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<th>Guidelines- Pressure relief in the treatment of Diabetic Foot Ulceration</th>
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<tr>
<td>Document Type</td>
<td>Guidelines</td>
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<tr>
<td>Issue no</td>
<td>DE011/03</td>
</tr>
<tr>
<td>Issue date</td>
<td>01/07/2012</td>
</tr>
<tr>
<td>Review date</td>
<td>01/07/2015</td>
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<tr>
<td>Distribution</td>
<td>Intranet</td>
</tr>
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<td>Equality &amp; Diversity Impact Assessed</td>
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Guidelines – Pressure Relief in the treatment of Diabetic Foot Ulceration

5-7% of people with diabetes suffer from foot ulceration at any one time and up to 15% will suffer from ulceration at some point in their life (NICE, 2003).

Any patient with an active foot ulcer must be assessed for a managed program of pressure relief by a podiatrist specialising in diabetes.

Podiatrists should use some form of (research based where possible) pressure relieving device to offload pressure from the ulcer site.

Prevention of ulcers

Education

The diabetes team has a responsibility to provide the appropriate education to enable patients to acquire the necessary knowledge and skill to take responsibility for managing their own foot health care. Enabling the patient to alter their lifestyle in such a way as to maximise their foot health and reduce the risk of complications.

Patients at risk of ulceration need to know how foot ulcers are caused, how footwear can precipitate them and what the patient's role is in preventing and healing them. Education should be given written and verbally and should be reinforced at regular intervals.

Where patients had an agreed ‘personal behaviour contract’, there was a significant reduction in serious foot lesions (SIGN 116 2011)

Footwear

Patients should receive a footwear advice leaflet where appropriate (SCIDC network)

Low to moderate risk

Patients assessed as being of low to moderate risk (SIGN 116, 2011) should:

1. Receive verbal and written advice on suitable footwear and fitting, appropriate to their activity. eg Cushioned soles, foot shaped shoe and insole, leather uppers, adequate depth, adjustable fastening, correct size.

2. A daily foot care routine including checking footwear daily for anything that could cause injury to the foot, such as rough edges in seams or linings, and worn soles or heels. Shoes should be in good condition.
and be replaced wherever there are signs of wear and tear that can’t be repaired.

**Moderate to High Risk**

Patients who are higher risk of foot ulceration, due to abnormal foot shape, loss of protective sensation, limited joint mobility and who cannot be fitted with appropriate over-the-counter shoes in the shoe shops should be assessed for stock/bespoke footwear depending on their level of risk/deformity.

**Footwear**

Shoe trauma if frequently the pivotal event that precedes ulceration or amputation.

Therapeutic shoes and customised insoles have been shown to reduce ulcer occurrence and the severity of callus.

Patients who are provided with stock/bespoke footwear should be provided with insoles appropriate to their risk/deformity. (Australian National Guidelines, 2001)

**Review of footwear and insoles**

All supplied footwear and insoles must be reviewed on a regular basis ensuring that the effectiveness of the footwear/insoles is being maintained

**Callus**

Good Podiatric care is essential because the removal of callus can reduce high foot pressures by up to 26% (Young et al, 1992, SIGN 12, 1997)

**Current Ulceration**

All patients with a foot ulcer should be referred urgently for assessment at a specialist multidisciplinary diabetic foot ulcer clinic.

**Total Contact Casts**

Total contact methods of pressure relief are aimed at increasing the area of contact between the foot and the supporting surface thus redistributing the same force over a larger area, which results in a decrease in pressure.

\[
\text{Pressure} = \frac{\text{Force}}{\text{Area}}
\]

(Force = Mass X Acceleration)

A total contact cast is a non-removable cast which is very efficient at redistributing plantar pressure. However this is not without complications.
It consists of a close fitting plaster of Paris cast reinforced with fiberglass. This is placed over a protective area of felt padding. A rocker is applied to the cast in the mid foot area. Skilled, trained practitioners should only apply a total contact cast. The total contact cast controls oedema, sheering stress and alters cadence, velocity and will reduce activity. The cast is removed first in 3-4 days then weekly for dressing change and inspection of the ulcer. The foot and leg can also be checked at this stage for any sign of trauma. Patients must be given written and verbal instructions on how to care for their feet and cast. An emergency contact number is essential.

