



New Paradigms in Pediatric Equinus Deformity Management

A One-Day Review of Sciences & Strategies for Optimizing AFO's

Course Description, Objectives, and Schedule

LEVEL: Beginner and Intermediate

TARGET AUDIENCE: Rehabilitation team members, including orthotists, physical therapists, physical medicine and rehabilitation physicians, and pediatric orthopedists.

Course Description

The landscape of considerations of ankle function in balance and gait, and of strategies for managing ankle plantarflexion contracture - i.e., equinus deformity - is changing to embrace the roles of the somatosensory system and postural control both as causative factors and intervention strategies. Instructor reviews the relevance of ankle function in postural control and in gait, and discusses the physiology of muscle transformation and the role of spasticity in contracture formation.

The content features challenges to the rationale and effectiveness of common equinus deformity intervention paradigms including stretching, blocking ankle plantarflexion at 0° with orthoses, injecting the gastrocnemius muscle with toxin, and surgically lengthening any aspect of the triceps surae muscle-tendon unit. Instructor presents new orthotic and training strategies, based upon the work of Shirley Sahrman, Mary Weck, and Elaine Owen, with emphasis on children with pyramidal-types of cerebral palsy.

Course Objectives

Upon completing this program, attendees are expected to be able to:

- Define postural control and an antigravity righting reaction.
- Discuss the developmental changes in weight distribution through the foot in standing position.
- Describe the stance phase rockers.
- Define gait kinematics and kinetics.
- Discuss the variance in tibial and femoral inclination rates during the stance phase of gait.
- Explain the contributions of the triceps surae muscles to gait kinematics and kinetics.
- Describe normal developmental changes in ankle DF ROM as measured in prone with foot joints congruent.
- Discuss the physiology and functional significance of normal and pathologic R1 (first-catch) and the modulus of stiffness to R2 (maximum) end ranges of DFROM.
- Define relative hypermobility and give 3 examples in equinus deformity.
- Define muscle dominance vs. muscle strength in the presence of a muscle force couple imbalance.
- Discuss the proposed reordering of common interventions for equinus deformity according to S.A. Sahrman's Muscle Balance Theory.

- Using Sahrman’s principles, explain the flaw in using stretching, toxin injections, or surgical lengthening to weaken the ankle plantarflexors in equinus deformity.
- Explain the rationale for “tuning” the orthosis and shoe, and suggest three tuning strategies for implementing the new equinus deformity management paradigm.
- Explain the purpose of managing orthotic degrees of freedom.
- Describe the components of a weight-line and weight-shift training program and the necessity for implementation with tuned orthotic interventions.

Program Schedule:

| Start | Topic | Contact hours |
|-------|---|---------------|
| 8:00 | Registration | -- |
| 8:30 | Introduction – What have we been doing about equinus deformity (EQD) prevention and management? How has it been working? | 50 |
| 9:00 | Controlling the body center of mass (COM): Contributions from somatosensory receptors & massed practice of preliminary skills to effective upright postural control | 1.00 |
| 10:00 | Short Break – 15 minutes | -- |
| 10:15 | Gait Kinematics Feed Kinetics: Ideal Ankle and Foot Function in the Stance-Phase Rockers | .75 |
| 11:00 | Connecting Postural Control Problems and Somatosensory Deficits to Equinus Deformity (EQD) Development | .50 |
| 11:30 | Sahrman’s Approach to Muscle Imbalances: Implications in Equinus Deformity Management | .50 |
| 12:00 | Lunch | -- |
| 1:00 | Ankle ROM Assessment: Proposed Method & Relevance of R1 and Stiffness | .75 |
| 1:45 | Posting (i.e. “Tuning”) Modifications for EQD: Rationale and Strategies | .75 |
| 2:30 | Short Break – 15 minutes | -- |
| 2:45 | The Place for Serial Casting in the New Paradigm for EQD Management | .50 |
| 3:15 | Case-Based Review of Orthotic Designs for Neuromotor Re-education | 1.00 |
| 4:15 | Hypoextensibility Management Using Physiologic Adaptation | .25 |
| 4:30 | Short Break – 15 minutes | -- |
| 4:45 | Videotaped Case | .50 |
| 5:15 | Questions & discussion | .25 |
| 5:30 | Turn in evals and adjourn | -- |
| | Didactic Contact Hours: | 7.25 |

Instructor Bio - Beverly (Billi) Cusick, PT, MS

Education:

1972 - BS in PT from Bouve College at Northeastern University (Boston) in 1972, summa cum laude.

1988 - MS in Clinical and College Teaching for Allied Health Professionals - Univ of Kentucky.

Work experience:

- 1 year – PT staff at (now) Spaulding Rehabilitation Center, Boston, MA
- 3 years – PT staff and Director for UCP Center, Lawrence, MA
- 9 years - PT staff at Children's Rehab. Center (now, Kluge Center), Charlottesville, VA.
- 3 years - PT Education faculty, College of Health Related Professions at MUSC, Charleston, SC, and Director of PT Services for the Div. Of Developmental Disabilities at MUSC.
- 1 year, consultant, Cardinal Hill Hospital's Head Trauma & Pediatrics teams – Lexington, KY.
- 4 years, assisting in the PT Department at Children's Hospital at Stanford, Palo Alto, CA.
- 23 years in private practice.

Publications:

- Help Patients Manage Equinus Deformity. *O&P Business News*, 2011; April: 74-77.
- Orthotic Management of Low-Toned Children: The Earlier the Better. (Co-author). *O&P Edge*. 2011; Apr: 24-29.
- *Serial Casting and Other Equinus Deformity Management Strategies for Children and Adults with CNS Dysfunction* (2010) by Beverly Cusick, published by GaitWays.
- *Foot Talk* (2009), a 2-hour lecture on functional foot anatomy and closed chain biomechanics, accompanied by a set of Power Point handouts of the same lecture.
- *Serial Casting for the Restoration of Soft Tissue Extensibility in the Ankle and Foot (2007/2009)* text.
- *Legs & Feet: A Review of Musculoskeletal Assessments* (1997, revised 2005), instructional DVD.
- *Lower Extremity Developmental Features* (2000), a home study monograph for the APTA's Orthopedic Section.
- *Progressive Casting and Splinting for Lower Extremity Deformity in Children with Neuromotor Dysfunction* (1990), a full-length text.
- Several textbook chapters, articles for journals, conference proceedings, and professional newsletters, including a series (2006 and 2007) on Pediatric Orthopedics for the *NDTA Network*.

Clinical Teaching:

Guest lecturer for annual conferences of the APTA, the NDTA, and the American Academy of CP and Developmental Medicine, in the US and Canada; the British Association of Prosthetists and Orthotists; and the American Academy of Orthotics and Prosthetics. Instructor of more than 450 courses, by invitation only, in 18 countries.

Associate Professor for the Rocky Mountain University of Health Professions – Pediatrics Program – Provo, Utah, 2006 to present.

Since 1993 Ms. Cusick has been consulting and practicing privately in Telluride, Colorado. There, she devotes most of her professional effort to generating literature and educational materials, teaching, and developing therapeutic products, including her invention, TheraTogs orthotic systems.

A curriculum vita is available upon request.