



Developmental Orthopedics of the Trunk & Lower Extremity

A One Day Review of Operating Processes With Implications for Management

Course Description, Objectives, and Schedule

LEVEL: INTERMEDIATE – Pre-course readings are assigned.

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

LEVEL-INTERMEDIATE. Pre-course readings are assigned. Attendees are expected to arrive prepared.

Course Description

This intermediate-level program features an overview of somatosensory function and development, the role of postural control in movement acquisition and physiologic adaptation, skeletal modeling mechanisms and influences, and ideal and pathomechanical features of orthopedic development of the trunk and lower extremity. The content pertains primarily to the torso and lower limb segments proximal to the foot.

Normal developmental events are related to:

- The operations of the somatosensory system
- Postural control acquisition and body weight management
- Biomechanical influences of full-term gestation
- Functioning postural and limb joint alignment
- Elements of Sahrman's approach to analysis of the Movement System
- The process of physiologic adaptation of bone, soft tissues, and the sensorimotor cortex

Deformity development is discussed in relation to:

- Spasticity
- Ligament laxity
- Premature birth
- Movement strategies in the presence of inadequate postural control and innate righting reactions
- Use history in postural malalignment
- Skeletal modeling errors

Management strategies are related to:

- Body weight distribution onto the functioning base of support
- Functioning joint alignment and related muscle lengths
- Weakness

- Skeletal modeling potential
- Musculoskeletal assessment findings.

Selected musculoskeletal assessments are described and the implications of their findings are brought to therapeutic and orthotic management planning with the goal of optimizing functioning postural alignment and control in order to optimize musculoskeletal and sensorimotor use history. Strategies include principles of tuning ankle-foot orthoses and using TheraTogs™ Orthotic Undergarment and Strapping Systems. The relevance of the findings obtained in the musculoskeletal assessment to target selected interventions is made evident in videotaped cases.

Course Objectives

Participants completing this course are expected to be able to:

- Identify these features of immaturity of skeletal structure and alignment: increased medial femoral torsion, medial leg and foot rotation biases, genu varum, and ankle valgus.
- Discuss the influences of normal neonatal limb joint alignment and soft tissue constraints on skeletal and motor development.
- Distinguish between strain and load, and apply this distinction to the skeletal modeling process.
- Describe the modeling effects of functional history of experiencing compression, tension, cantilever flexure, and loaded, torsional torque strains, and relate this information to intervention strategies.
- Describe the source of postural symmetry in supine and prone positions at age 4 months and explain its relevance to orthopedic development.
- Relate ideal, full-term neonatal posture and joint alignment to the modeling of the spine in the sagittal plane.
- Relate ideal, full-term neonatal posture and joint alignment to postural control acquisition in prone and supine positions.
- Relate ideal, full-term neonatal posture and joint alignment to the achievement of competent weight shifting in the frontal plane.
- Explain the relationship between frontal-plane weight shift skill, the swing limb torque generator, and long bone torsion reduction in the lower extremities.
- Explain the impact of Level 1 (basic) direction-specific postural the swing limb torque generator responses on the development of common contractures in ambulatory children with cerebral palsy.
- Referring to the active and passive muscle length-tension relationships, describe a muscle imbalance, and differentiate between muscle dominance and muscle strength.
- Explain the objective of inserting a heel lift under a plantarflexed ankle in children with equinus deformity, and describe strategies for improving weight distribution and sensory input through the heels.
- Explain the principle of relative hypermobility strain in the presence of a soft tissue contracture or a skeletal malalignment, and provide 2 examples.

Program Schedule

| Start | Topic | Contact Hours |
|-------|---|------------------------------|
| 8:00 | Register and settle in | -- |
| 8:30 | The Somatosensory System in Postural Control and Orthopedic Development | .50 |
| 9:00 | Elements of Sahrman's Movement System Analysis in Orthopedic Development | .50 |
| 9:30 | Skeletal Modeling Mechanisms - The Role of Balance & Movement in Shaping the Lower Extremities | .50 |
| 10:00 | Short Break – 15 minutes | -- |
| 10:15 | Overview of Developmental Changes in the Spine and Lower Extremities | .25 |
| 10:30 | Biomechanical Advantages of Full-Term Gestation in Orthopedic Development | .50 |
| 11:00 | Weight Shifting & Walking as Bone & Joint Modeling Mechanisms | 1.00 |
| 12:00 | Lunch | -- |
| 1:00 | Typical Soft-Tissue Extensibility Changes in the Lower Extremities During Development – Evidence of Use History | .50 |
| 1:30 | Contracture Formation - Evidence of Spasticity or of Use History? | 1.00 |
| 2:30 | Short break – 15 minutes | -- |
| 2:45 | Common Lower-Extremity Modeling Errors & Assessments | .75 |
| 3:30 | Short break – 15 minutes | -- |
| 3:45 | Resume Common Lower-Extremity Modeling Errors & Assessments | .75 |
| 4:30 | Videotaped Case Presentations | .75 |
| 5:15 | Questions / Discussion | .25 |
| 5:30 | Adjourn | Didactic Contact Hours: 7.25 |

Attendees will be given a test at the end of the day. If they wish to be graded on the test, they are to complete the test and send it to Instructor within 3 days of the Course. Instructor will return the graded test to attendee via email within 7 days of receipt.

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 and 2009) a text.*
- *Legs & Feet: A Review of Musculoskeletal Assessments* (1997, revised 2005), an instructional videotape.
- *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 400 courses by invitation only in 18 countries.

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

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

A curriculum vita is available upon request.