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# 🌐 Micro-training for patients with chronic wounds and their relatives on changing wound dressings at home – a hybrid type 2 effectiveness-implementation pilot study protocol

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## Abstract

**Background:** Chronic wounds represent a growing global health challenge, substantially affecting patients' quality of life and placing significant demands on healthcare systems. Promoting self-management can enable patients and their relatives, improve clinical outcomes, and reduce healthcare utilization. However, evidence on how to effectively implement self-management education - such as micro-training - for wound care at home remains limited. To address this gap, a micro-training intervention focusing on home dressing changes was developed and implemented at a Swiss university hospital's outpatient wound centre, using eight defined implementation strategies. This study protocol outlines the planned evaluation of the intervention and its implementation. The primary aim is to assess the impact of micro-training on self-efficacy and consultation frequency over eight weeks, comparing those who receive the micro-training to those who do not. In addition, the implementation process will be examined by evaluating key outcomes such as acceptability, feasibility, fidelity, reach, and costs to determine the intervention's integration into routine care.

**Methods:** A hybrid type 2 implementation pilot study is planned over a six-month period. This non-blinded, multi-methods study follows a pre-post design to evaluate the clinical effects of a micro-training intervention on self-efficacy and consultation frequency among patients with chronic wounds and their relatives. In parallel, key implementation outcomes - acceptability, feasibility, fidelity, reach, and costs - will be assessed. The study will include adult patients with chronic wounds, their trained relatives, and the participating wound experts. Data will be collected through hospital records, standardized questionnaires, and focus group interviews with wound experts. Quantitative data will be analysed descriptively and examined using appropriate statistical methods, including parametric or non-parametric tests, as well as regression analyses. Qualitative data from focus groups will be analysed using structured content analysis supported by knowledge-mapping techniques.

**Discussion:** The planned study aims to improve self-efficacy and reduce healthcare utilization in patients with chronic wounds and their relatives through a micro-training intervention designed for integration into routine care. The hybrid design enables simultaneous evaluation of clinical effectiveness and implementation. While the study is non-randomized and limited in follow-up duration, it is expected to yield valuable initial insights into the feasibility and impact of the intervention. Longer-term effects should be explored in future research.

## Attachments



[Appendix.pdf](#)

251KB

## Background

1

Chronic wounds are a growing global issue, affecting around 2.2 per 1000 people worldwide (1). They are defined as wounds that do not heal within a certain period despite optimal treatment (2, 3). However, the lack of a standardized definition complicates prevalence comparisons across studies (1, 4-6). Chronic wounds are increasingly common due to demographic changes and lifestyle-related diseases such as obesity, diabetes, and vascular conditions (5, 7).

These wounds significantly impair the quality of life for patients and their relatives (2, 5) due to physical symptoms (e.g. pain, limited mobility, appetite loss) and psychological effects (e.g. depression, social isolation) (8). They are also associated with increased mortality (5). The long treatment duration places a considerable burden on healthcare systems (2). In Europe, chronic wounds care accounts for 2-4% of healthcare expenditures - around 8 billion euros annually (4). Given that most treatment occurs in outpatient settings (4), optimizing outpatient care is crucial for efficient resource use (7).

Promoting self-management in patients with chronic wounds and their relatives can reduce the physical and psychological burden while conserving healthcare resources (8, 9). Self-management involves actively dealing with chronic illness through symptom monitoring, decision-making, goal setting, and health-promoting behaviours (8, 10). A key factor is self-efficacy (10, 11), confidence in one's ability to manage challenges, which increases the likelihood of successful self-care (12). However, 66% of patients lack the knowledge to effectively support wound healing at home (13). Education programs can address this gap by promoting self-management and reducing complications and healthcare costs (13-15). Informed patients are more engaged (16), which improves adherence and healing outcomes (11, 17, 18). Low self-efficacy is associated with poorer outcomes. For instance, Al Sayah et al. (2015) reported significantly higher infection rates in patients with diabetic foot ulcers and lower self-efficacy ( $p > 0.001$ ) (19). Strengthening self-management can therefore enhance clinical outcomes (20), enhance quality of life (10, 11, 21), and reduce healthcare utilization (11, 17).

Despite growing interest, there is limited evidence on how best to implement self-management education in wound care (22). Schieron, Bükér & Zegelin (2021) suggest that micro-training is a suitable method for promoting self-management in general (23). Micro-trainings are short (~15-minute) sessions (24) aimed at imparting knowledge and developing practical skills and behaviours (24, 25).

