EPIGENETICS SYMPOSIUM: ENVIRONMENTAL AND GENOMIC FACTORS IN NEURODEVELOPMENTAL DISABILITIES
H Bjornsson MD, PhD; S Desai MGC; A Fatemi MD; M Gentner BS; E Gordon-Lipkin MD; E Graham MD; H Gwynn MD; A Hoon MD, MPH; M Johnston MD; M Leppert MBCh; E Levey MD; E Stashinko PhD, RN; A Wilms Floet MD

Course Summary: A recent report from the National Academy of Sciences has called for the adoption of 'precision medicine'—looking at genomics, epigenomics, environmental exposures and other information to identify which approaches will be effective for which patients based on these factors. To provide relevant information for Academy members on this complicated topic, we offer this all-day pre-conference symposium titled “Environmental and Genomic Factors in Neurodevelopmental Disabilities”. In the first two thirds of the day there will be presentations on Genetics, Epigenetics, Genetic Predisposition to Environmental Insults, Developmental Origins of Health & Disease, Teratogens, High Risk Obstetrics, Prenatal Infections and Adverse Childhood Experiences/Toxic Stress. These will be followed in the late afternoon by a presentation integrating these concepts into clinical practice, a panel discussion featuring distinguished clinicians from the Academy, and a closing summary.

Learning Objectives:
1. Learn the principles of genomic medicine and the application to neurodevelopmental disabilities
2. Develop a basic understanding of mechanisms of epigenetics
3. Understand how environmental risk factors affect gene expression
4. Understand the Developmental Origins of Health and Disease (DOHaD) paradigm
5. Integrate genetic, epigenetic, teratology and developmental origins of health and disease concepts into clinical practice of neurodevelopmental disabilities

ULTRASOUND SYMPOSIUM: NEUROMUSCULAR ULTRASOUND: HANDS ON ULTRASOUND TRAINING COURSE FOR CHEMODENERVATION PROCEDURES
Katharine Alter, MD; Florian Heinen, MD; Sebastian Schroeder, MD; Steffen Berweck, MD

Target Audience: Physicians, nurse practitioners, physician assistants, therapists

Course Summary: This full day course includes 90 minutes of didactic lectures including the following: Part I Ultrasound (US) Basics: the principles of ultrasound scanning/physics, the sonoacoustic properties of relevant tissues, US scanning techniques/tips. Part II, Clinical Applications of US: The use of US for procedural guidance/chemodenervation procedures including Botulinum Toxin and Phenol, The use of US in Neuromuscular Medicine. Part III, Hands on Scanning: The remainder of the course is comprised of hands on ultrasound training: Head and neck muscles, structures, upper/lower limb muscles and nerves. Part IV Procedural guidance training using phantoms or other models will also be included.

Learning Objectives:
1. Be proficient in the basic physics and scanning techniques of ultrasound
2. Be proficient with the basics of US imaging
3. Identify clinical applications of US for procedural guidance and in Neuromuscular medicine
4. Identify key muscles in the neck, upper/lower limbs, parotid/submandibular glands. Identify sonoacoustic properties of relevant tissues and the benefits and limitations of incorporating US into clinical practice
8:00 am – 12:00 pm
**GCMAS SYMPOSIUM: QUANTITATIVE TECHNIQUES FOR ASSESSMENT OF UPPER EXTREMITY MOVEMENT DYSFUNCTION**
Susan Duff, OT, PT, EdD; Kathleen Friel, PhD; Lanie Gutierrez Farewik, PhD; Ellen Jaspers, PT, PhD; Cristina Simone-Martinez, PT, MSc; Eva Pontén, MD, PhD; Jean Stout, PT, MS; Aviva Wolff, OT, EdD

**Target Audience:** Clinicians (physicians, occupational therapists, physical therapists), engineers, biomechanists, kinesiologists, and scientists who treat, assess, study and/or measure upper extremity movement disorders in children and youth with cerebral palsy and other conditions will benefit from this symposium. Prior experience analyzing and interpreting motion analysis data is beneficial, but not required.

**Course Summary:**
The course will focus on measures used clinically and scientifically to assess function and the effects of interventions. A review and description of a wide range of techniques for the assessment of movement dysfunction will be presented. Topics covered in this symposium will include clinical assessment tools, standardized outcome measures, kinematic and biomechanical models, methods to assess muscle stiffness and activity, and neuro-imaging techniques that are used to measure cortical activity and changes in hand and arm function. Clinical applications will be discussed with case presentations to illustrate use and interpretation of data.

**Learning Objectives:**
1. Discuss the various methods used to collect motion data and how it can be used to describe and assess UE motion and function
2. Identify indications for motion analysis of hand and arm function in clinical practice
3. Read and interpret basic graphs representing kinematic and muscle function data
4. Identify indications for cortical measures of hand and arm function in clinical practice.

1:00 pm – 5:00 pm
**PC 1: COLLABORATIVE DEVELOPMENTAL MONITORING TO PROVIDE OPTIMAL INDIVIDUALIZED SERVICES FOR CHILDREN WITH CEREBRAL PALSY**
Doreen Bartlett, PhD; Sarah Westcott McCoy, PhD; Lisa Chiarello, PT, PhD, PCS, FAPTA

**Target Audience:** physical therapists, occupational therapists; developmental pediatricians and family members with children with CP

**Course Summary:** Our evidence stems from the Move & PLAY study, in which we developed measures of participation in self-care and leisure activities, balance, strength, range of motion, endurance, and associated health conditions, for use across the Gross Motor Function Classification System (GMFCS) levels. We also tested multivariate models of determinants of motor function and participation in self-care and leisure. In the On Track study, we developed both longitudinal growth and reference percentile curves for all measures. Replicating procedures for the Gross Motor Function Measure, we describe both average and individual development of children in each of the levels of the GMFCS. Objective criteria are used to describe individual children’s relative strengths and weaknesses as they develop. Along with knowledge of determinants of motor function and self-care and leisure participation, we illustrate how this information enables a family-centred approach to collaborative goal setting and intervention planning. We propose that an annual comprehensive clinical assessment, ‘checking up’, with use of the criteria to interpret individual development, will contribute to more efficient and effective family-centred, collaborative, ‘checking-in’, rehabilitation care.

**Learning Objectives:**
1. Understand how enablement frameworks, family priorities, family centredness and collaborative approaches contribute to optimal care
2. Understand the comprehensive tool-box of measures that are brief, clinically feasible, reliable and valid and the conceptual model that were developed and tested in the Move & PLAY study
3. Develop skill in using the reference percentile curves developed in the On Track Study to identify individual strengths and weaknesses
4. Discuss a variety of collaborative clinical decisions based on individual characteristics and family priorities
Target Audience: Physicians, Occupational Therapists, Physical Therapists, Psychologists, Nurses, Researchers

Course Summary: Pain is common in Cerebral Palsy (CP) and impacts activities of daily living, sleep, mood and communication. Although the challenges of pain in CP are well known, it is often under recognized and under treated in clinical practice. Presenters will describe the complex nature of pain in adults with cerebral palsy including characteristics, causes, associated symptoms, aggravating and elevating factors, and pain’s impact on life. Practical, evidence-based information will be presented to guide clinical practice including efficient pain assessment and treatment approaches for adults with CP across all GMFCS levels.

Learning Objectives:
1. Identify characteristics and potential causes of pain in adults with CP
2. Learn effective means of assessing pain in all levels of GMFCS
3. Understand different treatment approaches from a multidisciplinary viewpoint
4. Understand different aspects of living with chronic pain in adults with CP

Thursday, September 14, 2017

Breakfast Seminars (1-10) 7:00am – 8:00am

BRK01: A PRACTICAL APPROACH TO GENETIC TESTING FOR CHILDREN WITH NEURODEVELOPMENTAL DISORDERS
Melissa Carter, MD

Purpose: To help clinicians decide when and how to order genetic investigations for their patients with neurodevelopmental disorders (developmental delay, autism spectrum disorder, learning disabilities)

Target Audience: Clinicians who diagnose and treat neurodevelopmental disorders in children

Course Summary: With so many advances in genetic testing technology over the past decade, it is increasingly difficult for non-genetics professionals to keep current and make evidence-based decisions about genetic testing for their patients. At the same time, waitlists for genetics services are becoming increasingly longer, and young children with developmental delays are at high risk for a genetic disorder. Timely genetic diagnosis is essential for parents who may alter their reproductive planning based on results of genetic tests. This course will provide a “how-to” guide for clinicians, providing the attendees with a practical approach to genetic testing in their patients with a wide range of developmental, neurological and behavioral disorders.

