

# Specific guidelines on footwear and offloading

S. A. Bus<sup>1\*</sup>, G. D. Valk<sup>2</sup>,  
R. W. van Deursen<sup>3</sup>,  
D. G. Armstrong<sup>4</sup>,  
C. Caravaggi<sup>5</sup>, P. Hlaváček<sup>6</sup>,  
K. Bakker<sup>7</sup>, P. R. Cavanagh<sup>8</sup>

<sup>1</sup>Department of Rehabilitation, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands; <sup>2</sup>Department of Internal Medicine, University Medical Center Utrecht, Utrecht, The Netherlands; <sup>3</sup>Research Centre for Clinical Kinaesiology, Department of Physiotherapy, School of Healthcare Studies, Cardiff University, Heath Park, Cardiff, UK; <sup>4</sup>Dr. William M. Scholl College of Podiatric Medicine at Rosalind Franklin University of Medicine and Science, North Chicago, IL, USA; <sup>5</sup>Centre for the Study and Treatment of Diabetic Foot Pathology, Abbiategrasso Hospital, Abbiategrasso (Milan), University Vita Salute San Raffaele, Milan, Italy; <sup>6</sup>Tomáš Baťa University, Faculty of Technology, Zlín, Czech Republic; <sup>7</sup>IWGDF, Heemstede, The Netherlands; <sup>8</sup>Department of Biomedical Engineering, Lerner Research Institute, Cleveland Clinic, Cleveland, OH, USA

\*Correspondence to: S. A. Bus, Department of Rehabilitation, Academic Medical Center, University of Amsterdam, PO Box 22700, 1100 DE Amsterdam, The Netherlands. E-mail: s.a.bus@amc.uva.nl

Received: 9 October 2007  
Accepted: 25 January 2008

**Keywords** footwear; diabetic; offloading; guidelines

This article is a specific guideline on footwear and offloading for the diabetic foot which is based on conclusions from the systematic review on available evidence and on consensus agreement within the International Working Group on the Diabetic Foot.

## Prevention of ulceration

### Callus removal

- Regular callus removal should be performed on people with diabetes and neuropathy by a skilled health care provider.

### Footwear

- Patients with an at-risk diabetic foot should be urged to not walk barefoot but to wear protective footwear both at home and outside.
- Although no evidence exists, it is often clinically apparent that even extra-depth footwear may not accommodate a foot with a significant deformity. In such cases, custom footwear is recommended.
- Therapeutic shoes can be used for preventing plantar ulceration in the at-risk diabetic foot.
- To achieve maximal reduction of peak plantar pressures in footwear prescription, custom-moulded insoles should be incorporated in the therapeutic footwear as long as sufficient space exists.

## Surgical offloading

- Given the paucity of data, no definitive statement can be made about the effectiveness and safety of preventive surgery.
- Achilles tendon lengthening can be considered in selected patients, but this procedure carries the risk of heel ulceration. More information, including high quality studies, is needed before the procedure can be recommended for widespread use.
- There are few high quality studies on metatarsophalangeal (MTP) joint arthroplasty and metatarsal head (MTH) resection. These approaches cannot be recommended for widespread use before further evidence is available.
- One should also be aware of the disadvantages of applying surgical techniques for the prevention of plantar ulcers in the diabetic foot, which can include post-operative wound infection, induction of acute neuro-osteoarthropathy (Charcot) and development of ulcers at other sites (transfer ulcers).

## Treatment of ulceration

### Offloading

- The total contact cast (TCC) is the preferred treatment for non-infected, neuropathic diabetic plantar forefoot ulcers in patients with no signs of critical limb ischaemia.
- Adverse effects of total contact cast include the following: immobilization of the ankle, reduced activity level, difficulty with sleeping or driving a car, and pressure ulcers due to poor casting technique.
- If casting is not available, then removable walkers with an appropriate interface should be considered. Preferably, these walkers should be made irremovable as this 'forced adherence' increases healing rates.
- The use of half-shoes or cast shoes for neuropathic plantar ulcer treatment is recommended if total contact cast or below-knee-removable walkers are contraindicated or cannot be tolerated by the patient.

### Footwear

- Conventional or standard therapeutic shoes should not be chosen for treatment of plantar foot ulcers as, usually, many devices that are more effective are available.
- Non-plantar ulcers and post-surgical wounds also need relief from mechanical stress. Depending on the location of the ulcer, various modalities can be considered, including shoe modifications, temporary footwear, and toe spacers.

### Surgical offloading

- More studies are needed to better define the role of surgical offloading compared to conservative treatment, and one should be aware of the disadvantages of applying surgical techniques for the treatment of plantar ulcers in the diabetic foot (see above).

### Other offloading interventions

- If other forms of biomechanical relief are not available, felted foam in combination with appropriate footwear can be used to provide accommodative offloading at an ulcer site. It should not be used as a single treatment method.

### Conflict of interest

P. R. Cavanagh owns stock in DIApedia and is an inventor on US patents 6,610,897 6,720,470 and 7,206,718 which elucidate a load relieving dressing and a method of insole manufacture for offloading diabetic feet. DIApedia receives royalties from a licensing agreement with Acor Orthopaedic. P.R. Cavanagh has received honoraria from Merck, Eli Lilly, and ConvaTec and he is a recipient of grants from the National Institutes of Health. None of the other authors have conflicts of interest.