To date, no study has evaluated how such education intervention should be implemented in wound care, which implementation strategies are effective, or which implementation outcomes should be measured. An evaluation is essential to understand not only whether such an intervention works, but also how and why it

succeeds or fails in practice. This study protocol aims to address this research gap, which is particularly relevant in the Swiss context, as recent healthcare reforms have prioritized the promotion of self-management (10, 11, 26).

The overall aim is to evaluate a micro-training intervention for patients with chronic wounds and their relatives and its implementation process in a Swiss outpatient wound centre. Therefore, the objectives are:

- 1) to investigate the impact of micro-training, focusing on home dressing changes, on self-efficacy and the number of consultations for chronic wound patients and their relatives over the first eight weeks, compared to those not receiving micro-training and
- 2) to explore the implementation process and assess the success of the intervention's integration into routine care by evaluating the implementation outcomes of acceptability, feasibility, fidelity, reach, and costs.

## Methods

### 2 Design and Setting

A hybrid type 2 implementation pilot study will be conducted over six months. This non-blinded multi-method study will assess both the clinical intervention's effects and the impact of the implementation strategies, as defined by Curran et al. (2012) (28), and will be documented following the Standards for Reporting Implementation Studies (STARI) guidelines for implementation studies (29). The study takes place at the outpatient wound centre of a university hospital in north-west Switzerland, where patients with acute and chronic wounds are treated. Care is provided by six wound experts (3.3 FTE) from Monday to Friday, with specialist consultation available as needed. Patients are referred by their general practitioner, post-inpatient care, or self-referred. In 2022, the centre recorded 2,137 outpatient treatments, marking a 26% increase from the previous year, with approximately 48.5% of patients diagnosed with diabetic foot syndrome (30).

### 3 Intervention

#### *Sample and sample size*

To evaluate the intervention, all first-time patients with chronic wounds treated at the outpatient wound centre during the data collection period will be included. Eligible participants will be adults ( $\geq 18$  years) with any type of chronic wound, such as pressure ulcers, diabetic foot syndrome, or venous ulcers. Patients with acute wounds will be excluded. Both patients who have received micro-training and those who have not will be included. The number of patients for the data collection window of six months is estimated at  $n = 274$ , based on the number of patients in 2023 ( $n = 547$ ). The statistical power is not calculated as this study is a pilot study.

All relatives who have received micro-training and perform dressing changes at home will be included, while relatives without training will be excluded. Patients and/or their

relatives will be directly invited to participate in the study.

### 3.1 *Description*

The intervention micro-training aims to promote the transfer of knowledge and skills into daily life. Patients eligible for the micro-training must have a non-critical wound course. Either the patients or their relatives must possess sufficient cognitive, linguistic, and physical abilities to understand the training and perform basic wound care. The intervention is individually tailored, embedded in routine wound care, and incorporates structured communication techniques (e.g., "Ask-Tell-Ask", "Closing the Loop"). Core topics include wound healing, hygiene, warning signs, and self-care. A patient brochure is provided and explained. Detailed information on the intervention is available in Wüthrich et al. (2024) (24)

### 3.2 *Data collection and variables*

In addition to existing patient data, the wound experts will document relevant information in the internal hospital information system. They will receive training to ensure consistent and accurate documentation.

The primary outcome is the impact of micro-training on self-efficacy in performing home dressing changes among patients with chronic wounds and their relatives, compared to those not receiving the intervention. Self-efficacy will be assessed at two time points, baseline and after eight weeks, as no specific recommendations exist for the optimal timing of assessments. Self-efficacy is assessed using the question: 'How confident are you that you will be able to change the dressing yourself in the future?'. Responses are given on a numerical scale from 0 to 10 (Appendix A). Higher scores indicate greater self-efficacy. The item is based on the internal micro-training concept (24). The outcome is recorded verbally by wound experts at baseline and after eight weeks.

The secondary outcome is the impact of micro-training on the number of consultations for chronic wound patients at the outpatient wound centre over the first eight weeks, compared to those not receiving the intervention. The total number of consultations is recorded for all patients, starting from the first consultation, over the eight-week period. To assess the cost-effectiveness of the intervention, the duration of treatment, unplanned consultations and hospitalisations for chronic wound patients over an 8-week period will also be investigated.

Descriptive variables, including age, gender, wound type, duration of the wound (i.e., how long the wound has been present), and the individual performing the dressing change, are recorded for each patient. Wound experts also document whether the patient has received micro-training. For relatives who receive micro-training, their age, gender, and relationship to the patient are also noted.

Details of the variables can be taken from table 1.

