AOPA Evidence Statement no. 1:
The role of the orthotist in the management of diabetes related foot disease

Minimising ulceration and amputation through the early provision of pressure off-loading orthoses
About the Australian Orthotic Prosthetic Association

The Australian Orthotic Prosthetic Association (AOPA) is the peak professional body for orthotist/prosthetists in Australia. AOPA self-regulates the profession through the establishment of standards, codes and guidelines which are upheld by AOPA certified practitioners.

Our certified practitioners are qualified orthotist/prosthetists employed throughout the public and private sectors. They provide the full range of orthotic and prosthetic clinical care to support mobility, quality of life, rehabilitation, and participation goals of their clients.

AOPA’s mission is to self-regulate the profession to ensure the delivery of safe and effective orthotic and prosthetic care in Australia.

AOPA also has a role in member representation and the delivery of member benefits, which contributes to the growth of the profession, the shaping of clinical services and maintaining a profession of excellence.

For more information about the Australian Orthotic Prosthetic Association, visit www.aopa.org.au

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Key message

- Diabetes related foot disease imposes substantial and widespread mobility and health care costs to the individual and health care system.
- Foot ulceration is a common complication that marks the beginning of a cycle of re-ulceration, lower limb amputation and re-amputation.
- Pressure off-loading custom-made orthoses including non-removable and removable casts and orthotic walkers, which are evidence based interventions that reduce ulceration rates and improve healing time.
- Orthotists are the only allied health professionals qualified to provide the full range of lower limb orthoses for people with diabetes related foot disease.
- Reducing the rate of ulceration and lower limb amputation relies upon early access to orthotists in both the primary and secondary health care setting.

Diabetes in Australia

Diabetes is the epidemic of the 21st century\(^1\) affecting nearly 1.7 million Australians or approximately 5% of the population\(^1,2\). Over the last 20 years, the prevalence of diabetes has more than doubled\(^3\) and it is expected that by the year 2025 one in three Australians will develop diabetes in their lifetime\(^4\). Diabetes is the fastest growing chronic disease in Australia, increasing at a faster rate than conditions such as heart disease and cancer\(^1\).
Diabetes related foot disease

Diabetes related foot disease is a common complication of diabetes and up to 15% of people with diabetes, or a quarter of a million Australians, are expected to experience foot ulceration in their lifetime. There are many factors that contribute to diabetic foot disease and delayed ulcer healing, including peripheral neuropathy, foot deformity, peripheral arterial compromise and infection. Diabetes related foot ulcers have lengthy healing times and a high reoccurrence rate which may lead to lower limb amputation. Individuals with diabetic foot ulcers experience profound compromise of physical quality of life, which is worse in those with unhealed ulcers. In Australia, diabetes related foot ulceration is the leading cause of lower limb amputation, which in 2012 resulted in 3,570 amputations. Re-amputation is likely with a 50% chance of amputation in the remaining limb within the next 5 years.

The cost of diabetes related foot disease

Health costs associated with diabetes related foot disease are expected to increase; quadrupling between the year 2000 and 2051 if obesity and inactivity prevalence rates continue to rise. The cost of ulcer healing increases with severity and the cost of amputation is even higher. In a 2004 US study, the cost of healing a severe (Grade 5 Wagner) ulcer was estimated at AUD$18,000 and nearly 80% of this cost was attributed to inpatient stay. The average hospital costs of a diabetes related lower limb amputation has been estimated at between AUD$17,089 - $26,810. Given there were 3570 diabetes-related lower limb amputations performed in Australia in 2012, the direct or ‘hospital related’ cost of lower limb amputation can be estimated to be at least AUD$80 million per annum. This estimation is conservative as it does not include the costs of recurrent ulceration and amputation, or the indirect costs including rehabilitation, the fitting and supply of orthoses and prostheses, time lost from work and reduced health related quality of life.

