

Orthotics Awareness Publication

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Orthotic Management of the Diabetic/Neuropathic Foot

Renowned diabetes researcher Dr. Debra Haire-Joshu once said that to know diabetes is to know health care itself. Similarly, for the certified orthotist, to know diabetes is to know lower extremity orthotics itself.

The American Diabetes Association reports that 8.3% of Americans have diabetes. That's 25.8 million children and adults. This wide prevalence means that much of any orthotic practice in North America consists of patients with type I or II diabetes and the spectrum of orthotic treatment and management is vast.

For the diabetic patient, complete and successful treatment of diabetes-related dysfunction comes from a collaborative team setting. The role of the orthotist in this setting should not be understated. Orthotic treatment is critical to improving neuropathic dysfunction of the ankle, preventing and treating ulcers and treating and preventing charcot deformities. Physiologically, diabetic individuals are at high risk for ulcer-type wounds, lower extremity amputation and foot/ankle deformities that are secondary to the inherent neurological and circulatory compromise. Risks for skin breakdown are further increased when deformed weight-bearing surfaces sustain increased pressures. While physicians are well-versed in the pathology and medical treatment of the disease, the orthotic treatment "tool box" remains largely unknown.

When it comes to orthotic management, there are many biomechanical goals the orthotist must achieve in both prevention and treatment. Prevention of pressure ulcers is the first line of



defence for the diabetic patient, and that begins with the correct fitting of diabetic-specific footwear. Generally, these have a sturdy construction with appropriate depth

and width at the toe box. A smooth, seamless interior and soft insole round out the key features.

A custom-fabricated, total-contact foot orthosis is a sound approach when combined with such diabetic-specific footwear. It is incumbent upon the certified orthotist to pay close attention to proper contours of the device so that high pressures are avoided and a more equal pressure distribution is achieved. Softer materials are chosen to assist with shock absorption and further modeling of the anatomical contours.



Biomechanical alignment is maintained so that mid-foot joints are not deformed under load, thus minimizing risks of charcot deformities. Together, the foot-orthosis-footwear combination is an excellent and generally accepted preventative protocol for any diabetic individual. Colagiuri and colleagues (1995) found that custom-made foot orthotics improved the rates of callus resolution, an indicator of abnormal pressure distribution in the foot. Although the primary outcome of this study was callus

resolution and not ulcer prevention, this does demonstrate modification of risk factors in normalizing plantar pressure distribution.



Neuropathic weaknesses, such as a flaccid drop-foot, are easily mitigated with the use of a custom-fabricated ankle-foot-orthosis (AFO). Similar attention to contour detail is paramount so that excess pressures from the device are avoided. There is a large scope of AFO designs employed to sufficiently treat the gait deficiency and is decided by the trained certified orthotist.



The goal of ulcer treatment is off-loading and pressure distribution. This may be achieved with the use of special pressure-reducing shoes or custom total-contact foot orthoses. In some cases, a total contact walking boot is fitted with off-loading detail built into the insole.



This is called a charcot-restraint-orthotic-walker (CROW) and can be highly effective.

For the charcot joint individual, more aggressive treatments are administered with the full-time use of a patellar tendon bearing AFO. This device is designed to off-load the entire ankle/foot and can support the deformity. Typically, the brace is worn until the inflammatory phase has subsided and bone recalcification has completed. At this point, foot orthoses/footwear may be employed to prevent and support the deformity.



Despite the many tools available to the certified orthotist, none is more important than regular collaboration with the complete care team. This consists of the primary physician, therapists, nurses and commonly other family members. Regular monitoring and inspection of wounds is essential for successful treatment; patient education on inspection and prevention is also vital. In many cases, regular maintenance and communication between a wound-care nurse specialist and the certified orthotist is a recipe for success.

As described by Heikki Uustal, "The orthotic team works best if a good balance of medical knowledge from the physician is combined with a good understanding of biomechanics and materials from the orthotist. The cooperative effort of these two key individuals from the orthotic team, and the sharing of knowledge among the other team members, ultimately will provide the most appropriate prescription for the orthosis and the treatment plan. The orthotic prescription then becomes a part of the road map to achieve the final endpoint of improved diabetic patient function".