Table 1: Variables of the intervention evaluation

| Variables                                  | Targeted sample                                         | Source                      | Measurement                                   | Scale              | Unit                                                                                                                                                            |
|--------------------------------------------|---------------------------------------------------------|-----------------------------|-----------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Outcome variables</b>                   |                                                         |                             |                                               |                    |                                                                                                                                                                 |
| <b>Self-efficacy</b>                       | Patients or relatives, who have received micro-training | Patients or relatives       | Numerical scale requested by WEX <sup>3</sup> | cat. <sup>3</sup>  | 0 = not convinced ...<br>10 = absolutely convinced                                                                                                              |
| <b>Number of consultations per patient</b> | All patients                                            | Electronic patient planning | Available data                                | con. <sup>2</sup>  | Numbers                                                                                                                                                         |
| Duration of treatments                     | All patients                                            | Electronic patient planning | Available data                                | con. <sup>2</sup>  | Minutes                                                                                                                                                         |
| Unplanned consultations                    | All patients                                            | Electronic patient planning | Available data                                | con. <sup>2</sup>  | Numbers                                                                                                                                                         |
| Unplanned hospitalizations                 | All patients                                            | Electronic patient planning | Available data                                | con. <sup>2</sup>  | Numbers                                                                                                                                                         |
| <b>Descriptive variables</b>               |                                                         |                             |                                               |                    |                                                                                                                                                                 |
| Patients age                               | All patients                                            | Electronic patient file     | Available data                                | con. <sup>2</sup>  | Date of birth (dd/mm/yyyy)                                                                                                                                      |
| Patients gender                            | All patients                                            | Electronic patient file     | Available data                                | cat. <sup>3</sup>  | Female; male; diverse                                                                                                                                           |
| Wound type                                 | All patients                                            | Electronic patient file     | Available data                                | cat. <sup>3</sup>  | diabetic foot; venous leg ulcer; arterial leg ulcer; mixed leg ulcer; pressure ulcer; post-operative wound healing disorders; oncological wounds; others: which |
| Duration of the wound                      | All patients                                            | Patients or relatives       | Requested by WEX <sup>1</sup>                 | con. <sup>2</sup>  | Date of wound development (dd/mm/yyyy)                                                                                                                          |
| Performer                                  | All patients                                            | Patients or relatives       | Requested by WEX <sup>1</sup>                 | cat. <sup>3</sup>  | Patient; relative; spitem; nursing home; others: which                                                                                                          |
| Received micro-training                    | All patients                                            | WEX <sup>1</sup>            | WEX <sup>1</sup>                              | dich. <sup>4</sup> | No; yes                                                                                                                                                         |
| Relatives age                              | Relatives, who have received micro-training             | Relatives                   | Requested by WEX <sup>1</sup>                 | con. <sup>2</sup>  | Years                                                                                                                                                           |
| Relatives gender                           | Relatives, who have received micro-training             | Relatives                   | Requested by WEX <sup>1</sup>                 | cat. <sup>3</sup>  | Female; male; diverse                                                                                                                                           |
| Relatives' role                            | Relatives, who have received micro-training             | Relatives                   | Requested by WEX <sup>1</sup>                 | cat. <sup>3</sup>  | life partner; sister/brother; child; friend; neighbour; others: which                                                                                           |

<sup>1</sup>wound experts; <sup>2</sup>continuous; <sup>3</sup>categorical; <sup>4</sup>dichotomised

## 4 Implementation strategies

### Sample and sample size

All wound experts from the outpatient wound centre will be involved in the evaluation of the implementation. The number of participating wound experts is estimated at n = 6. These are experienced nurses with additional certification in wound care but without formal training in patient or relative education. Prior to implementation, participants will attend two one-hour training sessions on micro-training techniques. Throughout the implementation phase, they will receive ongoing information and be formally invited to participate in the study.

### 4.1 Description

As part of the implementation strategy, organizational readiness was assessed to identify facilitators and barriers. Based on the results, a draft implementation template was developed. A champion was trained to coach the wound experts, and process flows were jointly defined by the implementation team - from patient selection to evaluation and documentation of dressing changes. Team meetings addressed necessary adjustments to materials and room setup. Learning collaboratives, audits, and feedback will support reflection and adaptation during implementation. The executive boards will be informed regularly. A detailed description of the strategies is provided in Panfil et al. (2025) (27).

### 4.2 Data collection and variables

Data will be collected using a questionnaire (Appendix B), which will be distributed to the wound experts at the beginning and end of the data collection period. The focus group interview will be conducted at the end of the data collection.



The secondary aim is to explore the successful implementation of the intervention into routine care by evaluating the implementation outcomes: acceptability, feasibility, fidelity, reach, and costs.

