



# Pediatric Neuromotor Rehab Using Orthotic Modifications & TheraTogs Orthotic Systems



Sponsored by:



**Contact:**  
Hannah Bridges  
[hbridges@newlifechurch.tv](mailto:hbridges@newlifechurch.tv)  
(501) 908-2679  
Dee Smith  
(501) 472-4923

**Instructor:**  
Beverly Cusick, PT, MS, COF

**TARGET AUDIENCE:** Ms Cusick is committed to the fostering of collaborative and educated team management of people with complex neuromotor problems. Therefore, this course is open to a range of clinicians who are likely to work together to maximize physical function as a rehabilitation team, including physical therapists, orthotists, occupational therapists, rehabilitation physicians, and orthopedists.

**LEVEL-INTERMEDIATE.** Precourse readings are assigned. Attendees are expected to arrive prepared.

---

## Course Description

---

The first 3 days of this intermediate-level program feature a review of skeletal modeling mechanisms and influences, followed by a detailed discussion of the developmental features of the trunk and lower extremity. The content pertains primarily to the torso and lower extremity segments proximal to the foot, with attention to the upper extremity intended to serve the interests of any attending occupational therapists. The instructor emphasizes the use of accurate nomenclature and plane-based views in the identification of characteristics of joint alignment and bone configuration.

Normal developmental events are related to:

1. The process of physiologic adaptation of bone, soft tissues, and the sensorimotor cortex in the presence of a history of use.
2. Skeletal modeling errors in the presence of ligament laxity and premature birth without the skeletal alignment and motion constraints imposed by uterine confinement after full-term gestation.
3. Problems of postural control and distribution of the body center of mass over the feet in children with neuromotor disorders.
4. The principles of Muscle Balance Theory as proposed by Shirley Sahrman, PhD, PT
5. The role of the ankle and foot as the body-ground interface in standing and gait with clinical management implications and strategies, with management principles as proposed by Elaine Owen, MCSP.
6. Findings obtained by undertaking selected musculoskeletal assessments and their significance in management planning.
7. Therapeutic management featuring the principles and precautions inherent in the individualized use of the TheraTogs™ Orthotic Undergarment and Strapping System. The relevance of the findings obtained in the musculoskeletal assessment is made evident in a review of videotaped cases.

Attendees will engage in a clinical problem solving workshop in which they apply the principles and concepts covered in the lectures to a presented (videotaped) case to the design of a prioritized management plan that includes TheraTogs system design. The same attendees will complete the program in a TheraTogs "Try-On" lab session.

On Day 4, lab participants will execute 8 musculoskeletal assessments under supervision: Pelvic Tilt, Hip rotation ROM, Modified Ryder's Test, hip abduction ROM, hamstring length test, patella angle, thigh/foot angle, and ankle dorsiflexion ROM with knee extended. During the TheraTogs "try- on" lab session, participants will learn to apply, and to appreciate by experience, the potential influences of a variety of upper and lower extremity strapping applications.

---

## 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, tibial slope, and ankle valgus.
- Discuss the influences of normal neonatal 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.
- Explain the kinematics and related kinetics of the 3 rockers and the swing-limb torque generator in gait, and apply this information to orthotic designs for the ankle and foot.
- Describe the source of postural symmetry in supine and prone positions at age 4 months.
- Explain the impact of Level 1 (basic) direction-specific postural responses on the development of common contractures in ambulatory children with cerebral palsy.
- 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.
- Referring to the active and passive muscle length-tension relationship, differentiate between muscle dominance and muscle strength.
- Explain the principle of relative flexibility in the presence of soft tissue contracture, and provide 2 examples of this phenomenon.
- Distinguish between anteversion and antetorsion of the femur, and explain the clinical significance of this distinction in terms of lateral rotation strapping across the hip joint.
- Distinguish between femoral medial rotation and excessive medial femoral torsion in swing and stance phases of gait.
- Describe tibial plateau alignment in the sagittal plane – i.e. anteversion and retroversion – and discuss modeling influences as they pertain to the safe use of AFOs or TheraTogs strapping applications to reduce knee hyperextension or excessive knee flexion.
- Describe the components of the thigh-foot angle, and relate the assessment findings to foot progression angle in gait.
- Relate the findings obtained by reviewing a battery of presented musculoskeletal assessments to age-related, ideal findings, to postural and gait deviations, to modeling potential as it is currently understood, to foot segment loading, and to TheraTogs™ strapping applications.
- Acquire novice skill level in donning and doffing a TheraTogs garment and torso-alignment strapping system.
- Experience the sensory and postural effects of wearing TheraTogs garments (over clothing) and Stage 2 strapping applications to improve torso postural alignment and weight distribution through the heels.