Learning Objectives:
1. Have a “bird’s eye view” of the current state of knowledge regarding the genetic etiologies of neurodevelopmental disorders
2. Understand how and when to order genetic testing to maximize diagnostic yield and minimize cost to the family and/or health care system
3. Understand the different types genetic tests that are currently available, and the benefits and drawbacks to each. 
4. Feel more confident ordering genetic investigations for their patients

BRK02: A PROGRAM TO MEASURE WALKING ACTIVITY PRE AND POST SURGERY IN YOUTH WITH CEREBRAL PALSY
Nancy Lennon, MS, PT; Julieanne Sees, DO, FAOAO

Purpose: This breakfast seminar will describe an innovative program, coordinated through our gait analysis laboratory, to measure mobility performance utilizing portable accelerometry and patient report tools.

Target Audience: Rehabilitation professionals, including surgeons, therapists, and physiatrists
Course Summary: This breakfast seminar is directed towards surgeons and rehabilitation professionals who care for ambulatory children and youth with cerebral palsy. We will describe the development of a measurement protocol utilizing a portable FDA approved device to capture habitual walking activity (WA). We will present our experience in device selection, and clinical protocol development, including processes to examine data accuracy, reliability and validity. We will present early data to discuss differences in WA between surgical candidates and literature reports of WA in children and youth with CP. Case studies will illustrate the feasibility and utility of data collection during the post surgical recovery of youth with CP. Cases will show how data sharing among surgeons, therapists, and families during post-operative monitoring can support recovery of walking mobility. Preliminary data on one and two-year outcome of WA following orthopedic surgery will facilitate a discussion of post-op rehabilitation programing.

Learning Objectives:
1. Gain an understanding of typical walking activity (WA) levels in children and youth with cerebral palsy
2. Describe differences in WA for youth with CP by age groups, disability levels, and pre / post surgery
3. Develop knowledge-based skills in methods to measure and interpret (WA) for children and youth with cerebral palsy
4. Understand the practical considerations of implementing a program to measure walking activity in a clinical setting

BRK03: COMPETENCE IN COMPLEX CARE: EDUCATIONAL APPROACHES TO EMPOWER FUTURE HEALTHCARE TEAMS
Kathleen Huth, MD; Anne Marie Sbrocchi, MD; Tammie Dewan, MD; Hema Patel, MD, MSc (Clin Epi)

Purpose: To discuss innovative and feasible educational approaches for fostering competency in the care of children with medical complexity.

Target Audience: Pediatricians, educators, and members of interdisciplinary healthcare teams involved in the care of children with medical complexity and/or training of future healthcare providers in this area.

Course Summary: While the population of children with medical complexity (CMC), including cerebral palsy and developmental disability, continues to grow, specific knowledge and skill development is required in the next generation of healthcare professionals in order to build capacity to care for CMC. However, many training programs offer variable educational exposure. To address this gap for Canadian trainees, a national standardized curriculum in the care of CMC was developed with the support of the Royal College of Physicians and Surgeons of Canada, our national licensing body, and the Canadian Pediatric Society. The goal was to provide a harmonized exposure to the basic knowledge and skills involved in the care of CMC through a module-based curriculum which could be integrated in pre-existing dedicated teaching rounds. The main objective of the curriculum is to enable future pediatricians to provide proactive, coordinated care for CMC, incorporating interactive activities and hands-on simulations to promote increased self-efficacy. While developed with pediatricians in mind, the content and principles of care have generalizability to broader healthcare teams and may serve as a template in the development of similar teaching tools. Drs Patel, Sbrocchi, Huth and Dewan will discuss the process of curriculum development and evaluation through a national collaborative effort, and the educational methods used to promote the transfer of knowledge and skills from classroom to clinical practice.

Learning Objectives:
1. Describe a six-step approach to curriculum development in complex care for pediatric residents in Canada
2. Discuss innovative yet practical educational strategies that enhance learning, motivation and transfer of skills to clinical practice
3. Reflect on opportunities and challenges of implementing and evaluating a national educational initiative in complex care
4. Develop action plans for curriculum development to meet educational needs in their own discipline and institution
**BRK04: MORE THAN “JUST DATA”: GETTING THE MOST OUT OF A CEREBRAL PALSY REGISTER**
Susan Reid, PhD; Elaine Meehan, BSc; Dinah Reddihough, MBBS

**Purpose:** To discuss the scope for cerebral palsy (CP) registers to be used to inform clinical practice and healthcare decision making, using the Victorian CP Register (VCPR) as an example and the results of a survey of medical professionals to guide the discussion.

**Target Audience:** Researchers, CP register professionals, and all clinicians working in the field

**Course Summary:** The VCPR has been in existence for 30 years, and currently holds data on over 5500 individuals, the oldest group now being 46 years of age. Its research outcomes have been significant over this period, contributing to more than 100 different research projects and a similar number of publications, while helping over 20 PhD students complete their studies. While it continues to strengthen its track record in longitudinal and epidemiological research, the potential of the VCPR to improve patient outcomes by collecting new types of data and linking to other datasets is being explored. During this seminar, the presenters will share their experiences of setting up and maintaining a CP register for over three decades, while striving to keep it “relevant” in an era when registers are difficult to fund and research priorities are changing. The results of a survey in which medical professionals working with children with CP were asked about the types of clinical questions they would like answered by CP registers will also be presented.

**Learning Objectives:**
1. To understand how CP registers can be used for knowledge generation in the field of CP, beyond epidemiological research
2. To recognize the potential for CP registers to improve health outcomes for individuals with CP
3. To identify important research questions that may be answered by using CP registers in novel ways
4. To discuss strategies for increasing the utility of CP registers

**BRK05: READY TO EAT? CAN TRAINING CAREGIVERS IMPROVE PARTICIPATION IN FEEDING FOR CHILDREN WITH CEREBRAL PALSY**
Gina Rempel, MD, FRCPC; Marianne Gellert-Jones, MA, CCC-SLP; Barb Barton, BMR (OT), MSc (Rehab); Cynthia Dodds, PT, PhD

**Purpose:** Participation in feeding is important for children of all abilities from a social and emotional perspective, as well as, to enhance communication and skill development. Yet, children with cerebral palsy (CP) with difficulty feeding and swallowing may be excluded from participation for fear of negative health consequences. This session will present evidence that feeding training methods improve participation in safe feeding. An inter-professional team will review important elements of caregiver feeding training to promote and develop safe feeding skills allowing children with CP (Eating and Drinking Classification System (EDACS) levels 4 and 5) to participate in an enriching life experience.

**Target Audience:** Clinicians, Therapists, Nurses, Physicians, Parents and Caregivers

**Course Summary:** Using the International Classification of Functioning, Disability and Health Framework (ICF), this case-based session will describe essential elements necessary to train caregivers across environments (home, school, community) in order to provide feeding and eating opportunities to children with CP. Ethical, safety and quality of life considerations will enrich the discussions. During this interactive session, participants will be able to prioritize elements of training significant to their settings.

**Learning Objectives:**
1. List the benefits of participation in feeding for all children regardless of their feeding abilities
2. Elucidate the pros and cons of balancing risk and fostering participation in feeding
3. Articulate the importance of engaging caregivers in feeding training across environments in order to promote safe feeding participation for children with CP
4. Identify important elements of caregiver training and resource development in a variety of care settings
BRK06: SLEEP PROBLEMS IN THE CHILD WITH PHYSICAL DISABILITIES
Golda Milo-Manson, MD

Purpose: to improve a health professional’s ability to counsel parents and children/youth with sleep difficulties

Target Audience: health professionals who work with children and youth with physical disabilities who also have sleep challenges

Course Summary: Pediatric sleep problems are common and appear to occur more frequently in children with special needs. Although the range is variable one study documented an 80% occurrence of sleep problems in children with developmental disorders. This breakfast seminar will; review the literature, discuss principles of developmental issues in sleep, discuss common issues in sleep with children with physical disabilities, review behavior management techniques, when medication is appropriate and when a sleep study should be ordered

Learning Objectives:
1. Gain knowledge of current evidence related to management of sleep problems in children with physical disabilities
2. Understand when to use medication intervention to assist with sleep challenges
3. Articulate to families the sleep hygiene issues that contribute to sleep difficulties
4. Rule out other medical issues that may contribute or mask behavioral sleep difficulties

BRK07: SO YOU WANT TO BUILD A ROBOT FOR REHABILITATION....
Sarah Evans, MD; Kevin Cleary, PhD; Catherine Coley, PT.DPT.PCS.

Purpose: To highlight the key elements to collaborative work between clinicians, engineers and end users to develop innovative and participatory designs for rehabilitation robots.