Acceptability measures how wound experts perceive the micro-training intervention in terms of satisfaction, as low acceptance is a key barrier to successful implementation (31). This outcome is evaluated using the Acceptability of Intervention Measure (AIM) by Weiner et al. (2017) (32), with the German translation by Kien et al. (2021) (33). The AIM, a reliable and valid instrument (Cronbach's  $\alpha = 0.94$ ), consists of four questions rated on a 5-point Likert scale (33). Higher scores indicate greater acceptance.

Feasibility assesses the extent to which the micro-training intervention "Dressing changes at home" micro-training can be successfully implemented. It can be used retrospectively to explain success or failure (31). The outcome is measured using the reliable and valid Feasibility of Intervention Measure (FIM) by Weiner et al. (2017) (32), with the German translation by Kien et al. (2021) (33). The scale explains 79.35% of the variance and has high internal consistency (Cronbach's  $\alpha = 0.91$ ) (33). The four questions are rated on a 5-point Likert (33). Higher scores indicate greater feasibility.

Reach refers to the proportion and representativeness of the eligible target population that receives the micro-training intervention (31). To identify potential access barriers and better understand reach, reasons for non-participation in the intervention will be systematically collected.

Fidelity assesses the degree to which the micro-training was implemented as planned, as this influences its effectiveness (31). To evaluate fidelity, a focus group interview with all wound experts will be conducted based on three guiding questions.

Implementation costs refer to the cost impact of an implementation effort (31). These includes the implementation costs based on the hours spent and the salaries of those involved in the intervention and its associated strategies.

Descriptive variables include age, gender, workload, and professional experience of the wound experts.

Details of the variables can be taken from Table 2.



Table 2: Variables of the implementation

| Variables                      | Targeted sample                                     | Source                          | Measurement                                                                                                                                                                                                                                                                                                                                                                                                          | Type               | Answer option                                                                    |
|--------------------------------|-----------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------|
| <b>Outcome variables</b>       |                                                     |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                                                  |
| <b>Acceptability</b>           | WEX <sup>1</sup>                                    | AIM <sup>2</sup> -Questionnaire | <ul style="list-style-type: none"> <li>Approval: I approve of the micro-training "dressing changes at home"</li> <li>Appeal: The micro-training "dressing changes at home" appeals me</li> <li>Like: I like the micro-training "dressing changes at home"</li> <li>Welcome: I welcome the micro-training "dressing changes at home"</li> </ul>                                                                       | cat. <sup>3</sup>  | Completely disagree (1)<br>... Completely agree (5)                              |
| <b>Feasibility</b>             | WEX <sup>1</sup>                                    | FIM <sup>4</sup> -Questionnaire | <ul style="list-style-type: none"> <li>Implementable: The micro-training "dressing changes at home" appears to be implementable</li> <li>Possible: The micro-training "dressing changes at home" appears to be possible</li> <li>Doable: The micro-training "dressing changes at home" appears to be doable</li> <li>Easy to use: The micro-training "dressing changes at home" appears to be easy to use</li> </ul> | cat. <sup>3</sup>  | Completely disagree (1)<br>... Completely agree (5)                              |
| <b>Reach</b>                   | All patients                                        | WEX <sup>1</sup>                | Assessment by WEX <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                       | dich. <sup>6</sup> | No; yes                                                                          |
| <b>Reason for non-receipt</b>  | All patients/relatives not receiving micro-training | WEX <sup>1</sup>                | Assessment by WEX <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                       | cat. <sup>3</sup>  | Does not fulfil inclusion criteria; denied by patient or relative; other: Which? |
| <b>Fidelity</b>                | WEX <sup>1</sup>                                    | Focus group interview           | Degree: To what degree, could the micro-training intervention "dressing changes at home" be implemented according to the intervention description?<br>Reasons: What were the reasons that it could not be carried out as planned?<br>Barriers and facilitators: What were the barriers or facilitators for the planned implementation?                                                                               |                    |                                                                                  |
| <b>Costs</b>                   | Implementations team                                | Protocols, salary list          | Available data                                                                                                                                                                                                                                                                                                                                                                                                       | con. <sup>5</sup>  | Swiss francs                                                                     |
| <b>Descriptive variables</b>   |                                                     |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                      |                    |                                                                                  |
| <b>Age</b>                     | WEX <sup>1</sup>                                    | Questionnaire                   |                                                                                                                                                                                                                                                                                                                                                                                                                      | con. <sup>5</sup>  | Years                                                                            |
| <b>Gender</b>                  | WEX <sup>1</sup>                                    | Questionnaire                   |                                                                                                                                                                                                                                                                                                                                                                                                                      | cat. <sup>3</sup>  | Female; male; diverse                                                            |
| <b>Workload</b>                | WEX <sup>1</sup>                                    | Questionnaire                   |                                                                                                                                                                                                                                                                                                                                                                                                                      | con. <sup>5</sup>  | Percent                                                                          |
| <b>Professional experience</b> | WEX <sup>1</sup>                                    | Questionnaire                   |                                                                                                                                                                                                                                                                                                                                                                                                                      | con. <sup>5</sup>  | Years                                                                            |

