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Effectiveness of offloading interventions to heal foot ulcers in persons with diabetes: a systematic review

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Abstract

Background: Offloading interventions are commonly used in clinical practice to heal foot ulcers. The aim of this updated systematic review is to investigate the effectiveness of offloading interventions to heal diabetic foot ulcers.

Methods: We updated our previous systematic review search of PubMed, EMBASE, and Cochrane databases to also include original studies published between July 29, 2014 and August 13, 2018 relating to four offloading intervention categories in populations with diabetic foot ulcers: (a) offloading devices, (b) footwear, (c) other offloading techniques, and (d) surgical offloading techniques. Outcomes included ulcer healing, plantar pressure, ambulatory activity, adherence, adverse events, patient-reported measures, and cost-effectiveness. Included controlled studies were assessed for methodological quality and had key data extracted into evidence and risk of bias tables. Included non-controlled studies were summarised on a narrative basis.

Results: We identified 41 studies from our updated search for a total of 165 included studies. Six included studies were meta-analyses, 26 randomised controlled trials (RCTs), 13 other controlled studies, and 120 non-controlled studies. Five meta-analyses and 12 RCTs provided high-quality evidence for non-removable knee-high offloading devices being more effective than removable offloading devices and therapeutic footwear for healing plantar forefoot and midfoot ulcers. Total contact casts (TCCs) and non-removable knee-high walkers were shown to be equally effective. Moderate-quality evidence exists for removable knee-high and ankle-high offloading devices being equally effective in healing, but knee-high devices have a larger effect on reducing plantar pressure and ambulatory activity. Low-quality evidence exists for the use of felted foam and surgical offloading to promote healing of plantar forefoot and midfoot ulcers. Very limited evidence exists for the efficacy of any offloading intervention for healing plantar heel ulcers, non-plantar ulcers, and neuropathic ulcers with infection or ischemia.

Conclusion: Strong evidence supports the use of non-removable knee-high offloading devices (either TCC or non-removable walker) as the first-choice offloading intervention for healing plantar neuropathic forefoot and midfoot ulcers. Removable offloading devices, either knee-high or ankle-

high, are preferred as second choice over other offloading interventions. The evidence bases to support any other offloading intervention is still weak and more high-quality controlled studies are needed in these areas.

Keywords: diabetes mellitus; diabetic foot; foot ulcer; footwear; off-loading; offloading; offloading device; pressure; surgery; systematic review.

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