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Developmental Orthopedics – Interrelated Influences of Movement, Postural Control, and Skeletal Design: Management Implications

A 3-Day Program - Level: Intermediate

Course Description, Objectives, and Schedule

Level: Intermediate. Pre-course readings and review materials are assigned.

Target Audience: This program is designed to educate teams of clinicians in the fields of neuromotor and orthopedic rehabilitation, including physical therapists, orthotists, physicians in physical medicine, orthopedic physicians, and occupational therapists who wish to learn more about issues of skeletal modeling, torso and lower-extremity development, biomechanics, and kinesiology.

Course Description

The content features a review of skeletal modeling mechanisms and influences, followed by a discussion of the developmental features of postural control acquisition, and a detailed review of the developmental features of the trunk and lower extremity. The fundamental content pertains primarily to the body segments proximal to the foot. 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) modeling errors in the presence of ligament laxity and recruitment and weight-loading problems in children with neuromotor disorders; 2) muscle balance theory as proposed by Shirley Sahrmann, PhD, PT; 3) findings obtained by undertaking essential musculoskeletal assessments; and 4) therapeutic management featuring the principles and precautions inherent in the individualized use of the TheraTogs™ Orthotic Undergarment and Strapping Systems. The relevance of the findings obtained in the musculoskeletal assessment is made evident in a review of videotaped cases.

Seminar-only attendees will complete the program in the morning of Day 3 in a clinical problem solving workshop in which small groups review and categorize the findings acquired from past cases, and apply the principles and concepts covered in Days 1 and 2 to the design of a management plan that includes TheraTogs systems if appropriate.

Participation in all lab sessions is limited to 18/ 1 instructor, or 24/ 2 instructors. Others are welcome to audit the lab sessions at an adjusted tuition fee.

Lab participants will execute 6 musculoskeletal assessments under supervision: Hip extension ROM, hip rotation ROM, Modified Ryder's Test, hamstring length test, 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 the potential influences of a variety of strapping applications.

Course Objectives

Participants completing both seminar and lab portions of this course are expected to be able to:

- Distinguish between strain and load, and apply this distinction to the skeletal modeling process.
- Describe the modeling effects of compression, tension, cantilever flexure, and loaded, torsional torque strains.
- Identify these features of immaturity of skeletal structure and alignment: increased medial femoral torsion, genu varum, genu valgum, and ankle valgus.
- Describe the functional influences of neonatal soft tissue constraints at the hip and knee joints on skeletal and motor development.
- Discuss postural control development in terms of the somatosensory system, compensatory and anticipatory adjustments, and weight distribution through the base of support.
- Differentiate between muscle dominance and muscle strength in the context of a force couple imbalance.
- Explain the principle of relative flexibility, and provide 2 examples of this phenomenon.
- Describe the influences of muscle imbalance on the passive and active muscle length tension relationships, and relate them to TheraTogs™ strapping applications.
- 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.
- Participate in clinical problem-solving groups that are challenged with the details of a case evaluation.
- Correctly sort the findings, obtained for the presented case, into orthopedic categories of problems.
- Assign a treatment strategy to each problem, considering the probable stage of skeletal modeling.
- Relate the findings to recorded postural, weight-distribution, and gait patterns.
- Build a list of 5 management priorities for the assigned case.
- Design a TheraTogs Orthotic Garment and Strapping System for the assigned child.

Lab participants completing lab sessions Day 3 of this program are expected to be able to:

- Acquire novice-level skill in executing 6 LE musculoskeletal assessment procedures; hip extension ROM, hip rotation in extension, Modified Ryder's Test, hamstring length test, thigh/foot angle, passive ankle DFROM.
- Appreciate the material and design properties of TheraTogs garments, cuffs, and straps, and apply them with principles of muscle balance theory, weight distribution, and modeling prospects in mind.
- Acquire novice skill level in donning and doffing TheraTogs garments and 3 strapping systems.