Target Audience: Physiatrists and other physicians who participate in pediatric rehabilitation, Physical Therapists, Occupational Therapists, Speech Language Pathologists, and Bioengineers

Course Summary: Rehabilitation robots are not developed because of a desire to build a robot. They are created in response to a functional deficit seen in a particular patient or group of patients. Rehabilitation robots evolve based on their usefulness, which is determined by whether they are used by patients to attenuate function. This course will focus on the working relationship and interdisciplinary approach required between bioengineers and clinicians that leads to the development of the best mechanical and robotic devices to assist in the rehabilitation of children with functional deficits. We will discuss concept, development of robotic devices, proof of concept, and clinical trials to test devices as well as languages spoken by each discipline and the appropriate role of each person on the team as we work to bring a device to market. The importance of including the patient and family in the development process, participatory design, will be discussed and emphasized.

Learning Objectives:
1. Understand the benefits of incorporating robots into pediatric rehabilitation
2. State the problem to be addressed with a rehabilitation robot in terms that make the problem understood by clinicians and engineers
3. Describe the steps required to develop a rehabilitation robot
4. Define participatory design and describe the significance of the same

BRK08: UNDERSTANDING THE SPEED OF AGING IN ADULTS WITH CEREBRAL PALSY
Mark Peterson, PhD; Edward Hurvitz, MD

Purpose: Aging is a multidimensional phenomenon that manifests differently between individuals throughout the lifespan, and is highly conditional on interactions between environmental, behavioral, and demographic characteristics. Traditional aging research ignores changes in life-expectancy at the population level, actual life expectancy at the individual level, and characteristics of people throughout time, and has led to an incomplete understanding of the factors that influence altered aging trajectories. For example, while the incidence of cerebral palsy (CP) has remained stable in recent years, the mortality rate of children with CP has declined, suggesting that adults with CP represent a growing population whose health status and healthcare needs are poorly understood. This expansion of the aging CP population has led to a diversification of cardiometabolic disease morbidity,
including increased prevalence of aging-related multimorbidity and musculoskeletal frailty. Thus, early screening and continued health promotion efforts for healthy aging in persons with CP are vital to reduce the escalating burden associated with chronic disease clustering and worsening function. This session will highlight the need for a lifespan approach to improve screening and tailoring of interventions to preserve function and cardiometabolic health, increase longevity, and improve overall quality of life in the CP population.

**Target Audience:** Physicians, Therapists, Nurses, Program Coordinators, Physiologists, Researchers, Post-doctoral fellows

**Course Summary:** Although decrements in muscle mass and strength are typically considered the primary contributing factors of gross motor decline in adults with CP, it is likely that these changes are actually the direct consequence of years spent accumulating extremely sedentary lifestyles. These modifiable behaviors lead to substantially increased risk of multiple chronic disease processes, such as obesity, diabetes, hypertension, asthma, and stroke. We have recently completed two studies which represent a substantial addition to the current body of literature pertaining to: (1) predictors of multimorbidity in middle-aged adults with CP, and (2) characterization of the longitudinal trends and disease free survival of chronic disease risk factors, such as diabetes, hypertension, hypercholesterolemia, hypogonadism, dementia, depressive disorders, osteoporosis, pulmonary disease, arthritis, etc., in large samples of adults with CP.

**Learning Objectives:**
1. Develop an approach to clinical screening of the adult with cerebral palsy that includes greater attention to aging-related chronic disease risk
2. Describe the risk of chronic disease clustering (i.e., multimorbidity) in adults with cerebral palsy and risk factors that contribute to increased risk
3. Understand the need for surveillance of health risks in adults with cerebral palsy, with a priority focus on metabolic and musculoskeletal systems
4. Identify and discuss relevant risk factors for chronic conditions in CP, and offer guidance for lifestyle interventions to prevent losses of function and disease, and to improve quality of life

**BRK09: WHEN A PICTURE PAINTS A THOUSAND WORDS: ACCURATE DESCRIPTION AND APPLICATION OF THE GROSS MOTOR FUNCTION CLASSIFICATION SYSTEM**

*Kate Willoughby, B Physio, D Physio; Pamela Thomason, MPT; Brenda Agnew, Bachelor of Arts*

**Purpose:** To familiarise participants with the revised illustrations which accompany the Gross Motor Function Classification System (GMFCS) descriptors, to explore the utility of the GMFCS and why accurate classification of gross motor skills is important in a variety of clinical and research settings.

**Target Audience:** Physical therapists, paediatricians, rehabilitation physicians, parents

**Course Summary:** The GMFCS has become a gold standard tool which has been of immense benefit to parents/carers, clinicians and researchers in understanding the wide spectrum of gross motor function in young people with cerebral palsy, and it has provided a common language for the description of severity of gross motor involvement. In this seminar, the importance of accurate classification of gross motor skills by the GMFCS will be discussed using the framework of a variety of clinical and research contexts: long term gross motor prognosis, epidemiology of secondary musculoskeletal disorders, goal setting and selection of interventions and understanding the effectiveness of interventions. Participants will become familiar with the revised Gross Motor Function Classification System (GMFCS) ‘Descriptors and Illustrations’, which were amended in direct response to feedback from parents and carers. Interactive case studies will assist participants in understanding the important distinctions between each of the five levels of the GMFCS, and in the practical application of the classification in a variety of situations.

**Learning Objectives:**
1. Understand the development of the GMFCS, its clinical utility, and how it is underpinned by gross motor curves
2. Understand and confidently apply the distinctions between each of the levels of the GMFCS
3. Engage parents and caregivers in positive discussion about the GMFCS and its relevance to their child’s function
4. Understand the relationship between GMFCS and the effectiveness of interventions, and apply that knowledge in goal-setting and the selection of interventions
BRK10: YES, CLINICAL RESEARCH CAN BE DONE IN YOUR BUSY PRACTICE!
Lynnette Rasmussen, OTR/L; Virginia Nelson, MD, MPH; Kate Wan-Chu Chang, MA, MS

Purpose: To address the importance and challenges of clinical research, and to encourage attendees to consider implementing a research study based on clinical observations.

Target Audience: Physicians and clinicians.

Course Summary: With health care requiring more evidenced-based practice, there is growing demand to increase the volume of clinic-based research in treating patients. However, medical professionals are often left with little resources, including time and funding, to conduct research in their practice. This session will discuss the benefit of evidence-based practice and challenges of clinical research. The speakers will share their experience and provide helpful tips for practitioners who are interested in clinical research. The audience is encouraged to bring their research questions to the session and will have the opportunity to share ideas while exploring this topic.

Learning Objectives:
1. State the importance and benefits of evidenced –based practice
2. Identify the tools and resources that address the challenges faced in setting up a research project in a busy clinical practice
3. Develop a research question based on clinical observations
4. State how to incorporate research into a busy clinic

Instructional Courses (1-13) 4:00pm – 6:00pm

IC01: A MULTI-DISCIPLINARY APPROACH TO SURGERY FOR TREATING HIP DISPLACEMENT: A PERI-OPERATIVE JOURNEY FROM PLANNING TO OUTCOMES
Wade Shrader, M.D.; Benjamin Shore, MD, MPH, FRCSC; Abhay Khot, FRACS; Giuliana Antolovich, BSc(Hons), PhD, MBBS, FRACP; Kate Willoughby, B Physio, D Physio

Purpose: This course will present an overview of the journey from the decision to perform bony surgery for hip displacement through to the outcome. The indications for hip reconstruction in the context of cerebral palsy (CP) will be discussed, along with a review of evidence of the outcomes of surgery. The workshop will assist attendees to utilize multi-disciplinary team planning to prepare the child and family for surgery and minimize peri-operative risks. Attendees will learn the technical details involved in a varus derotational osteotomy (VDRO) through case examples and a hands-on laboratory session where they will perform a VDRO on a saw-bone model, guided by pediatric orthopedic surgeons.

Target Audience: Physicians, Physical and Occupational Therapists, Nurses

Course Summary: This course will provide an introductory level discussion of hip osteotomies for children and adolescents with CP and neuromuscular hip dysplasia. The pathophysiology, prevalence, and treatment indications for reconstructive hip surgery will be presented. Planning and preparation in the pre-operative period will be outlined with case examples. The step-by-step surgical details of a VDRO will be presented with photographic details and videos of actual surgical procedures. The technical modifications that allow clinicians to achieve surgical outcomes will be demonstrated. The laboratory portion of the course will allow participants to perform a VDRO on a saw-bone model with modern surgical instrumentation. Issues raised during the post-operative recovery period will be discussed to help clinicians navigate a potentially difficult time for the child and the family. The nuances of multidisciplinary post-operative care to realize both safe outcomes and the attainment of all pre-operative goals will be also be considered.

