Appendix K: Offloading devices

This fact sheet outlines factors to consider regarding offloading pressures, recommendations for offloading devices for forefoot ulcers and offloading device choices (with advantages and disadvantages).

PRODUCT PICKER

WoundsCANADA.ca

Offloading Plantar Pressures in Diabetes

Key Messages

- Pressure is a factor in 90% of diabetic plantar ulcers and the pressure must be modified or removed in order to heal the ulcers and prevent recurrence.
- Diabetic foot ulcer (DFU) recurrence is significantly reduced with professionally fitted footwear and insoles/orthoses.
- Three main factors contribute to elevated foot pressures that result in ulceration:
  1. **Intrinsic:** neuropathy, altered blood flow, genetic or structural deformity
  2. **Extrinsic:** shoes, ambulation and weight-bearing activity, traumatic accident or surgery
  3. **Behavioural:** poor choice of footwear, lifestyle choices, type of ambulatory activity
- Offloading is the key to managing patients with a DFU and preventing further ulceration for the rest of the patient's life. Clinicians should always remember that considerations when offloading the foot are not limited to the device itself, but also include patient characteristics, environmental factors, appropriate use of the device, modofication of activity, reduction of walking speed and alteration of gait.

Treatment Strategy

The best device is a mechanically supportive device the patient will wear at all times when up, whether they are inside or outside the house.

Prevention Strategy

Footwear for persons with diabetes always needs to:

- Fit the foot
- Protect the foot
- Support the foot
- Be appropriate for the occasion

Factors to Consider When Offloading Pressures to Support Healing of Diabetic Foot Ulcers

Factors	Description
Disease	•Neuropathy •Retinopathy •Peripheral arterial disease (PAD) •Inflammatory disorder •Condition of contralateral limb
Foot Ulcer	•Type of ulcer: ·Neuropathic ·Ischemic ·Neuroischemic •Location •Dressing selection •Type of ulcer: ·Healing ·Non-healing ·Non-healable
Pressure	•Combination of: ·Shear stress ·Vertical pressure •Intrinsic ·Structural modifications (deformity/limited range of motion/tissue quality loss) ·Infection ·Malignancy •Extrinsic ·Biomechanics, gait and balance ·Deformity ·Condition of contralateral limb ·Footwear: socks, shoes, insoles ·Wound dressing bulk
Activities of Daily Living	•Occupation •Home lifestyle •Motor vehicle use •Sports/recreational activity
Funding	•Ability to pay for device •Third-party insurance •Inability to fund •Unwillingness to fund
Behavioural	•Commitment to meeting clinic appointments •Ability to adhere to plan of care •Ability to explore barriers and make recommendations for change

Recommendations for Offloading Devices for Forefoot Ulcers

Treatment	Offloading Device
First Line	•Above the ankle joint – requires that patient have adequate balance: ·Total contact casts (irremovable)* ·Cast walker (removable or irremovable)
Second Line	•Below the ankle joint: ·Surgical shoes ·Customized or custom-made footwear and orthotics
Third Line	•Shoes and orthotics

* Not to be used in the presence of peripheral arterial disease (PAD) or infection

Offloading Plantar Pressures

Offloading Device Choices

Offloading Device		Wound Location: Toes	Wound Location: Forefoot	Wound Location: Midfoot	Wound Location: Heel (Rearfoot)	Advantages	Disadvantages
Total contact cast (TCC)		✓✓	✓✓✓	✓✓✓	✓✓	•Gold standard •Reduces pressure under ulcer site between 84 and 92% •Custom moulded to shape of foot •Most studies indicate the shortest healing time as 8 to 12 weeks •Forced patient adherence to device	•Requires a trained professional to apply weekly •Can result in secondary ulceration with improper application •Contraindicated for infected or ischemic wounds; use with caution for heel ulcers •Difficult to sleep with •May prevent patient's ability to work •Patient may not tolerate device
Cast walker		✓✓✓	✓✓✓	✓✓	✗	•Effective at reducing plantar pressure at ulcer site with peak pressures similar to TCC •Can be used for infected wounds •All clinicians can be trained to apply •Same device can be used for the full the duration of treatment •Can be made irremovable with the application of a cohesive bandage to become an Instant Total Contact Cast (iTCC) (see below)	•Generic fit to the foot •Complicated by patients not wearing the device as prescribed because it is removable •Use of removable device results in longer healing times •Patient needs time to learn how to use device •May prevent patient's ability to work •Contraindicated for those with heel ulcers and poor balance
Instant total contact cast (iTCC)	 	✓✓✓	✓✓✓	✓✓	✗	•Cast walker made irremovable with the application of a cohesive bandage to become an iTCC •Same advantages as the Cast Walker •Same device can be used throughout the duration of treatment – and will require a change of the irremovable component	•Generic fit to the foot •May prevent patient's ability to work •Patient may not tolerate device
Half shoe (forefoot)		✓✓	✓✓	✗	✗	•Transfers pressure to mid-foot and rearfoot by eliminating propulsion •Low cost	•Very unstable •Contraindicated for patients with gait instability •High risk of falls
Half shoe (rearfoot)		✗	✗	✗	✓	•Low cost	•Difficule to ambulate

cont'd...

Offloading Plantar Pressures

Offloading Device Choices

Offloading Device		Wound Location: Toes	Forefoot	Midfoot	Heel (Rearfoot)	Advantages	Disadvantages
Surgical shoe		❣	✓✓	❣	❣	•Low cost •Accommodates edema •Good for short-term management	•Offloading properties are limited •Use with orthotic or insert devices •Not ideal for activity
Over-the-counter walking footwear		✓	✓✓	✓	✓	•Affordable •Easy to access •For preventative care	•Offloading properties are limited •Use with orthotic or insert devices
Footwear modifications (rocker toe)		✓✓	✓✓	✓	✗	•Moves pressure from forefoot to rearfoot	•Requires trained professional to apply •Expensive
Custom-made footwear		✓✓	✓✓	✓✓	✓✓	•Distributes pressure under foot evenly •Ideal for foot deformity	•Requires trained professional to apply •Very expensive
Custom-made orthotics		✓	✓✓	✓✓	✓	•Distributes pressure under foot evenly •May be used with over-the-counter footwear	•Requires trained professional to apply •Expensive
Padding		✓	✓	✓	✓	•Low cost •Easily modified	•Offloading properties are limited •Can cause increased pressure at wound edge
Crutches/cane		✓	✓	✓	✓	•Low cost •Adjustable •Walking aid to support balance	•Offloading properties are limited •Can cause shoulder dislocation

✓ = indicated; ✗ = contraindicated; ❣ = can be used

For more information:

1. Botros M, Kuhnke J, Embil J, et al. Best practice recommendations for the prevention and management of diabetic foot ulcers. In: Foundations of Best Practice for Skin and Wound Management. A supplement of Wound Care Canada; 2017. 68 p. Available from: www.woundscanada.ca/docman/public/health-care-professional/bpr-workshop/895-wc-bpr-prevention-and-management-of- diabetic-foot-ulcers-1573r1e-final/file.
2. Diabetes, Healthy Feet and You (DHFY): https://www.woundscanada.ca/about-dhfy.

Source: Reprinted with permission from Wounds Canada. Product picker: offloading plantar pressures in diabetes [Internet]. North York (ON): Wounds Canada; [updated 2018 Jun]. Available from: https://www.woundscanada.ca/docman/public/health-care-professional/1214-wc-product-picker-offloading-ltr-1703e/file