

A Future Solution for Diabetic Peripheral Neuropathy Assessment

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Background: This study compares current devices for assessing diabetic peripheral neuropathy (DPN) and introduces a smartphone-based approach as a potential future solution.

Methods: Commonly used tools include the 10g monofilament, inexpensive but insensitive to early neuropathy; the 128 Hz tuning fork, simple yet non-quantitative; and neurothesiometers, accurate but costly and requiring training. VibraTip, an affordable vibration device, lacked variability and was not recommended by NICE. These limitations prompted development of a smartphone-based tool for stratified, continuous monitoring.

Results: The proposed system combines a 3D-printed probe with a mobile app that controls vibration intensity, enabling guided self-testing. Calibration ensures standard vibration perception threshold (VPT) readings. Clinical trials demonstrated reliability, accuracy, and repeatability, confirming its potential for early detection and ongoing assessment.

Conclusions: Existing non-invasive devices have significant drawbacks in sensitivity, cost, and usability. A smartphone-based solution offers an accessible, low-cost alternative with broad applicability, supporting proactive management of DPN.

Clinical relevance: Early and scalable detection of DPN can reduce complications, improve patient self-management, and lower healthcare burden.