Learning Objectives:
1. Describe the causes and prevalence of hip displacement in children with CP
2. Recognise the scope and complexity of care required in the surgical planning process
3. Understand the indications for hip reconstruction in children with CP and describe the technical steps involved in the surgical technique of a VDRO
4. Navigate the post-operative recovery period after surgery and minimize peri-operative risks
IC02: APPLICATION OF MIYOGA, A NOVEL EMBODIED MINDFULNESS MOVEMENT PROGRAM, FOR CHILDREN WITH CEREBRAL PALSY
Catherine Mak, BS; Roslyn Boyd, PhD, MSc (PT), BAppSc (PT), BSc (Anatomy), Pgrad (Biomech)

**Purpose:** This workshop is based on the results of a randomised control trial of the MiYoga program. MiYoga is a lifestyle intervention based on mindfulness and yoga techniques for children with cerebral palsy. The presenters will review the theory and scientific evidence behind mindfulness and yoga and how it could benefit children with cerebral palsy. Attendees will learn techniques and strategies on how mindfulness and yoga can be applied in therapy, as well as how to help families utilise the strategies from this lifestyle intervention in their everyday lives. The practical component of this workshop will allow attendees to experience embodied mindful movements first hand as well as help them integrate it into their clinical practice.

**Target Audience:** This workshop is suitable for clinicians, therapy students, and parents caring for children with cerebral palsy.

**Course Summary:** This workshop aims to educate therapists and clinicians on the benefits of yoga and mindfulness for children with disabilities, especially cerebral palsy, based on current literature and results of a recent randomised controlled trial. In addition, it aims to provide participants an opportunity to experience the application of yoga and mindfulness in therapy. The workshop content includes a brief summary of current literature highlighting the benefits of yoga and mindfulness and how these are relevant for children with cerebral palsy. It will discuss the development of the MiYoga program and provide participants the opportunity to experience some of the mindfulness and yoga techniques in the program. There will be small group activities that will allow participants to apply some of the techniques and learn how to adapt and tailor simple mindful yoga sequences for children with cerebral palsy.

**Learning Objectives:**
1. To understand the benefits of mindfulness and yoga for children and how this may be relevant for children with cerebral palsy
2. To understand and practice, how mindfulness and yoga can be applied in therapy to facilitate embodied movements and to enhance children’s attention outcomes
3. To apply MiYoga strategies for children with cerebral palsy in an individual, group and in home settings where families can integrate strategies from this lifestyle intervention into their everyday lives
4. To practice and apply simple mindful movement routines for stretching, strengthening, body awareness and calming the neurological system

IC03: DIFFERENTIATING BETWEEN PRIMARY, SECONDARY AND COMPENSATORY MECHANISMS IN GAIT IN PERSONS WITH CEREBRAL PALSY
Sylvia Ounpuu, MSc; Kristan Pierz, MD

**Purpose:** The purpose of this course is to describe gait pathology in CP in terms of primary, secondary and compensatory deviations.

**Target Audience:** Physicians, orthotists, physical therapists and kinesiologists who are making treatment decisions to improve gait function in persons with neuromuscular disorders.

**Course Summary:** The course will begin with a brief overview of joint kinematics to allow a complete understanding of the angle definitions and kinematic plotting formats. Then the definition of primary, secondary and compensatory gait deviations will be provided and discussed. The importance of differentiating between these different categories of gait deviations will be reviewed. These concepts will then be illustrated in a series of case examples. These case examples will involve attendee participation through discussion of the initial visual assessment of each patient example. Each case will be discussed in terms of the joint kinematics and associated clinical examination parameters that allow determination of primary problems. All cases will be reviewed in an interactive format with the assistance of video records. Strategies for differentiating between primary and secondary deviations and compensations will also be discussed and illustrated.
Learning Objectives:
1. Define primary and secondary deviations and compensations seen in gait
2. Differentiate between primary deviations that need to be treated and other gait deviations that will resolve if the primary problem is addressed
3. Understand common multi-level gait patterns in CP
4. Describe how motion analysis can help us understand primary vs. secondary gait deviations

IC04: FUNCTIONAL NEAR-INFRARED SPECTROSCOPY (fNIRS): A NOVEL EMERGING MOBILE BRAIN IMAGING TECHNOLOGY FOR INVESTIGATION OF CORTICAL ACTIVATION DURING FUNCTIONAL MOTOR TASKS IN INDIVIDUALS WITH CEREBRAL PALSY
Ana Carolina de Campos, P.T, PhD; Theresa Moulton, Ph.D., DPT; Diane Damiano, PhD; Ryota Nishiyori, PhD

Purpose: This course will present the rationale for and utility of functional near-infrared spectroscopy (fNIRS) for investigating the neural coordinates of normal and abnormal motor control and for measuring cortical changes after motor training in cerebral palsy (CP). NIRS is an emerging mobile brain imaging technology that uses near-infrared light to examine Blood Oxygen Level Dependent (BOLD) changes in response to cortical activity, much like fMRI.

Target Audience: Researchers and clinicians interested in brain imaging technologies and cortical activation patterns in CP

Course Summary: fMRI has led to great advances in understanding brain reorganization in response to injury and as result of treatment in stroke and unilateral CP. However, the MRI scanner is restricted to small movements in supine and many with CP are unable to remain still in the scanner due to increased startle or involuntary movements. Because it can be used in clinical research settings and is more robust to movement artifacts, fNIRS presents great potential for investigating both typical and atypical control of functional movements such as reaching and walking. Our laboratory at NIH has collected data during motor tasks on more than 50 individuals with and without CP. This course will focus on the following topics:
- Review of the anatomy of the hemodynamic response, and the use of light to monitor blood flow;
- Literature review of the use of fNIRS to study movement in typically developing children and adults and in individuals with CP;
- Sharing experiences with fNIRS data acquisition and analysis in CP
- Comparison of fNIRS to other technologies, e.g. EEG, also being utilized to study cortical activation during motor tasks
- Present results obtained from fNIRS during motor tasks in the upper and lower extremities of individuals with unilateral and bilateral CP compared to those with typical development.

Learning Objectives:
1. Demonstrate a general understanding about the use of fNIRS to study brain activity
2. Critically discuss the challenges of using the technology with brains that have lesions, and advantages of this technology for CP
4. Appreciate relationship of brain activity to muscle activity and selectivity
IC05: HYPERTONIA MANAGEMENT IN CEREBRAL PALSY: PAST IDEAS AND LESSONS, CURRENT PRACTICE AND OUTCOMES, FUTURE INNOVATIONS AND POSSIBILITIES
Marcie Ward, MD; Mark Gormley, MD; Timothy Feyma, MD

Purpose: This course will review tone management in cerebral palsy -- the past and the lessons learned, the present and its shortcomings, and the future and its possibilities for improving care of patients. The course will review research which assesses tone management modalities, describe common clinical uses for tone management modalities and invite the audience to consider alternative uses of these modalities in clinical practice.

Target Audience: Developmental pediatricians, pediatric neurologists, neurosurgeons, pediatric orthopedic surgeons, pediatric physiatrists, physical therapists, occupational therapists and other providers who treat patients with cerebral palsy who want to learn more about spasticity and dystonia management options for their patients.

Course Summary: This course will begin by reflecting on the history of tone management for patients with cerebral palsy and the lessons learned from that practice. Next, the course will summarize current practice trends in tone management including neurosurgical options (rhizotomy and deep brain stimulation) in conjunction with a review of the available evidence evaluating those practices. Finally, the presenters will explore potential future directions in hypertonia management and consider novel uses for established techniques (such as "palliative rhizotomy"). Focus will be directed at examining the use of neurotoxins and nerve blocks, and neurosurgical interventions including rhizotomy, intrathecal baclofen and deep brain stimulation. Case examples will be presented and audience response software will be used to generate discussion and collaboration.

Learning Objectives:
1. Summarize the available tools for tone management, their potential limitations and benefits
2. Examine the current literature regarding the use of tone management modalities
3. Explore less common uses of surgical techniques for symptom relief in cerebral palsy
4. Review current efforts with deep brain stimulation therapy in cerebral palsy and learn early patient results

IC06: MAXIMIZE NEUROPLASTICITY AND MINIMIZE MALADAPTIVE HABITS IN CHILDREN AND TEENAGERS WITH CEREBRAL PALSY
Karen Pape, MD, FRCP; Pia Stampe, PT, DPT; Suzanne Davis Bombria, PT

Purpose: This course will provide an overview of human neuroplasticity, emphasizing the impressive recovery advantage of pediatric versus adult brain injury.

Target Audience: Physicians, surgeons and physical therapists who work with children with cerebral palsy.

Course Summary: A wide range of neuroplastic interventions has now been incorporated into the best practice delivery model for adult patients with stroke. Implementation of a similar intensive pediatric service model will be discussed. This course will help participants recognize neuroplastic potential and to institute evidence-based and best practice protocols that can replace early formed maladaptive movement patterns in cerebral palsy.