Participants completing the lab sessions on Day 3 are expected to be able to:

- Acquire novice-level skill in executing 5 LE musculoskeletal assessment procedures; hip rotation in extension, Modified Ryder's Test, hamstring muscle length test, thigh/foot angle, and passive Ankle DFROM with knee extended.
- Acquire intermediate-level skill level in donning and doffing TheraTogs garments and strapping applied for weight shifting & hip stability, and functioning limb joint alignment, with principles of muscle balance theory and skeletal modeling prospects in mind.

## 4-day Schedule

Start	Day 1	Contact Hrs
8:00	Register / Continental breakfast	
8:30	Introduction – Practicality of Cardinal Planes	.25
8:45	Skeletal Modeling Mechanisms - The Role of Movement in Shaping the Lower Extremities	.50
9:15	Overview of Skeletal Modeling Events	.75
10:00	Break	.00
10:30	The Somatosensory System and Infant Morphology in the Development of Postural Control	1.00
11:30	Common Postural Control Problems in Children with Neuromotor Disorders	.75
12:15	Lunch - videotaped Case Study – Kylie – optional – 12:30 start	.00
1:15	Sahrmann’s Muscle Balance Theory - Management Implications	1.00
2:15	Short Break	.00
2:30	Developmental Events and Related Assessment Procedures - <b>Sagittal Plane:</b> Spine & Pelvic Alignment, Hip Flexion & Extension ROM - Management Implications	1.00
3:30	Short Break	.00
3:45	Videotaped Case Presentation - Emilia	.25
4:00	<b>DEMO:</b> TheraTogs Stage 1 – Garment Donning; Stage 2 Strapping (Postural Alignment)	.50
4:30	<b>LAB:</b> TheraTogs Stage 1 – Garment Donning (Teams of 2 or 3 - Participants share supplies, everyone gets donned in garments first); Stage 2 – Postural Strapping as time permits.	1.00
5:30	Adjourn	Day 1 Didactic Contact Hours: 6.00
		Day 1 Lab Contact Hours: 1.00

*Attendees have homework tonight - please read through handouts section on Muscle Physiology.*

*Check the schedule each day for start, lunch, and end times.*

Start	Day 2	Contact Hours
8:00	Sign in / Continental breakfast	
8:15	Review of Ankle Function in Gait	1.00
9:15	Ankle DFROM – Assessment with Clinical Application - Sagittal-Plane “Tuning”	.75
10:00	Videotaped Case Presentation: Axel	.25
10:15	Short Break	00
10:30	Sagittal-Plane Events / Assessments, <i>continued:</i> Hamstring Muscle Length, Patella Angle,	.50
11:00	Standing Knee Alignment: Management Implications	.25
11:15	Videotaped Case Presentation: Max	.75
12:00	Lunch - Adult-Sized TheraTogs available for Try-On	00
1:00	<b>DEMO:</b> TheraTogs Strapping for Sagittal-Plane Hip, Knee, and Ankle Motions	.75
1:45	Developmental Events & Related Assessment Procedures - <b>Frontal Plane:</b> Weight-loading Asymmetry, Pelvis, Leg Lengths, Hips & the ITB Complex: Management Implications	.75

Start	Day 2	Contact Hours
2:30	Short Break	00
2:45	<b>DEMO:</b> Toggling for Frontal-Plane Alignment & Stability; Unilateral Weight-Loading	.25
3:00	Using TheraTogs for the Pediatric Upper Extremity	.75
3:45	<b>DEMO:</b> Toggling for Upper Extremity Functioning Malalignments	.25
4:00	Short Break	00
4:15	Using TheraTogs for Sensory Processing Disorders, Ataxia, & Autism Spectrum Disorders	.25
4:30	Videotaped case presentations – Chloe, Hannah	.75
5:15	Questions & Discussion	.25
5:30	Adjourn	Day 2 Didactic Contact Hours: 7.50

