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## Growing Needs

### **Pediatric orthoses improve results one step at a time.**

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The world of pediatric orthoses can be exciting, challenging and rewarding, all at the same time.

Clinicians have many options for foot and ankle braces to accommodate pediatric patient populations. But it's not just about finding a fit. To be successful, you also need to know how to work with younger patients to address their needs for orthotic intervention.

Each patient presentation is different. And it's important to remember that children aren't simply smaller adults. To treat their mobility issues, you need to pay attention to therapeutic goals and have an extensive knowledge of the options.

Patients we see for orthotic intervention often have a larger, more debilitating diagnosis, such as cerebral palsy. The poor muscle control and musculoskeletal imbalances typical of this patient group often make them a candidate for an orthotic device. Improving or maintaining a functional position, given varying degrees of spasticity, can be challenging.

Developmental delay is another common diagnosis that requires orthotic intervention. Orthoses can help maintain the foot and ankle in an appropriate biomechanical position to encourage normal patterns of muscle and bone development as a child grows. Low tone patients, such as those with Down syndrome and spina bifida, can also experience improved mobility from foot and ankle support. Degenerative diseases such as muscular dystrophy may require increasing levels of support with changing goals as the child ages.

Another issue facing pediatric patient populations is autism, which can manifest in sensory input challenges and a need for support to block unwanted patterns during gait.

Since each of these disorders has a different set of patient presentations, you should be able to recommend an orthosis that fits the patient, in terms of physical and social needs.

The two basic categories of orthoses for lower extremity treatment are off-the-shelf (OTS) and custom-fabricated braces. Within these categories are two types: ankle-foot orthoses (AFO) and foot orthoses. Both OTS and custom-fabricated devices have strengths and weaknesses that make them appropriate for specific patient presentations. An evaluation of your patient's long-term goals at the outset of treatment helps you identify an appropriate brace.

In general, OTS devices provide an appropriate intervention more quickly. These braces are typically used for short-term needs. Custom-fabricated braces offer multiple design and material options, and a greater degree of support and control, due to a more intimate fit.

### **Off-the-shelf AFOs.**

In some cases, a custom-fabricated brace may not be the best choice. A patient may present with mild gait deviations, or may have minor involvement that doesn't require the intimate fit of a custom-fabricated device.

OTS braces may cost less than their custom-fabricated counterparts, and they can be fit and delivered in a single visit, which speeds up the process. The goal is always to provide the best possible solution at the lowest level of support required to meet a patient's rehab needs.

Until recently, a large divide existed between the support and control offered by custom-fabricated and OTS devices. Clinicians usually had to compromise when fitting a patient. However, current custom-fit AFOs offer a precise fit and appropriate level of support. Recent advances have narrowed the OTS/custom-fabricated divide. It's now much easier to find an appropriate AFO for patients who previously landed somewhere between an OTS and custom-fabricated device.

### **Custom-fabricated AFOs.**

Custom-fabricated AFOs are prescribed for the majority of patients at our facility. These devices are tailored for the functional needs of a child and can maximize control with an intimate fit. They are also used when the patient expects to have long-term bracing needs.

General features of a custom-fabricated orthotic design include an appropriate level of support, maximum comfort and a design that encourages brace-wearing compliance. Devices with a wrap-around design can control foot and ankle alignment through the principle of total contact to maintain a corrected position, while distributing forces to maintain control. This design discourages edge pressure and provides better stability and comfort.

Flexibility is another important characteristic to pediatric orthoses. An overly rigid brace lacks the flexibility to move with a patient, which can lead to overcompensation of other joints and muscles, increasing the potential for discomfort or injury. In addition, AFOs that offer spring-like flexibility can be superior to rigid orthoses, if the goal is to improve gait. A small degree of plantar flexion, designed to allow a smooth transition from initial contact to mid-stance, can provide a more natural gait pattern and decrease compensatory stress on proximal joints.

In addition, a flexible toe shelf may promote normal terminal stance. This adjustment makes the difference between a device that contributes to appropriate gait and one that creates secondary gait deviations.

### **Foot orthoses.**

Foot orthoses are used by patients who exhibit a higher level of mobility. These patients tend to be less involved neurologically and need a lower degree of support or correction. If a foot orthosis offers an appropriate level of support, it's likely that an OTS device can fit a pediatric patient's needs.

These bracing options can address development needs. Children who need orthotic support are often working with a physical therapist to develop motor skills, and stretch and strengthen muscles.

Because these patient presentations aren't static, orthotic support must also change to meet children's needs as they mature and their skills progress. In addition, a physical therapist may be treating a pediatric patient's broader mobility issues, not just the foot and ankle issues.

With this ongoing relationship between a clinician and child, it's important for an orthotist and physical therapist to work together to meet overall therapeutic goals.

As part of therapy, an orthosis can enhance the patient's mobility improvements or address new challenges. A brace can also be used to meet the patient's changing needs for foot and ankle support.

The clinical team should be prepared to re-evaluate the brace design each time a child outgrows a device. The ongoing goal is to provide bracing that enhances a patient's own abilities and minimizes unwanted secondary effects.

You should also be prepared to offer brace fitting tips. Small children probably won't be able to don an orthosis. Therefore, you need to educate the parent or caregiver on how to do this properly and make sure they can assess fit.

Because children grow and mature quickly, the expected useful life of a brace is approximately 1 year. To maximize this timeframe, O&P clinicians can size the device to create room for the child to grow by leaving approximately one-quarter of an inch of extra room at the end of the toes. As the patient grows, you can add toe pads to increase length. You can also increase volume by heating and flaring the device.

In addition, altering trim lines as a patient develops more range of motion and voluntary muscle control can improve brace function to fit the patient's needs. And lowering the trim line late in the brace's life cycle can be a useful diagnostic tool to determine the appropriate characteristics of the patient's next brace.

In modern orthotic treatment, clinicians have a wider variety of bracing options. The treatment team must have extensive knowledge of these choices to maximize a patient's positive outcome. Pediatric bracing can be challenging, and it requires patience and fortitude. But it's also rewarding to offer children the freedom of mobility and play a role in maximizing their physical potential.

## Reference

1. Brunner, R., Meier, G., & Ruepp, T. (November/December, 1998). Comparison of a stiff and a spring-type ankle-foot orthosis to improve gait in spastic hemiplegic children. *Journal of Pediatric Orthopaedics*, 18(6), 719-726.

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