Learning Objectives:
1. To understand the peak periods of pediatric neuroplasticity and the interaction of brain changes with periods of peak body growth velocity
2. To develop skills in uncovering evidence of brain recovery marked by maladaptive habits
3. To discuss neuroplasticity based treatment plans incorporating evidence-based intensive protocols for skill and strength training
4. To understand ways to incorporate intensive practice into a pediatric service model
IC07: PATIENT REPORTED OUTCOMES: STATE OF THE SCIENCE 2017
Carole Tucker, PhD; Katherine Bevans, PhD

Purpose: This course will provide an overview of state-of-the-science patient-reported outcome (PRO) assessment methods for use in pediatric rehabilitation. The workshop will prepare attendees to make informed decisions about the administration and interpretation of PRO measures in pediatric rehabilitation.

Target Audience: Clinicians, researchers and individuals involved in quality improvement processes as well as those interested in patient reported outcomes

Course Summary: This course will highlight the strengths and weaknesses of several child- and parent-report outcome measurement systems used in pediatric rehabilitation (e.g., PROMIS®, CP-CAT). It will identify numerous technological innovations aimed at improving the feasibility and accuracy of PRO assessment. These include hybridization of generic and condition specific measures; use of computerized adaptive test algorithms, application of computerized adaptive test algorithms and engaging data-capture platforms to enhance children’s self-report capacity, and integration of PRO data into electronic health records. Approaches to enhancing the interpretability and impact of PRO score reporting will also be reviewed. Lastly, workshop attendees will participate in a discussion with clinical leaders who systematically evaluate PROs in clinical care contexts.

Learning Objectives:
1. Understand the relative merits of multiple PRO assessment systems for use in pediatric rehabilitation
2. Understand technological innovations that may enhance PRO measurement in pediatric rehabilitation
3. Discuss ways of improving the interpretability and impact of PRO scores in clinical care contexts
4. Identify facilitators and barriers to using PRO measures in real-world pediatric rehabilitation settings

IC08: PRINCIPLES AND BASICS OF CLINICAL RESEARCH FOR CLINICIANS
Hiroko Matsumoto, MA, PhD; Brian Snyder, MD, PhD; Chan-Hee Jo, PhD

Purpose: The purpose of this instructional course is to provide clinicians with a basic understanding of study design, hypothesis development and testing, and data interpretation.

Target Audience: Clinicians and researchers who conduct clinical research with patients with cerebral palsy.

Course Summary: Conducting high quality research with patients with Cerebral Palsy has been challenging in many ways. Most investigators in the field are busy clinicians without much help from epidemiologists or biostatisticians. Therefore, developing a research hypothesis, designing a study, analyzing the data and interpreting the results can be extremely challenging. This instructional course will review 1) how to develop a testable research hypothesis, 2) basic study design that tests the hypothesis, 3) what to measure and 4) how to interpret results appropriately. There will be a working session for audience to participate. The session will involve direct audience participation in developing a research question, testable hypothesis, appropriate study design, meaningful statistic analyses, and interpretation of results. Participants are highly encouraged to bring their research ideas and questions to the course. At the end of the session, participants will have a basic understanding of how to conduct a clinical research.

Learning Objectives:
1. Develop a testable research hypothesis
2. Understand basic study design that tests a research hypothesis
3. Define variables to measure in their proposed studies
4. Interpret results appropriately
IC09: STEPPING INTO PHYSICAL THERAPY MANAGEMENT FOR INDIVIDUALS WITH CEREBRAL PALSY FOLLOWING SINGLE EVENT MULTI-LEVEL SURGERY
Kelly Greve, DPT; Michelle Menner, DPT

Purpose: Evidence-based recommendations will be provided to coordinate and improve care for physical therapists evaluating and treating individuals with cerebral palsy between 5-25 years old who have had a Single Event Multi-Level surgery (SEMLs). Clinicians will be informed of finalized clinical recommendations for this patient population. Case studies will be presented for ambulatory and non-ambulatory individuals receiving physical therapy following SEMLs.

Target Audience: Physical Therapists, Orthopedic Surgeons, PMR Physicians, Pediatricians, Occupational Therapists, Orthotists, Nurses, Social Workers, Child Life Specialists

Course Summary: Orthopedic surgeons prefer Single Event Multi-Level surgery (SEMLs) to improve bony and muscle alignment to maximize function and mobility for individuals with cerebral palsy. This surgical intervention is most successful when supported by physical therapy. To reduce the wide variation of care between pre and post-operative physical therapy, evidence-based physical therapy recommendations were developed for physical therapists evaluating and treating individuals with cerebral palsy undergoing SEMLs. A physical therapy algorithm will be presented along with case studies of ambulatory and non-ambulatory individuals who received physical therapy following SEMLs.

Learning Objectives:
1. Outline evidence-based recommendations for physical therapists evaluating and treating individuals with cerebral palsy undergoing SEMLs
2. Explain an evidence-based physical therapy algorithm for individuals with cerebral palsy undergoing SEMLs
3. Examine case studies across Gross Motor Function Classification System levels for physical therapy management in individuals with cerebral palsy undergoing SEMLs using evidence-based recommendations and an algorithm
4. Discuss gaps in the literature and future research for physical therapy management of individuals with cerebral palsy undergoing SEMLs

IC10: THE NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE (NINDS) AND AMERICAN ACADEMY OF CEREBRAL PALSY AND DEVELOPMENTAL MEDICINE (AACPDM) CEREBRAL PALSY COMMON DATA ELEMENTS (CDE) RECOMMENDATIONS
Joline Brandenburg, MD; Eileen Fowler, PhD, PT; Robin Feldman, B.S., M.B.A.; Sherita Alai, MS; Joy Esterlitz, M.S., Biostatistics

Purpose: Through a partnership with the American Academy of Cerebral Palsy and Developmental Medicine (AACPDM), the National Institute of Neurological Disorders and Stroke (NINDS), initiated the development of cerebral palsy (CP) specific Common Data Elements (CDE) as part of the NINDS project to develop data standards for all funded clinical research in neuroscience. The first iteration (Version 1.0) of the NINDS CP CDEs was made available on the NINDS CDE website in December 2016. Use of the CP CDEs and associated case report forms is highly recommended for investigators submitting research grant applications involving children with CP to NIH. Thus, this course is intended to facilitate a greater understanding about the CP CDEs and the NINDS CDE Website. This course includes information on CP CDEs definitions, how they were developed, and how to use them.

Target Audience: Any individual interested in or currently involved in cerebral palsy clinical research. This is particularly important for individuals submitting clinic research involving children with cerebral palsy to NIH as they will be required to use the CP CDE in their proposal or justify why they did not use this tool.

Course Summary: The CP CDEs are an important step towards faster CP study start-up and data sharing. For creation of the CP CDEs, the AACPDM created working groups (WG) consisting of worldwide experts in seven domains: (1) Participant Characteristics and Disease/Injury Related Events; (2) Health, Growth, Genetics, Comorbidities, and Labs; (3) Neuroimaging; (4) Neuromotor Skills and Functional Assessments; (5) Neurocognitive, Social, and Emotional Assessments; (6) Engagement and Quality of Life Assessments; and (7) Integrated Across Working Groups. In this course, we will discuss how the WGs developed the CP CDEs including the standardized process used. We will describe how to locate and use the recommended CP CDEs. This course will include demonstrations of navigating the NINDS CDE website and selecting CP CDEs; examples of how CP CDEs
may be used for a research study; how users can submit feedback; and an interactive session with CP CDE WG members where participants (bring own laptops) use the CP CDE website to identify CDE and instruments for their research projects.

This project was funded by: HHSN271201200034C.

Learning Objectives:
1. Define CP CDEs
2. Describe the process for development of the CP CDEs
3. Demonstrate how to navigate the NINDS CDE website
4. Demonstrate how to use CP CDEs and case report forms in a research study

IC11: THE SINGLE EVENT MULTI-LEVEL SURGERY (SEMLS) WENT WELL, NOW WHAT? AN EVIDENCED-BASED GUIDE TO MANAGEMENT IN THE FIRST YEAR AFTER SURGERY TO IMPROVE GAIT
Vedant Kulkarni, MD; Jon Davids, MD; Karen Howes, RN, FNP; Suzanne Bratkovich, PT

Purpose: Single-Event Multi-Level Surgery (SEMLS) has emerged as the standard of care for improving gait in children with cerebral palsy at high-volume centers using instrumented gait analysis. A successful outcome requires not only appropriately indicated and executed surgeries, but also effective post-operative pain management, orthotics, and rehabilitation. This course will provide the attendee with a variety of evidence-based methods for optimizing the experience and outcome in the first year after SEMLS.