<sup>1</sup>wound experts; <sup>2</sup>Acceptability of Intervention Measure; <sup>3</sup>categorical; <sup>4</sup>Feasibility of Intervention Measure; <sup>5</sup>continuous; <sup>6</sup>dichotomised

## 5 Data management

Patient data, wound care documentation from the hospital information system, and questionnaire responses will be systematically collected and entered the Research Electronic Data Capture (REDCap) database (34, 35) by a responsible member of the study team. The focus group interview will be also electronically recorded by a research team member to enable subsequent qualitative analysis.

## 6 Analysis

The collected quantitative data will be described using descriptive statistics. For the continuous variables, the central tendency (mean and median) and the dispersion (standard deviation, range, minimum and maximum) will be calculated to characterize the sample. Categorized variables will be described using frequency and percentage distributions.

To evaluate the effect of the micro-training intervention, the two self-efficacy measures will be compared using a t-test or, if assumptions of normality are violated, a Wilcoxon signed-rank test. A comparison of the number of consultations with and without micro-training should be conducted using a t-test or, if normality assumptions are not met, a Mann-Whitney U test. A regression model will be used to examine the association between the intervention's independent variables and the categorical outcome variable self-efficacy.

To evaluate the implementation process, acceptability and feasibility scores will be compared using a t-test or, if normality assumptions are violated, a Wilcoxon signed-rank test.

The focus-group audio recording will be transcribed verbatim and subjected to content analysis, with themes organized through knowledge-mapping techniques (37).

The data is analysed using the statistical software R (36). Statistical significance is defined with a-level of less than 0.05. The collected data is checked for missing data. If missing data is discovered, it is treated critically and appropriately.

## Discussion

- 7 The planned study aims to investigate the benefits of micro-training for both patients and their relatives, as well as for the healthcare system. It is anticipated that patients or relatives who receive the micro-training will demonstrate higher self-efficacy compared to those excluded based on the predefined criteria. This difference may, for instance, influence the frequency of healthcare consultations. Insights gained from the implementation will provide valuable guidance for context-specific adaptations of the training interventions.

The choice of study design is based on a comprehensive analysis of relevant methodological challenges and practical requirements. To examine both the effectiveness of the intervention and the implementation process, a hybrid study design is planned. This approach will enable the generation of insights that go beyond a traditional efficacy study and simultaneously address practical implementation issues. Alternative designs, such as a purely randomized controlled trial (RCT), have been dismissed due to their limited capacity to adequately capture implementation aspects, despite offering high internal validity. Although the study is not planned as randomized, the comparison between patients receiving micro-training and those who do not is expected to provide initial insights into the intervention's effects.

The intervention was designed to be seamlessly integrated into existing healthcare structures to facilitate sustainable implementation. Traditional training programs often require in-person sessions and long-term support, which involves higher barriers for patients and the healthcare system. In contrast, the micro-training offers flexible and accessible learning modules tailored to the everyday lives of the affected individuals. Addressing patient education in a way that is tailored to the individual is difficult to standardize (23). Therefore, a detailed concept of micro-training was developed, and staff members will be regularly and personally coached as part of the implementation process. The evaluation of this intervention is important, as the knowledge gained could be useful for other hospitals in Switzerland and beyond.

The eight-week period is relatively short for measuring self-efficacy, meaning that long-term effects won't be able to be captured. Since this time interval is not evidence-based, the sustainability of the intervention remains unclear. Additional



follow-up surveys are needed to assess long-term impacts and effects in a more informed manner.

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## CRediT authorship contribution statement

- 10 **Stefanie Felder-Minder:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Mayuri Sivanathan:** Conceptualization, Methodology, Supervision, Writing – review & editing. **Victor Todorov:** Methodology, Writing – review & editing. **Jeanette Wüthrich:** Methodology, Writing – review & editing. **Maria José Mendieta:** Writing – review & editing. **Eva-Maria Panfil:** Conceptualization, Methodology, Writing – review & editing.

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