

Team Approach: The Biomechanical Gait Analysis Clinic

These podiatrists created a successful inter-disciplinary team.

By Ellen R. Delisio

Dispensing orthotics is such an integral and consistent part of most podiatry practices that many DPMs rely on the same procedures and resources they have used for years. A practice in Massachusetts has found that a team approach that pulls in different specialists to assess a patient's foot type and movement results in better outcomes for patients—and results in more patients as well.

Louis DeCaro, DPM, and his partner, Daniel P. Paknia, DPM, operate a Biomechanical Gait Analysis Clinic at one of their three offices as part of the DeCaro Total Foot Care Center (www.DeCaroPodiatry.com.) At the clinic, patients are assessed by a variety of specialists at different stations before the orthotics are created. Not only do the patients get better orthotics, but the practitioners are able to determine how the

patient's foot condition could be causing other problems, such as hip, back or knee pain.

"Patient care is so much more comprehensive in the clinic and it the work in the clinic increases patient flow," said DeCaro, who specializes in biomechanics and pediatrics. "And it does boil down to patient care—you get better care if you are seen by a team. Because patients get such good care, referrals increase and other specialists see you doing this." The multi-disciplinary approach has many other benefits for the patient and podiatrist as well, including growing the practice. "The interdisciplinary gait clinic that I instituted in my practice has facilitated a five-time growth in my patient base since its inception four years ago," DeCaro said.

The assessments at the clinic help differentiate DeCaro from other practitioners and can also bridge the gap between podiatrists and the competition in the orthotics world, such as orthotists, pedorthists, chiropractors and physical therapists. Additionally, the clinic helps to educate the community about what a podiatrist actually does. Most importantly, the more extensive evaluation can result in



DeCaro and Bastedo observe a child walking as part of the evaluation.

a superior orthotic and better patient outcomes.

Foot-Typing

As part of the evaluation process, DeCaro relies on a foot-typing concept outlined at www.whatsmyfoottype.com when he examines patients. (DeCaro also is part owner of the RX24 Quadra Step company listed on the Web site.) The site has a tutorial about the 24 different foot types that are subdivided into six major categorical groupings of four, known as quads. Podiatrists routinely only see two of these six groupings, DeCaro said, known as the D and F quad groupings. Both of those types cause conditions related to

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DeCaro (center) talks with orthotist Frank Tweyffort (left) and pediatric physical therapist Christine Sharkey (right).

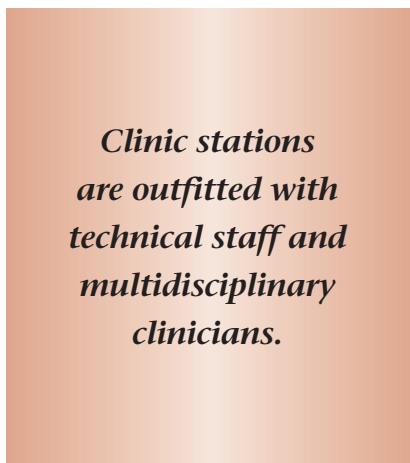
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the hypermobile flat foot. Some early studies indicate that congenitally only 20 percent of the population has the D and F foot types. "Of course, due to the nature of the symptoms associated with these foot types, these are the patient types that are most commonly referred to a podiatrist," noted DeCaro.

The other four foot groupings described in the tutorial represent the remaining 80 percent of the population. While people with these foot types may have pain resulting from improper foot biomechanics, their discomfort may manifest itself in areas outside of the foot such as the lower back, hip, knee or shins. These are conditions that typically are referred to orthopedists, chiropractors and physical therapists, although the root of the problem is in the feet. These are the patients best served by the clinic.

"Performing interdisciplinary

clinics allows the podiatrist an opportunity to educate ancillary service practitioners about the foot, while also giving us access to a larger patient base, such as the re-



maintaining 80 percent of the population with symptoms that we as podiatrists are missing out on," said DeCaro.

Once DeCaro identifies which one of the 24 foot types outlined in the foot-typing system applies

to a patient, he uses that information to guide his assessment and treatment. One aspect he considers is the clinical impact of the foot type on muscle function while a person is walking, according to DeCaro, to possibly anticipate how that foot type could affect a patient's other muscles as time goes on (Figure 1).

Also working at the clinic is Roberta Nole, who is owner of Stride Custom Orthotics and Stride Physical Therapy and Pedorthic Center in Middlebury, Connecticut. Nole is the creator of the 24 foot typing system and DeCaro's partner in the Rx24 Quadrastep System.

The clinic has six stations where patients are evaluated. Clinic stations are outfitted with technical staff and multidisciplinary clinicians. Each patient takes about one hour to complete the stations. This hour gives DeCaro a wealth of information that he can review as he oversees the operation as a

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whole. Yet the fact that he is able to deploy so many experts at once allows many patients to pass through the clinic each day.

Each patient is screened prior to attending the clinic to learn family and medical history. Once the patient is determined to be a candidate for the clinic, DeCaro starts the patient education process. Each patient is given a comprehensive 16-page booklet outlining the stages of the clinic, the importance of orthoses and tools to help patients understand the purpose of orthotics. Also included in the booklet is information on how to select and break in shoes, as well as links to educational sites to help each patient learn about his or her foot type and how it affects them. They are not just coming in, getting cast, being handed a pair of plastic inserts, and being sent on their way. "Education is the cornerstone of a successful podiatric orthotic program. The more the

patient knows, the more confidence s/he has in us as doctors. That translates into instant success for both of us," DeCaro said.