Target Audience: Physical Therapists, Physical Medicine and Rehabilitation Physicians, Orthopaedic Surgeons, and Orthotists

Course Summary: The course divides the recovery after SEMLS surgery into four phases, each with unique challenges and priorities: the inpatient phase, early post-operative phase, early rehabilitation phase, and late rehabilitation phase. Participants will learn about multi-modal pain protocols, urinary retention prevention guidelines, and mobility techniques for the inpatient phase. For the early post-operative phase, the course will present methods for cast management of knee flexion contractures, pain management in the ambulatory setting, maintaining muscle strength and mobility, and prescribing orthotic prescriptions. The course will give techniques and goals for optimizing a child’s outcomes using a week-long outpatient intensive physical therapy program for the early rehabilitation phase. Finally, the course will cover methods for continuing progress in a community-based physical therapy in the late rehabilitation phase. In each phase, focus will be on guidelines and protocols that can be immediately applied into practice.

Learning Objectives:
1. Upon completion, participants will be able to define the priorities of the four phases of recovery after SEMLS surgery – inpatient, early post-operative, early rehabilitation, and late rehabilitation phases
2. Upon completion, participants will be able to apply multi-modal protocols for post-operative management of pain following SEMLS
3. Upon completion, participants will be able to tailor a child’s post-operative cast and orthotics based on the gait optimization goals
4. Upon completion, participants will be able to apply principles of rehabilitation appropriate for each phase of recovery

IC12: THE YEAR’S TOP TEN ARTICLES ON DEVELOPMENTAL DISABILITIES
Nancy Murphy, MD; Richard Adams, MD

Purpose: To present summaries of the ten most intriguing articles on developmental disabilities published in the past year (2016 to 2017), and to encourage discussion about them among participants.

Target Audience: Physicians, nurses, and other provider who care for children with developmental disabilities and want to keep abreast of the latest evidence-based, scientific findings that have the greatest translational impact on care. Cross disciplinary participation is welcome and encouraged. The articles selected are generally grounded in
medical context; however, the articles are relevant to those whose practices are focused on children and youth with disabilities.

**Course Summary:** The top ten clinically relevant articles published in English between Fall 2016 and Summer 2017 will be presented to the audience. Articles will be chosen from the presenters’ personal experiences as well as from searches in Medicine and CINAHL (Current Information in Nursing and Allied Health Literature). Categories from which the articles are typically chosen include the following: attention deficit hyperactivity disorder, autism spectrum disorders, cerebral palsy, congenital syndromes and genetic conditions, intellectual disabilities, spina bifida, and spinal cord and acquired brain injuries. They will be selected using the following criteria: (1) impact on clinical care, (2) scientific merit of the study [strength / validity], and (3) translation to clinical practice. The presenters will summarize the ten articles in reverse order (saving number one for last). Their impact on clinical practice, place in the context of current care, and their implications for future research will be discussed. The audience is encouraged to respond to each article as it is presented. A copy of the references and abstracts will be provided to the attendees.

**Learning Objectives:**
1. Summarize the major conclusions of each of the ten articles presented. a) Be inspired by the presentations to seek articles on their own
2. Identify areas in which additional research is needed
3. Evaluate the utility of each of the articles for their own clinical practice
4. Be inspired by the presentations to seek articles on their own

**IC13: USING COGNITIVE TRAINING (CO-OP APPROACH) AS A REHABILITATIVE TOOL FOR CHILDREN WITH NEURODEVELOPMENTAL DISORDERS INCLUDING CEREBRAL PALSY**

*Hortensia Gimeno, MSc, OT; Iona Novak, B App Sc (Occupational Therapy), MSc (Hons), PhD; Helene Polatajko, BOTA, MEd, PhD; Ann-Marie Ohrvall, PhD; Marie Peny-Dahlstrand, PhD*

**Purpose:** With the shift in paediatric neuro-rehabilitation to focus on interventions that address activity and participation, new therapeutic approaches are being developed and tested in children and young people with neuro-disabilities, including Cognitive Orientation to daily Occupational Performance Approach (CO-OP ApproachTM). CO-OP’s focus is on increasing activity and/or participation rather than redressing impairments, but the key difference between CO-OP and other motor learning approaches is CO-OP’s unique focus on child-led problem solving, making it a cognitive and motor intervention. The success of top-down interventions, such as task-oriented, goal-directed approaches and CO-OP in children with neurodevelopmental disabilities, has implications for understanding the modifiable attributes of activity performance. We propose to explore lessons learned from research and clinical practice about the the CO-OP ApproachTM. Initially developed for children with developmental coordination disorder (DCD), the approach has now been empirically tested with children and young persons with more severe motor deficits, such as cerebral palsy (CP).

**Target Audience:** This workshop will be suitable for clinicians and researchers in any area of neurodisability, both adult and paediatric populations. Specifically OTs, PTs, psychologists, neurologists, paediatricians, movement scientists.

**Course Summary:** We will draw on the expertise of researchers working with populations including Stroke, DCD, spastic CP, spina bifida, dystonia and hyperkinetic movement disorders to begin to elucidate the principles that drive motor skill acquisition and performance in these populations. The ingredients of this cognitive treatment approach and the similarities and differences between different diagnostic groups will be also explored. We will discuss implications of these research findings in terms of principles for practice. Videos will be shown to exemplify some of the salient ingredients of CO-OP intervention and activity performance changes.

**Learning Objectives:**
1. Recognise the key principles and ingredients for CO-OP
2. Outline emerging research evidence-base for CO-OP in children and young people/adults with cerebral palsy and other developmental disorders
3. Present new data on the effectiveness of the CO-OP Approach in populations other than developmental coordination disorder
4. Explore knowledge translation implications for the implementation of CO-OP
Breakfast Seminars (11-20) 7:00am – 8:00am
BRK11: A MODEL FOR CARE COORDINATION IN A PRIMARY MEDICAL & ORTHOPEDIC CEREBRAL PALSY CENTER
Kirk Dabney, MD; Margaret Salzbrenner Hoopes, MSN, CPNP-AC; Laura Owens, MD; Nancy Lennon, MS, PT

Purpose: This breakfast seminar will describe the evolution of a care coordination approach at a large cerebral palsy center in a regional children’s health specialty network. The presentation will include a review of the evidence supporting the utility of care coordination and its advantages for youth with severe motor impairment and medical co-morbidities. Presenters will review early results of programmatic initiatives and discuss experiences in adopting new care delivery methods.

Target Audience: Special Needs Health Care Physicians, Nurses, Therapists, Educators

Course Summary: This 60 minute seminar is designed to inform participants and answer questions about the latest practices in medical care coordination through a team presentation and a panel discussion. Topics include: review the definitions of, rationale for, and cost effectiveness of care coordination in a pediatric population with severe motor impairments and medical co-morbidities; care coordination functions to ensure patients needs and preferences are met over time with respect to health services and information sharing across people, functions, and sites; good models ensure seamless coordination of care between inpatient and outpatient services for complex patient populations; discuss the implementation of effective care coordination practices, define optimal patient ratios, check-ins for geographically remote patients, role as liaison between the patient and community resources, discuss support for better adherence to hip, scoliosis, and contractures screening protocols, describe the intersection points between orthopedics, primary care, physiatry, and medical subspecialties in a care coordination model for medically complex neuro-orthopedic patients, describe preoperative and postoperative education and follow-up, points of contact for acute problems, ‘real-time’ team communication and care planning, and smooth transitions to acute care, sub-acute care, and rehabilitation, and present strategies for evaluating the effectiveness of care coordination program initiatives.

Learning Objectives:
1. Articulate the definitions of care coordination according to the newest national healthcare research and quality agencies.
2. Understand the rationale for care coordination in reference to quality care, family experience, costs, and patient outcomes.
3. Take home specific care coordination techniques and practices that can be tailored to their own clinical setting.
4. Apply appropriate program evaluation tools to examine care coordination practices in their own clinical settings.

BRK12: BOTULINUM TOXIN A AND SPASTIC EQUINUS – WHEN TO START, HOW OFTEN AND WHEN TO STOP: A ROAD MAP FOR MANAGEMENT
Tandy Hastings-Ison, PhD; Abhay Khot, FRACS

Purpose: Describe factors contributing to the effective management of spastic equinus using Botulinum Toxin A (BoNT-A) and understand the balance between optimal frequency and duration of treatment.

