patterns used by nursing staff, both in terms of speed and force applied to the wound surface. This “DebriTrack” recording system enables the creation of a database of various wound cleaning strategies.

To evaluate the efficiency of particular cleaning strategies and/or products used for the debridement, and thus to improve the wound cleaning process, a robot-based debridement simulator “DebriSim” has been developed that can replay debridement interventions recorded with “DebriTrack” in order to

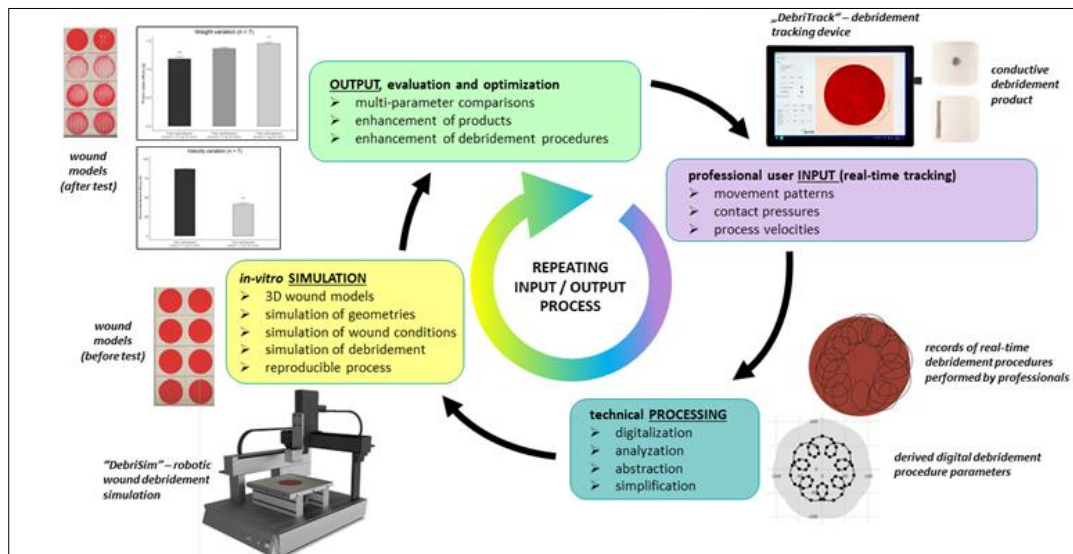


Figure 1: Debridement analysis and improvement system with “DebriSim”, “DebriTrack”, and standardized artificial wounds

repeat identical cleaning procedures with different products in a reproducible manner.

To ensure an always identical and reproducible test environment also regarding the wound condition, artificial wound models were developed whose parameters were optimized with experienced wound experts to achieve maximal realism.

Impact and effects

The unique combination of a multi-parameter debridement data recorder, a robot-supported real-time reproduction of debridement procedures and easily manufacturable, realistic wound models enables a systematic and reproducible in-vitro analysis of both the individual working methods of

caregivers and the cleaning effectiveness of pertinent products.

Based on the comprehensive database of debridement procedures, which is currently further extended, the results of the efficiency analyses can be applied for the improvement of debridement products. Furthermore, the system can be perfectly used for education and training of caregiving personnel. With that, the developed system will significantly contribute to a faster convalescence for the patients. Shorter wound healing times and the reduction of debridement efforts finally also contribute to lower expenses for the healthcare system.

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