Patients spend time at each of these six stations:

- **Tracing the feet.** At the initial station, patients stand on a blank sheet of paper with their feet pronated 4-to-6 degrees away from their sub-talar neutral position. A clinician carefully traces the outer perimeter of the foot, notating the sulcus of the toes, and the first and fifth MPJ's. This semi-pronated position provides the fabricator of the orthotic device with valuable information regarding tissue expansion and the splay of the foot that will likely occur when a patient is wearing new orthotics. The tracings are of particular value in determining heel cup width and placement of metatarsal pads and cut-outs. This foot tracing method may be used in conjunction with ink mat impressions, which in themselves do

not always give reliable foot perimeter measurements, but do add value in relation to revealing high pressure areas of the foot.

- **Photographing the feet.**

This is done in a weight-bearing stance. Digital photos are taken in both sub-talar neutral and resting calcaneal stance position. Additional photos are taken of the front and back of the feet, as well as the arches on occasion, if they do not appear in the first two photos.

- **Videotaping the gait cycle.**

Each patient is digitally videotaped as he or she walks on a treadmill for approximately 30 seconds. The patient is encouraged to walk as naturally as possible with a normal stride length at a speed of approximately 2-3 miles per hour. The digital video can be relayed in slow motion or frame by frame. Reviewing the details of each phase of gait reveals the specific impact the foot has, not only on the joints of the

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foot, but also its influence on the hip, knee and pelvis.

• **Comprehensive Gait Evaluation.** DeCaro and invited and attending providers, including pedorthists, physical therapists, chiropractors, and massage therapists, review the patient's gait. This review includes measurements, thorough gait analysis, and structural evaluation of the patient. "Any idiosyncrasies of the patient are factored into the discussion until the patient is completely and thoroughly examined in regard to orthotic fabrication," DeCaro said. The patient may receive instructions for therapy exercises to help achieve symmetry and proper muscle function. This is DeCaro's favorite part of the clinic experience. Part of the success of the clinic owes its attributes to the fact that DeCaro openly invites the other specialists to attend with their patients and join in the multi-disciplinary approach. "It's a win-win for me and the patient," DeCaro said. "We also evaluate factors such as the amount of talar shift, calcaneal-to-floor alignment, arch height, midfoot sag (mfs), talonavicular shelving, tibial position at heel strike, retrocalcaneal bumps and infracalcaneal fat pad dispersion," according to DeCaro.

"When we first started, patients had bunions and hammertoes. Now they have knee, back and hip problems, and want to see if they can be treated conservatively. In some cases, patients were able to avoid knee or hip surgery after a biomechanics analysis. If you give support to the knee on one side, maybe you can avoid knee replacement. We are showing other specialists in the area how to look at feet." Too few podiatrists consider the biomechanics of other foot conditions such as toenail fungus or in-grown nails, DeCaro maintains.

• **Prone Position Plaster Casting.** Staff members trained in alternative casting methods of the foot obtain non-weightbearing plaster foot impressions following the instructions of the biomechanical examiner. DeCaro says that successful orthotic outcomes are contingent upon utilizing the proper casting method. "Not all feet respond optimally to the longstanding sub-talar neutral foot positioning, especially when treating the pediatric population." According to DeCaro, the traditional subtalar neutral casting method works well only for those adult and pediatric patients who are able achieve proper mid-tarsal joint locking, such as the A, B, C, and E foot groupings. Other patients with hypermobile foot types such as the D and the F quad foot groupings may require alternate casting measures.

• **Footgear Station and Pedorthic Consultation.** A pedorthist who specializes in foot gear provides each patient with comprehensive consultation. "The patient is educated thoroughly about shoes, what shoe is best for the patient, and why and how to properly find and fit quality, appropri-

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ate shoes," DeCaro added. Part of the education that DeCaro also provides is an ever-changing handout for each patient that outlines shoe gear models by brand and which of those are proper for each individual patient's foot grouping,

"This dramatically affects my success rate treating patients," DeCaro said about the clinic approach. "I was never trained to look so comprehensively at the whole body. This gives me more time with patients and helps me to solve some problems I couldn't diagnose in a 15-minute visit."

DeCaro specializes in pediatrics and tries to learn as much as he can about the family's history when treating a young patient. "I invite the family in—the parents or kids of patients—so I'm able to evaluate genetic predispositions and find things that need to be treated. Once you talk to the family and learn their foot type, it all

comes together."

Flat feet and growing pains are the primary concerns for children, and often those problems are misdiagnosed, which can lead to more problems later on. "Every adult problem with the exception of trauma has its roots in childhood," DeCaro noted. "Most problems are biomechanical. Kids' feet are neglected. They are often not considered in the children's future and should be, especially if parents or grandparents had foot, knee or back problems."

DeCaro started the clinic after meeting with physical therapists at Cooley Dickinson Hospital and offering to lecture to groups of physical therapists about the foot. He also volunteered to see patients alongside physical therapists. "It's amazing how little we know about each other's specialties," DeCaro said. "Usually we are in competition. I also went to the rheumatology group and lectured on biomechanics of the foot and they ate it up."

He also suggested speaking to physical therapists and hospital staff members about the benefits of having a variety of practitioners assess patients. DPMs can suggest to the local hospital staff that the hospital fill a niche by becoming the place in the community for lower extremity biomechanical gait analysis. He and Nole now lecture across the country about expanding and enhancing the orthotics program in podiatric practices. As part of his own start-up effort, DeCaro invited other specialists to his office to observe his work and learn about podiatry. "If you have a large common area, arrange for other specialists to come in." ■



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