

# Pediatric Foot & Ankle Deformity Management with Serial Casting: Why & How



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A TUTORIAL FOR 6 CLINICIANS IN SENSATIONAL TELLURIDE, COLORADO

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## Course Description

**LEVEL: INTERMEDIATE** – Precourse readings and review materials are assigned in order to open more contact time for labs and videotaped cases. Enrollees are expected to arrive prepared.

**TARGET AUDIENCE:** This course is designed for the practitioner who has experience in working with children with CNS neuromotor dysfunction, including physical therapists, orthotists, pediatric orthopedists, and physical medicine and rehabilitation physicians. We believe that team education fosters more effective teamwork.

The content covered in this program includes the following topics:

- The emerging sciences of postural control acquisition and maintenance, including the role of the somatosensory system as it is currently understood in relation to load-bearing alignment of the torso, lower limbs, and feet.
- Foot and ankle functional anatomy, biomechanics, development, and pathomechanics in relation to body weight orientation over the base of support and to designing orthotic modifications to optimize foot development and function.
- Postural control deficits and body weight distribution on the foot in standing and walking as causative factors in contracture formation.
- Muscle and soft-tissue adaptation to chronic use of compensatory postural control mechanisms.
- An update on the role of spasticity in equinus deformity development.
- A review of conservative strategies for contracture reduction and management.
- The kinesiology and pathokinesiology related to - and in support of - the safe and effective use of below-knee casts and a variety of orthotic interventions designed to improve postural alignment and control and to reduce developmental, flexible foot and ankle deformities that commonly develop in the presence of central nervous system dysfunction, hypotonia, and ligament laxity in childhood. Discussion of orthotic options includes Elaine Owen's Tuned AFO/Footwear Combinations, heel lifting and weight-line training, orthotic posting and foot packaging principles and strategies, positioning, resting splints, stretching, and serial casting.

Common developmental foot deformities are identified and described in terms of plane-based anatomical components. Musculoskeletal assessment procedures are reviewed as the findings lead the clinician to a systematic clinical decision-making process regarding orthotic design in terms of desired load-bearing foot and limb joint alignment, magnitude of segment enclosure, degrees of freedom provided or restrained, and posting options. Soft-tissue extensibility findings are also used in the documentation of the effects of assorted orthotic intervention strategies.

Lab sessions feature closely-supervised trials of several ankle and foot assessment procedures, with findings applied to orthotic posting and design. Materials will be provided for an introductory practice lab on undertaking on-site posting trials to preview effects of proposed orthotic modifications, and for a day of training in fabrication of 3 types of below-knee cast: plaster and SoftCast combination, FlexCast, and a removable footboard-Flexcast combination.

**BONUS:** Tutorial attendees are welcome to undergo TheraTogs Fitter Certification training after hours at no additional cost. This training is optional.

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## Course Objectives

### **Participants completing the *seminar portion* of this course are expected to be able to:**

- Describe, in plane-based terminology, the motions of the joints and various bones of the foot in the open and closed kinetic/kinematic chains.
- Discuss the relationship between joint alignment and related muscle function in terms of joint axis inclination, muscle and loading force vectors, lever arms, and resultant moments.
- Describe the role of the foot and ankle sensory receptors and weight distribution on the foot in the achievement and maintenance of postural control in standing and gait.
- Explain the clinical rationale for using specific assessment techniques to identify features of soft tissue extensibility, joint mobility, and structural alignment in the ankle and foot.
- Discuss the reported reliability and validity of common clinical tests for spasticity.
- Distinguish between spasticity, connective-tissue contractility, and soft-tissue transformation, and discuss management implications.
- Discuss the physiology and functional significance of R1 (first-catch) end range of motion.
- Explain the physiologic and structural changes that are known to occur in chronically over-recruited muscle and surrounding tissues following a history of recruitment for maintenance of verticality.
- Distinguish between dominance and strength within a muscle force couple.
- Upon discovering a dominant muscle, name 3 related areas of concern.
- Describe orthotic posting in sagittal and frontal planes, and discuss posting objectives.
- Discuss the purposes of weight line training in foot and ankle deformity management re proprioception and muscle recruitment strategies used for postural control.
- Name 5 features that identify a sound developing foot.
- Identify the deformities of the foot and ankle that occur most commonly in children or adults with CNS upper neuromotor dysfunction, and describe the components of illustrated deformities at each joint in plane-based terms.
- Determine whether a deformity meets the criteria for intervention with heel-posting in ankle plantarflexion, serial casting, an R-wrap© orthosis, stretch splinting, and/or positioning.
- Explain the rationale for instituting strengthening and range-maintenance measures after restoring soft tissue extensibility.
- Discuss the limitations of stretching exercise as a deformity management tool.

### **Lab participants** are expected to be able to:

- Achieve novice skill level in musculoskeletal assessment of the ankle and foot in the open and closed chains.
- Bring the principles of orthotic posting to the findings obtained in assessment lab, and formulate an orthotic design plan.
- Demonstrate novice skill in undertaking an informed, targeted, temporary and exploratory posting trial.
- Demonstrate novice skill level in the fabrication and posting of 2 types of below-knee cast used for contracture reduction.