Target Audience: Rehabilitation Medicine, Physiatrists, Physiotherapists, Developmental Paediatricians, Orthopaedics, Neurology, Orthotists

Course Summary: BoNT-A injections are considered to be the standard of care for children who have spastic equinus as the result of cerebral palsy (CP). Efficacy and an acceptable safety profile has been established with emerging evidence on injection frequency. However the long-term effects of BoNT-A on contractile properties within spastic muscle as evidenced in gait, may be less obvious. In particular, progressive contracture and the transition to surgery may be difficult to recognize. Mr Abhay Khot and Dr Hastings-Ison will present cases and discuss with participants the balance between benefit and cost of this effective treatment modality and transition points to surgical management.
Learning Objectives:
1. Review current literature regarding the use of BoNT-A in spastic muscle, in children with CP and animal models, with specific emphasis on objective measures of efficacy and frequency
2. Determine effective and ineffective clinical outcomes for BoNT-A treatment in spastic equinus
3. Identify factors which establish the balance between 'too much' and 'not enough' BoNT-A in the management of spastic equinus
4. Recognize stages within active BoNT-A management for appropriate planning towards surgical intervention

BRK13: CEREBRAL VISUAL IMPAIRMENT IN INFANCY: FROM NEUROPLASTICITY TO INTERVENTION
Giovanni Cioni, Prof.; Andrea Guzzetta, PhD, MD

Purpose: Describe the neuroplastic mechanisms of cerebral visual impairment in congenital lesions, illustrate current best tools for early detection, and propose possible strategies for early intervention.

Target Audience: Child Neurologists, Neonatologists, Physiotherapists, Occupational Therapists, Vision Scientists

Course Summary: More than two thirds of the human brain are devoted, directly or indirectly, to vision. It is therefore not surprising that cerebral visual impairment is common in children with cerebral palsy (CP). As for other brain functions, early brain damage induces specific mechanisms of neuroplastic reorganization in the visual system and non-invasive tools to explore them are now available, such as advanced neuroimaging and electrophysiology. Also, simple clinical tools can be used from birth onwards to thoroughly assess and characterize visual disorders in infants at risk for cerebral palsy, which give reliable insights on long term visual outcome. Starting from the understanding of early neuroplasticity of the visual system, Profs. Cioni and Guzzetta will discuss with participants the best tools for early detection of cerebral visual impairment and the possible therapeutic strategies to optimize visual outcome.

Learning Objectives:
1. Understand the causes and epidemiology of cerebral visual impairment in children with congenital brain damage
2. Understand how the young visual brain reacts to damage with specific mechanisms of neuroplastic reorganization
3. Describe the best assessment tools available for early characterization of visual functions and early detection of cerebral visual impairment
4. Illustrate possible early therapeutic strategies based on underlying mechanisms and initial evidence of efficacy

BRK14: COMPLEX CARE MEETS BIOMEDICAL ENGINEERING: A PARTNERSHIP THAT WORKS
James Plews-Ogan, MD, MS; Christopher Lunsford, MD; David Chen, MS/MBA

Purpose: To describe an effective partnership between The Children's Hospital, The Department of Biomedical Engineering (BME), the community, and families to design, build and evaluate personalized devices for children with significant disability and medical complexity.

Target Audience: The session is primarily directed toward clinicians, therapists, educators and families working with children who have significant medical complexity and disability who have found themselves frustrated by the limitations of standard therapeutic interventions.

Course Summary: Children with significant disability and medical complexity face vexing limitations in their ability to participate in daily activities that promote autonomy, inclusion, and self-efficacy. Working with BME students allows for the production of individualized devices that can address unique limitations. The presenters will discuss their novel partnership which has allowed undergraduate biomedical students to work alongside clinicians and therapists both in the clinic and home settings to develop custom devices. Special consideration was given to patients for whom the limits of traditional or stock devices, failed to completely meet their needs, even after attempts to customize the device. The pilot program serves the patient and providers in clinical goals as well as students and teachers in BME coursework. A film covering the project as well as details of program development, key partnerships, and patient selection will be presented.
Learning Objectives:
1. Understand the significance of novel partnerships to advance the clinical care of children with significant disability and medical complexity
2. Learn about the range of applications available through an undergraduate biomedical engineering laboratory
3. Understand the impact of highly personalized devices for children with medical complexity and disability
4. Understand the scope and mission of this project, and the ways it promotes learning and outcomes for students, professors, clinicians, therapists, patients and families

BRK15: DARE GREATLY: INVOLVING YOUTH WITH NEURODEVELOPMENTAL DISABILITIES AS CO-RESEARCHERS
Jessica Kramer, PhD; Ariel Schwartz, MSOT

Purpose: To improve the relevance of pediatric rehabilitation research, attendees will learn strategies to involve and support youth with neurodevelopmental disabilities as co-researchers.

Target Audience: Rehabilitation researchers

Course Summary: The disability rights movement and the UN Convention on the Rights of Persons with Disabilities demand that people with disabilities are involved in research concerning them. Participatory action research (PAR) is an approach in which stakeholders are involved in all phases of the research process. PAR is recognized as best practice in the disability community for its potential to provide insights unavailable to non-disabled researchers, increase the accessibility of research processes for other participants with disabilities, and enhance the relevance of research outcomes. Pediatric rehabilitation researchers may derive similar benefits from including youth with neurodevelopmental disabilities (NDD) as co researchers, yet there is little guidance on how to do so.

We will illustrate four theory-based strategies used to authentically engage youth with NDD in all stages of research. These strategies were implemented by the presenters to develop a new patient-reported outcome, the Pediatric Evaluation of Disability Inventory-PRO (PEDI-PRO), using a PAR approach with a team of 8 youth with NDD including autism, CP, Down syndrome, and spina bifida. We will present examples of each strategy and illustrate how each strategy can be implemented in a range of rehabilitation research contexts and topics. We will use a case-study format to demonstrate how youth co-researchers with NDD helped develop the PEDI-PRO’s innovative measurement approach and increased its content validity. Finally, the seminar will discuss solutions to issues related to feasibility of PAR with youth with NDD in rehabilitation research. Attendees will work in small groups to identify a phase of their research in which they may use the described strategies to increase the involvement of youth with NDD in their research and discuss feasibility challenges.

Learning Objectives:
1. Define participatory action research and explain how involvement of youth with NDD enhances the validity and relevance of research
2. Describe four theory-based strategies to facilitate the involvement of youth with NDD as co-researchers
3. Identify how to involve youth with NDD in their own research
4. Discuss potential challenges and solutions to collaborating with youth with NDD in rehabilitation research

BRK16: INTERPRETING HIP SURVEILLANCE X-RAYS WITH THE HIPSCREEN APP: A PRIMER FOR THE RADIOLOGY NOVICE
Vedant Kulkarni, MD; Jon Davids, MD; Kate Willoughby, B Physio, D Physio; Pamela Thomason, MPT

Purpose: Large population-based studies have shown that hip surveillance with well-timed x-rays and proper intervention can eliminate hip dislocations and the need for salvage surgeries in children with cerebral palsy. Each hip’s migration percentage, or the percentage of the femoral head (ball) outside of the acetabulum (socket) on a pelvis x-ray, is the most important radiographic measurement to predict progressive hip displacement. The free HipScreen App, awarded the AACPDM’s 2016 Fred P. Sage Award and the 2016 MacKeith Press Award, could enable a community-based approach to hip surveillance though the measurement of migration percentage using a mobile device.

Target Audience: All clinicians with an interest in hip surveillance radiograph interpretation.
Course Summary: This seminar will introduce participants without formal training in radiology to the fundamentals of interpretation of hip surveillance radiographs. Participants will be tutored on identifying important radiographic landmarks for the measurement of migration percentage, and will also learn radiographic signs of poor positioning that could limit the accuracy of the measurement. The majority of the seminar will be spent on actual measurement of hip surveillance radiographs using the free HipScreen App with coaching of experienced clinicians.

Learning Objectives:
1. Upon completion, participants will be able to use the HipScreen App to measure a hip’s migration percentage
2. Upon completion, participants will be able to identify important landmarks on a hip surveillance radiograph used for quantifying hip displacement
3. Upon completion, participants will be able to recognize features of poor patient positioning for radiographs that could cause inaccuracy of the migration percentage measurement
4. Upon completion, participants will be able to understand protocols for proper positioning of children to obtain accurate hip surveillance radiographs

BRK17: MEET ME IN THE ARENA: FIGHTING FOR RECREATIONAL OPPORTUNITIES FOR CHILDREN AND YOUTH WITH DISABILITIES
Keiko Shikako-Thomas, BSc (OT), PhD; Gavin Colquitt, EdD; Jessica Camilleri, DO; Nienke Dosa, MD, MPH

Purpose: To enlighten and empower clinicians and families to dare greatly in creating programs that go beyond clinical settings and connecting children and youth with disabilities to school and community-based leisure activities, and national adapted sports and recreation programs. Participants will be able to understand basic language of local legislature (Canada, U.S.) and International frameworks, identify supportive policies for families, and outline the benefits of adapted physical activity and leisure activities outside of clinical settings.