Evidence based orthotic management of diabetes related foot disease

Given the cyclic nature of ulceration and amputation, a key focus in the management of the diabetic foot must be prevention and early treatment of initial ulceration. The gold standard management for diabetes related foot disease is an interdisciplinary team that is able to provide a range of interventions to address the many confounding factors that contribute to delayed ulcer healing, amputation and other complications. This team includes general practitioners, surgeons, nurses, podiatrists and orthotists, who provide education, wound care, medical treatment and pressure off-loading (pressure re-distribution or reduction) techniques. Accommodation of foot deformity and reduction of high plantar pressure is vital in the management and prevention of diabetic foot ulceration. Orthotists have the specialist skills and expertise to prescribe and manufacture custom-made pressure off-loading orthoses to redistribute pressure away from areas of ulceration or areas at risk of ulceration. These orthoses achieve an intimate fit over the surface of the foot with relief areas positioned precisely over specific anatomical areas requiring management. The effect of pressure off-loading techniques in the management of diabetes related foot have been subject to numerous studies.

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4 Estimated equivalent of US$27 721 based on 2004 exchange rate of 0.65
5 Australian study reported in AUD$ in the year 2000
6 Estimated equivalent of £10 531 (pounds sterling) based on 1992 exchange rate of 2.55 (Dutch study)
7 Calculated as 3570 multiplied by AUD$17 089 - $26 810 (the midpoint of the estimates AUD$17 089 - $26 810)
Cochrane\textsuperscript{21, 22} and systematic reviews\textsuperscript{23-30} with evidence based clinical practice guidelines regularly updated by the International Working Group on the Diabetic Foot\textsuperscript{20}.

**Orthoses for ulcer healing: non-removable and removable casts and walkers**

A non-removable knee-high orthosis is the gold standard treatment for off-loading diabetic foot ulcers\textsuperscript{18, 20}. This type of orthosis alters mechanical loading, effectively reduces plantar pressure and has been shown to heal ulcers more quickly than removable offloading orthoses, wound dressings or surgical off-loading techniques\textsuperscript{22, 23, 31, 32}.

In Australia, the most common non-removable orthosis is a Total Contact Cast or TCC, although a removable walker that has been rendered irremovable has been shown to have similar positive effects\textsuperscript{6, 18}. A TCC is a custom-made plaster of Paris and fibreglass cast that covers the leg and foot and is unable to be removed by the client. It requires replacement every 3-7 days depending on the condition of the ulcer and the leg, for the duration of ulcer treatment and soon after the ulcer has healed, which is usually 3-6 months\textsuperscript{32}. TCCs are not always appropriate for every client\textsuperscript{20} and therefore orthotists may instead prescribe removable offloading orthoses. Complications that might prevent use of a TCC include severe infection or ischaemia and ulcers with heavy exudate\textsuperscript{20}.

Removable walkers can be custom-made (a cast or negative impression of the foot and lower leg is used to fabricate an internal foot orthosis, cushioned liner and hard outer shell); or pre-fabricated and customized (a custom-made accommodative foot orthosis is included within a pre-fabricated walker). Removable walkers are often provided for more long term use and incorporate a rocker sole to minimize changes to the walking pattern. Removable walkers are as effective as TCCs at unloading the affected area, but the efficacy of healing may be compromised because they are removable\textsuperscript{19, 20}. Client adherence to wearing regimes is therefore essential to achieve successful ulcer healing\textsuperscript{20, 31}.

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*Figure 1: A Total Contact Cast, a type of non-removable orthosis*

*Figure 2: An orthotist applying a Total Contact Cast*
Orthoses for ulcer prevention: custom-made accommodative foot orthoses and therapeutic footwear

When wounds have healed and leg swelling has stabilized, any foot deformity and high plantar pressures must continue to be accommodated to prevent ulcer recurrence. Custom accommodative foot orthoses (specially designed shoe inserts) and therapeutic footwear (footwear that has been custom-made or customized to accommodate deformity) are recommended to ensure targeted pressure relief and reduced risk of re-ulceration.

The position of the Australian Orthotic Prosthetic Association

- Orthotists have the specialist skills and expertise to prescribe and manufacture custom-made pressure off-loading orthoses to redistribute pressure away from areas of ulceration or areas at risk of ulceration, and are therefore integral members of the multidisciplinary team for clients with diabetes related foot disease.
- Custom-made pressure off-loading orthoses are evidenced based interventions that prevent ulceration and positively affect ulcer healing.
- In Australia, orthotists are the only health care professionals who receive formal training in the provision of the entire range of custom-made orthoses, including pressure offloading orthoses used to prevent and heal diabetic foot ulcers.
- Early access to orthotists in both the primary and secondary health-care setting will improve outcomes relating to ulceration and amputation for people at risk of ulceration.

Figure 3: A custom-made accommodative foot orthosis
References