Course Schedule

Start	Day 1	Contact Hours
8:00	Register / Continental breakfast	0.0
8:30	Skeletal Modeling Mechanisms - The Role of Movement in Shaping the Lower Extremities	0.5
9:00	Overview of Skeletal Modeling Events	1.0
10:00	Break	00
10:30	Overview of Skeletal Modeling Events, continued	1.0
11:30	Highlights - Postural Control Development	.5
12:00	Lunch	00
1:00	Muscle Balance Theory and Pathokinesiology: Management Implications	0.75
1:45	Videotaped Case Presentation: Emilia	.50

Start	Day 1	Contact Hours
2:15	Short Break	00
2:30	Developmental Events and Related Assessment Procedures in the Sagittal Plane: Spine and Pelvic Alignment, Hip Extension ROM: Management Implications	.75
3:15	Sagittal-Plane Events / Assessments, *continued:* Hamstring Muscle Length, Patella Angle: Management Implications	0.50
3:45	Short Break	00
4:00	Sagittal-Plane Events / Assessments*, continued*: Ankle DF ROM	0.75
4:45	Demonstration: Using TheraTogs™ to Address Sagittal-Plane Problems	.5
5:15	Questions and Discussion	0.25
5:30	Adjourn	
	Subtotal (didactic) contact hours:	7.00

Homework: Read handout sections on muscle physiology and pathophysiology.

Seminar attendees adjourn at 11:15 today.

Start	Day 2	Contact Hours
8:00	Register / Sign in / Continental breakfast	
8:15	Videotaped Case Presentations: (Matthew, Max)	0.75
9:00	Developmental Events & Related Assessment Procedures in the Frontal Plane: Pelvis, Leg Lengths, Hips & the ITB complex, and Knees: Management Implications	1.0
10:00	Break	00
10:30	Demonstration: Using TheraTogs™ to Address Frontal-Plane Problems	.50
11:00	Developmental Events & Related Assessment Procedures in the Transverse Plane: Pelvis, Hip, Femur, & the ITB complex: Management Implications	1.0
12:00	Lunch. At 12:30, Videotaped Case Presentation – SPD (Chloe) *(optional)*	00
1:00	Transverse Plane: Femur (cont.): Management Implications	.5
1:30	Transverse-Plane Developmental Events: Knee, Leg: Management Implications	0.75
2:15	Short Break	00
2:30	Demonstration: Using TheraTogs™ to Address Transverse-Plane Problems	.50
3:00	Short Break	00
3:15	TheraTogs and the Upper Extremity Kinematic Chain	.75
4:00	Demonstration: Using TheraTogs™ to Address Upper Extremity Issues	.75
4:45	Videotaped Case Presentation: KM (severe dystonic quadriplegia)	.5
5:15	Questions and Discussion	.25
5:30	Adjourn	
	Subtotal Contact Hours:	**7.25**

Start	Day 3	Contact Hours
8:00	Sign in / Continental breakfast	
8:15	**Seminar:** Attendees Request for Review of Presented Content	.75
9:00	**Workshop: Clinical Application** of Assessment Findings – Groups meet to discuss observations and findings regarding a presented videotaped case. Objectives: sort the findings into orthopedic categories, propose related management strategies, and prioritize 5 of the management strategies.	1.0
10:00	Short Break	0.0
10:15	Review of Cases and Prioritized Plans	1.0
11:15	**Seminar attendees adjourn. Please turn in evals. *Safely Home.***	
11:15	**LAB:** Assessment Procedures: "Hip" Rotation ROM, Modified Ryder's Test. Participants work in groups of 3.	.75
12:00	Short Lunch on premises.	.50
12:30	**LAB:** Assessment Procedures: Hip Extension_ Dominance Test; Hamstring Length Test, Thigh/Foot Angle, and Ankle DFROM. Participants work in groups of 3.	2.0
2:30	Short Break	0.0
2:45	**LAB:** 'Try-It-On" TheraTogs Donning and Strapping – Participants work in groups of 3.	2:00
4:45	Final Discussion / Complete Evaluations	0.25
5:00	Adjourn	
	Didactic: 3:00 hours - LAB: 4.75 hours Total contact hours:	**7.75**

INSTRUCTOR BIO - BEVERLY (BILLI) CUSICK, PT, MS, COF

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:

- *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 (2006-present).

Guest lecturer for annual conferences of the APTA, the NDTA, and the American Academy of CP and Developmental Medicine, in the US and Canada; at the ISPO Consensus Conference for Orthotics in CP; and for the British Assoc.of Prosthetists and Orthotists.

Instructor of more than 350 courses and guest presentations by invitation only in the USA, Canada, Brazil, Argentina, Hong Kong, Italy, Australia, Ireland, England, Israel, India, and New Zealand.

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 systems.

A curriculum vita is available upon request.