Total contact cast can achieve mean healing time of 6 weeks and up to 85% reduction in plantar pressures (Armstrong et al 2005)

Air casts

The Aircast walker is a removable prefabricated walking cast, which is close fitting with 4 inflatable cells. These cells are easily inflated and deflated using a hand pump and gauge. Oedema can be controlled if the cells are inflated correctly. A rocker sole distributes pressure evenly and sheering stress is limited. The Aircast can be used with the plastazote insoles supplied or a total contact insole can be inserted. The walker alters cadence and velocity, reduces activity and can achieve 65% reduction in plantar pressures (Armstrong et al, 2001)

Advantages

- Patients may remove Aircast when not weight bearing i.e. in bed
- It can be easily removed to allow inspection of the foot and leg
- It is easily applied

Disadvantages

- Rigid shell may not accommodate certain deformities e.g. Charcot joint.
- Visual impairment (the wearer may have difficulty in reading the gauge)
- Contra lateral limb may require a shoe raise
- The patient may remove the device and weight bear against advice
- The patient cannot not drive when wearing the Aircast
Scotch cast boots

The Scotch Cast Boot is a lightweight, well padded fiberglass cast that extends from just beyond the toes to the ankle and is worn with a cast sandal. This device has an expected healing times of 8-12 weeks (Armstrong et al, 2005)

Advantages

• It can be easily removed to allow inspection of the foot
• Especially useful in patients with multiple ulceration i.e. forefoot and rear foot
• Useful in the treatment of midfoot ulceration

Disadvantages.

• Contra lateral limb may require a shoe raise
• May cause other areas of trauma

Hope Walking Cast

The Hope Walking Cast (Williams 1994) is constructed of Hexalite (a heat moldable material) which is built around a total contact insole with a rubber sole. It is fastened with Velcro straps and is quite durable. The skills of a podiatrist or orthotist are needed to make the casted orthosis. It has been successfully used to heal plantar- neuropathic ulcers.

Orthowedge/Orthoheel Shoes

An orthowedge/heel is an orthoses which provides either forefoot or rear foot pressure relief. Plantar pressure reduction of up to 66% can be achieved. The device can help to reduce mean healing times of neuropathic ulcers to 10 weeks (Chantelau 1993). The upper section is a foam lined nylon mesh, which incorporates a padded dorsal flap with Velcro fastenings. This is designed to accommodate bulky dressings. The sole section provides either fore foot or rear foot pressure relief in the form of a wedge.
• Orthowedged healing shoe; The 10 degree wedged sole redistributes weight behind the metatarsal heads giving greater pressure to the hind foot whilst relieving pressure from the fore foot.

• Orthoheel healing shoe; These orthoses relieve pressure from the hind foot by avoiding any ground contact to the posterior aspect of the foot

• These devices will alter cadence, velocity and activity therefore careful assessment of the patient’s ability is needed.

Advantages
• Stock can be held within clinic
• Easily applied
• Easily removed for inspection of foot and dressing change

Disadvantage
• Patient’s balance may be compromised.
• The patient may remove the device and weight bear against advice
• The patient cannot not drive while wearing the device

Soft heel cast device
This is a removable casted device designed to offload pre-ulcerative and ulcerated posterior heels, and is worn at night time in bed.

Advantages
• Reduces direct pressure from posterior aspect of heel
• Reduces sheer and friction
• Easy to fit
• Lightweight
• Comfortable to wear
• Rapid supply

Disadvantages
• Not to be used for walking

PRAFO (Pressure Relief Ankle Foot Orthoses)
This is a custom made ankle foot orthoses which will control dorsi-flexion and plantar-flexion. In addition the device provides complete pressure relief around the heel and ankle. The sole is non-slip. The PRAFO can and should
be worn in bed. The toe extension prevents pressure and risk of injury to the toes. The liner encloses the foot and calf areas but leaves the calcaneal area free. The liner is washable. The PRAFO alters cadence, velocity and activity.

Advantages

- Stock can be held within clinic
- Easily applied
- Easily removed for inspection of foot and dressing change
- Lining can be easily changed when soiled

Disadvantage

- Patient’s balance may be compromised.
- The patient may remove the device and weight bear against advice
- The patient cannot drive while wearing the device

**Suitable deflective/cushioning pads**

It is not generally advisable to use adhesive padding because of the risk of trauma on removing dressings and the risk of infection however in some circumstances where other effective methods are not available its use is acceptable for short periods with close monitoring.

The above measures should be employed until foot ulcer is healed, prevention of reoccurrence is essential and pressure relief must be continued.

**Prevention of Recurrence**

Prevention hinges around Education and regular review of feet, footwear and insoles (Boulton, 2000)

Every patient should be assessed for stock/bespoke footwear with total contact insoles if required. To prevent recurrence of pressure areas patients must receive specific advice on their usage.

Patients should be recalled for footwear and orthotic review:

1. 1st Review approx 4-6 weeks after original fitting
2. Orthotic review 6 Months after 1st review
3. Podiatry review as appropriate to risk level
4. Patient must have contact telephone number incase of any problems

**Conclusion**
Pressure relief is one of the most essential elements in the prevention and treatment of diabetic foot ulcers. Patient knowledge, motivation and participation is an essential element of the overall treatment plan.

Summary


Stuart L, Berry M, Gordon H, Wiles P: The Manchester Martini Cast The Pennine Acute Hospitals NHS Trust


Acknowledgement is given to Podiatry Services, NHS Ayrshire and Arran for their contribution to this piece of work.