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Diabetic Foot Skin Temperature Monitoring for Early Ulcer Identification and Prevention：A Scoping Review

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ADMINISTRATIVE INFORMATION

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 4 January 2026 and was last updated on 4 January 2026.

INTRODUCTION

Review question / Objective 1. Which foot skin temperature monitoring technologies are used for early identification and prevention of diabetic foot ulcers? 2. How effective are different monitoring modes (technology type, measurement site, frequency, threshold) in providing early warnings? 3. What is the evidence regarding the impact of temperature monitoring prevention strategies on ulcer incidence/recurrence rates? 4. What are the compliance, feasibility, and primary barriers associated with home-based/remote temperature monitoring? 5. What is the acceptance and user experience of foot temperature monitoring technologies among high-risk diabetic footpatients?

Background Diabetic foot ulcers represent one of the most severe complications of diabetes, characterized by high recurrence rates and associated risks of amputation. Elevated foot skin temperature often precedes ulcer formation by several days to weeks and is recognized as a pre-ulcer biomarker. The International Working Group on Diabetic Foot guidelines recommend considering foot skin temperature monitoring for patients at moderate to high risk, but there is heterogeneity in the predictive efficacy, threshold standards, and preventive effects of different monitoring technologies (such as infrared thermography and wearable sensors), with a lack of systematic evidence.

Rationale Systematically review existing research on the use of foot skin temperature monitoring for early ulcer detection (risk prediction) and prevention (primary/recurrent prevention) in patients with diabetic foot or high-risk feet. Describe the types of technologies, early warning strategies, predictive efficacy, preventive outcomes, and current implementation status. Identify evidence gaps to inform clinical practice guidelines and compliance intervention design.

METHODS

Strategy of data synthesis Analysis
Methods: 1. Primarily descriptive summaries presenting the strengths and weaknesses of each

technical approach, along with predictive performance metrics (sensitivity, specificity, AUC, etc.). 2. Exploratory quantitative analysis: Where studies exhibit high homogeneity, quantitative analysis may be conducted. 3. No evidence grading will be performed, but major methodological limitations will bedocumented.

Eligibility criteria Inclusion Criteria:
1) Clearly targeting patients with high-risk feet for diabetes or existing foot ulcers
2) Utilizing foot skin temperature monitoring to identify ulcer risk
3) Reporting ulcer-related outcomes (incidence/ recurrence/amputation)
Exclusion Criteria:
1) Studies solely focused on technology development or in vitro experiments
2) Studies solely assessing neural “temperature sensation” testing
3) Studies solely evaluating healing of existing ulcers
4) Conference abstracts lacking complete data.

Source of evidence screening and selection Web of Science, Cochrane Library, PubMed, Embase, ScienceDirect, China National Knowledge Infrastructure (CNKI), Wanfang Data Knowledge Service Platform, VIP Information Network, China Biomedical Literature Database.

Data management Importing references into Zotero: First, two researchers independently screen titles and abstracts for initial eligibility. References that cannot be definitively excluded based on these criteria undergo full-text review. After preliminary inclusion determination, full-text re-screening is conducted. When screening results differed, a third researcher was consulted to resolve discrepancies. Basic information extracted using Excel included: study methods, monitoring techniques, early warning criteria, primary outcomes (ulcer incidence, amputation rate, etc.), and secondary outcomes (compliance, patient feedback, etc.).

Language restriction This scoping review will include studies published in English and Chinese; studies in other languages will be excluded due to resource and translation limitations to ensure the accuracy and efficiency.

Country(ies) involved China.

Keywords Diabetic foot ulcer (DFU), Foot temperature monitoring, Early ulcer screening, Ulcer prevention,Scoping Review.

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