***Tonight's Homework: Please review the Transverse-Plane procedures for the Hip, Femur, Knee, and Leg on the Legs & Feet DVD***

Start	Day 3	Contact Minutes
8:00	Sign in / Continental breakfast	
8:15	Developmental Events & Related Assessment Procedures- <b>Transverse Plane:</b> Pelvis, Hip & the ITB complex, & Femur: Implications for Management & Precautions	1.00
9:15	Short Break	00
9:30	Understanding & Assessing Femoral Torsion, continued	.75
10:15	Short Break	00
10:30	Transverse-Plane Knee, Leg, Foot: Management Implications	1.00
11:30	<b>DEMO:</b> Toggling to Address Transverse-Plane Problems at Pelvis & Lower Extremity	.50
12:00	Lunch - Adult-Sized TheraTogs available for Trying New Strapping Applications	00
1:00	Using TheraTogs for the Upper Extremity	.75
2:00	<b>DEMO:</b> Toggling for Scapular Stability, Arm & Wrist Alignment	.50
2:30	Short Break	00
2:45	Review and <b>DEMO:</b> Strategies for Positioning – Prone, Sitting, Sleep	.50
3:15	Short Break	00
3:30	<b>Clinical Application</b> – Videotaped Case Study: Matthew at 4 sessions over 20 months	1.50
5:00	Questions & Discussion	.25
5:15	<b><i>Seminar-only enrollees, please turn in evals. Thank you, and safely home.</i></b>	6.75
5:30	Adjourn	Day 3 Didactic Contact Hours:
		Days 1, 2, 3 Didactic Contact Hours: 20.25
		Days 1, 2, 3 Lab Contact Hours: 1.00
		Total contact hours Days 1-3: 21.25

***Lab Enrollees:*** Please bring attire for lab sessions today: biking shorts; thin, snug-fitting stretch pants.

<b>Start</b>	<b>Day 4</b>	<b>Contact Minutes</b>
8:00	Sign in / Continental breakfast	
8:15	<b>LAB:</b> Assessment Procedures: Harvey and Sacral Angles, "Hip" Rotation ROM, Modified Ryder's Test, Hip Abduction ROM. Participants work in groups of 3.	1.75
10:00	Short Break	00
10:15	<b>LAB:</b> Assessment Procedures: Hamstring Length Test (R1), Patella Angle, Thigh/Foot Angle, Ankle DFROM. (In groups of 3)	2.00
12:15	<b>Lab session ends.</b>	00
12:30	Short Lunch on premises	00
1:00	<b>LAB:</b> TheraTogs Try-On - Stages 2 (posture) & 3 (extremities)	1.50
2:30	Short Break	00
2:45	<b>Workshop:</b> Groups of ≤6 are given a videotaped case study and assessment findings. <b>Objective:</b> Review and sort findings, assign management strategies, prioritize strategies, and design a plan.	1.25
3:45	Short Break	00
4:00	Groups Tog a member and present case to whole group for discussion, suggestions.	1.50
5:30	Turn in evals, Adjourn -	Day 4 Lab Contact Hours: 8.00
		Total Didactic Contact Hour - Days 1-4: 20.25
		Total Lab Contact Hours - Days 1-4: 9.00
		Total Contact Hours Days 1-4 29.25

---

## 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 - University of Kentucky in Lexington.

### 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; April: 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.
- ◆ *Serial Casting to Restore Soft Tissue Extensibility in the Ankle and Foot* (2000), a monograph.
- ◆ *Cast Fabrication Techniques #1: The FlexCast Preparatory AFO* (2000), a videotape & manual.
- ◆ *Progressive Casting and Splinting for Lower Extremity Deformity in Children with Neuromotor Dysfunction* (1990), a full-length text.
- ◆ *Serial Casts: Their Use in the Management of Spasticity-Induced Foot Deformity* (1990), an illustrated manual.
- ◆ 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:

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

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 ISPO Consensus Conference for Orthotics in CP; 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 the USA, Canada, Brazil, Columbia, Argentina, Hong Kong, Singapore, Italy, Australia, New Zealand, Ireland, England, Israel, and India.

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.