Part 1: New Paradigms in Pediatric Foot & Ankle Deformity Management – A 2.5-Day Program

Part 2: LABS: Foot & Ankle Assessments, Posting Trials - A 2.5-Day Program

Course Description

Level: Intermediate – Precourse readings and review materials are assigned – 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.
- Body weight distribution on the foot and through load-bearing joints as a causative factor in contracture formation, early onset of pain, and degenerative joint disease.
- Muscle physiology and pathophysiology in the presence of chronic use of compensatory postural control mechanisms while distinguishing spasticity from connective–tissue contractility and muscle transformation.
- Skeletal modeling mechanisms underlying the process of use-related ankle and foot development.
- Characteristics of and factors contributing to healthy foot development.
- Elements of gait development that relate to and support foot development.
- The kinesiology and pathokinesiology related to - and in support of - the safe and effective use of below-knee casts and 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.
- Hypoextensibility management is distinguished from the alteration of movement strategies, and includes discussions of interventions such as positioning, resting splints, manual stretching, neurolytics, 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.

Labs feature closely-supervised trials of several ankle and foot assessment procedures, with findings applied to orthotic posting and design. Assessment tools and materials will be provided for undertaking posting trials to preview effects of proposed orthotic modifications.

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 R_1 (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.

Participants completing the *lab sessions* of this course are expected to be able to:

- Demonstrate novice skill level in musculoskeletal assessment procedures 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.
- Participate in a workshop designed to generate ideas for promoting optimum body COM distribution over the feet in standing and walking.

Program Schedule

Day 1: Part 1 - Seminar

8:15	Register and settle in.	2:00	Short Break
8:30	Review of Functional Foot Anatomy & Closed-Chain Function	2:15	Muscle Balance Theory – Application to Pediatric Foot Deformity Management
9:30	Standing Lab	3:15	Development & Assessment of Ankle DFROM
9:45	Break	3:45	Short Break
10:15	Kinematics Feed Kinetics – Ideal Ankle & Foot Function in Gait	4:00	Sagittal Plane Posting – Rationale & Strategies
11:15	The Somatosensory System in Postural Control Acquisition & Maintenance	4:45	Videotaped Case - Max
		5:00	Questions & Discussion / Review of Planar Motions and Deviations
12:00	Lunch		
1:00	Postural Control Deficits and Contracture Formation - Are they Related?	5:15	Adjourn

Day 2: Part 1 – Seminar

8:30	Foot Assessments: Videotaped Demo - Review of Pathomechanics & Posting Options	2:00	Short Break
10:00	Break	2:15	Hypoextensibility Management Strategies
10:30	Orthotic Posting Options – continued	2:45	Name That Foot Deformity!
11:00	Healthy Foot Development & Loading	3:45	Short Break

12:00	Lunch	4:00	Videotaped Case - Matthew
1:00	Features of Gait Development	5:00	Questions & Discussion
		5:15	Adjourn

Day 3: Part 1 (AM): Seminar & Part 2 (PM): Foot Assessments Lab *(bring shorts today)*

8:30	Serial Casting: Precautions, Contraindications, Limitations, and Guidelines	12:00	Lunch - *Part 1 Attendees, please turn in evals.* *Thank you, & safely home*
9:15	Making Targeted Orthotic Design Decisions		
10:00	Break	Part 2: Lab Sessions	
10:30	Making Targeted Orthotic Design Decisions, continued	1:00	LAB: Open-Chain Assessments – Foot Design & Joint Mobility *Break food available – no formal break*
11:15	Videotaped Cases	5:30	Clean up and adjourn

Day 4: *(bring shorts and shoes with insoles today)*

8:30	LAB: Open-Chain Assessments – Foot Design and Joint Mobility – Repeat with a new partner *Break food available – no formal break*	1:30	Repeat Closed-Chain Assessment on Other Foot
		2:00	LAB: Post your 2nd partner's shoe insert using the findings.
11:00	LAB: Closed-Chain Foot Assessments	3:00	Pediatric Case Presentation – Foot & Ankle Assessment Demonstration & Posting Trial (if possible)
12:00	Lunch		
1:00	Posting Demonstration	5:00	Adjourn

Day 5 –Part 2: Pediatric Assessments & Posting Lab

8:45	Set up for lab with children.	1:00	Workshop: Designing Weight-Line Training Strategies for Clinic & Home
9:00	LAB: Pediatric Foot & Ankle Assessments & Posting Trials. 3 Attendees per child.	2:00	DEMO: Below-Knee Cast Fabrication & Posting
		4:00	Clean up, turn in evals
12:00	Lunch	4:30	Issue Certificates of Completion & Adjourn

Thank you, and safely home.