Target Audience: This course is applicable to clinicians treating children and youth with cerebral palsy and other childhood onset conditions as well as the individual with a childhood onset condition and their families as participants will gain knowledge to promote and engage in exercise and recreation beyond clinical environments.

Course Summary: Engagement in leisure and physical activities is essential to the social, physical, and mental well-being of children with cerebral palsy and other developmental disabilities. Therapists, practitioners, and educators can play a key role in advocating for school- and community-based opportunities for adapted sport, recreation, and inclusive fitness. Policy and funding often mediates access for families. This course will present successful cases and will discuss some tools for the creation and implementation of inclusive leisure programs. We will provide recommendations on how to leverage policy and to support the creation of programs that can expand and promote physical activity for youth with cerebral palsy and other developmental disabilities with illustrations from case studies. Audience members will be asked to provide examples from their experiences, which will be addressed in an interactive manner to problem solve barriers, implementation and sustainability.

Learning Objectives:
1. Appreciate the scope of opportunities for accessing sports, recreation, and wellness activities and programs for children and youth with disabilities in the community and clinical settings
2. Understand the variety of policies at the local, regional, national and international levels that can influence physical activity and leisure programs for children and youth with disabilities
3. Identify specific strategies for leveraging local assets to create inclusive school- and community-based programs
4. Illustrate concrete actionable ways clinicians can support patients and families identifying and promoting engagement in physical and other leisure activities outside the clinical context

BRK18: QUALITY IMPROVEMENT THROUGH THE CEREBRAL PALSY RESEARCH NETWORK
Paul Gross, BA; Robert Bollo, MD, MS

Purpose: To educate Academy members on how the Cerebral Palsy Research Network (CPRN) will leverage its clinical registry for quality improvement (QI) initiatives.

Target Audience: All attendees who are interested in the potential for quality improvement to rapidly change outcomes in cerebral palsy.
Course Summary: This course will review the infrastructure that CPRN has put in place to conduct quality improvement initiatives. It will briefly cover quality improvement methodology and how CPRN can apply QI techniques throughout the network to rapidly improve outcomes. The course will then present its initial foray into QI through the implementation of a protocol to standardize the procedure for intrathecal Baclofen (ITB) pumps to reduce pump infection rates. Dr. Robert Bollo, a pediatric neurosurgeon from University of Utah and the principal investigator for the CPRN ITB pump protocol, will present the initial retrospective review of ITB pump infection data from 79 procedures in 90 patients over 30 months at Primary Children's Hospital (Salt Lake City, UT) as well as data from implementation of the same protocol at Texas Children's Hospital (Houston, TX) and Wolfson Children’s Hospital (Jacksonville, FL). Dr. Bollo will share how non CPRN sites can implement the ITB pump protocol at their sites.

Learning Objectives:
1. Describe how quality improvement methodology can be applied to cerebral palsy to rapidly change outcomes
2. Understand how the CPRN clinical registry and other CPRN infrastructure can be used not only for clinical research but also for quality improvement initiatives
3. See how the first CPRN quality improvement protocol is being used to reduce infection rates for intrathecal Baclofen pumps
4. Provide preliminary infrastructure suggestions to their institution to participate in the ITB pump infection quality improvement protocol

BRK19: READING BETWEEN THE LINES: USING METABOLIC AND GENETIC TESTING TO FURTHER ASSESS PATIENTS WITH CEREBRAL PALSY
Aloysia Schwabe, MD; Shannon DiCarlo, MD

Purpose: Improve familiarity with the clinical indications for further workup of patients with cerebral palsy and to review the appropriate stepwise evaluation of patients including currently available forms of testing which have changed over the last decade.

Target Audience: Physicians, nurses, case managers, and therapists

Course Summary: Cerebral palsy is an extremely broad diagnosis and can have varied underlying causes. Our knowledge of human genetics has evolved greatly within the past decade and numerous patients who were previously diagnosed as having cerebral palsy are likely to have a genetic or metabolic component contributing to their clinical picture. Physicians must be able to perform assessment of each patient on a case by case basis. Drs. DiCarlo and Schwabe will discuss with participants which patients should have further evaluation and the best diagnostic tools to be used for each type of patient.

Learning Objectives:
1. Recognize patients with a diagnosis of cerebral palsy that would benefit from further clinical investigations
2. Understand the types of investigations that are available and when they should be used
3. Utilize a cost effective, step-wise assessment of such patients
4. Discuss with families the significant of test results and next steps

BRK20: SPINA BIFIDA: MANAGEMENT TOWARDS AN OPTIMAL UPRIGHT STANDING AND WALKING
Eva Pontén, MD, PhD; Åsa Bartonek, PT PhD; Marie Eriksson, CPO, PhD; Elena Gutierrez Farewik, PhD

Purpose: Teach a team based approach to the treatment of children with spina bifida

Target Audience: Orthopedic surgeons, physiotherapist, orthotists, biomechanical engineers

Course Summary: Spina bifida is a central neural system malformation associated not only with neurological deficits of motor and sensory function of the lower limbs, but also of impairments of a more central origin resulting in e.g. poor balance and reduced sense of orientation. Ambulation is often possible if the child has knee extension strength. In this symposium, the Stockholm Spina Bifida Team will describe their management of children with spina bifida, with emphasis on encouragement to sit, stand and possibly walk at the same time points as typically developed peers. As a dislocated hip will result in reduced stability, attention is kept to keep the hips in position, first by abduction orthotics, and then with bony surgery. Best possible mobility, stability and strength are emphasized. For a plantigrade foot, Ponseti-like management is used with serial casting and possibly Achilles
tendon tenotomy. Standers are aligned for good balance, as are hip-knee-ankle-foot orthoses (HKAFO), knee-ankle-foot orthosis (KAFO) and ankle foot orthoses (AFO). These prerequisites will help the child to ambulate without using crutches, enabling them to use their hands for daily activities. Cases will be presented and possible treatments will be discussed with the participants. The course is based on peer reviewed scientific research on spina bifida regarding e.g. classification, physiotherapy, orthotics, orthopaedic findings, gait analysis, spasticity and health related quality of life.

**Learning Objectives:**
1. Grade the child into muscle function class MFC I-V, i.e. Sacral, Low lumbar, Mid-lumbar and High lumbar/Thoracic level and identify additional ambulation-related factors, e.g. contractures, spasticity, balance problems and hypotonia
2. With the help of the MFC, choose the most optimal balanced and stable orthotics that will have the child standing and walking at about the same age as their peers
3. Choose the appropriate orthopaedic intervention for each MFC that will prevent deformities and help the child keep an upright and balanced standing and walking and an optimal sitting
4. Achieve optimal gait with the body aligned by keeping the hips contained, preventing deformities and using stable orthoses that reduce the need for crutches

**Instructional Courses (14-27) 4:00pm – 6:00pm**

**IC14: A MULTIDISCIPLINARY APPROACH TO IMPROVING GAIT IN CHILDREN WITH CEREBRAL PALSY WITH RHIZOTOMY: PATIENT SELECTION, SHORT TERM OUTCOMES AND LONG TERM OUTCOMES**

*Marcie Ward, MD; Peter Kim, MD, PhD; Tom Novacheck, MD*

**Purpose:** To disseminate an evidenced based approach for improving ambulatory function in the pediatric patient with cerebral palsy using a multidisciplinary strategy which explores motion analysis data, safe patient selection for rhizotomy and orthopedic surgery to maximize gait.

**Target Audience:** Developmental pediatricians, pediatric neurologists, neurosurgeons, pediatric orthopedic surgeons, pediatric physiatrists, physical therapists and other providers who want to know more about how to improve the function of their ambulatory patients with cerebral palsy.

**Course Summary:** This course will cover an evidence based multidisciplinary approach to evaluating the ambulatory patient with cerebral palsy for consideration of selective dorsal rhizotomy using selection criteria predictive of a favorable outcome. The selection criteria will be highlighted and the evaluation process explained. The post-operative rehabilitation of the patient following rhizotomy will be reviewed, as well as, the role of subsequent orthopedic surgical intervention. Finally, the long term outcomes following selective dorsal rhizotomy will be summarized and discussed. Audience response software will be used to collect aggregate participant data for the purpose of adjusting the content to the needs of the audience and to generate collaborative discussion during case presentations.

**Learning Objectives:**
1. Describe patient selection for selective dorsal rhizotomy that uses a multidisciplinary approach which predicts a favorable outcome
2. Examine the various approaches to performing a rhizotomy and consider the benefits to utilizing a selective approach
3. Summarize the benefits of a coordinated rehabilitation program following SDR
4. Explain the short and long term outcome data available following selective dorsal rhizotomy

**IC15: AN OVERVIEW AND UPDATE OF EVALUATION AND MANAGEMENT OF PAIN IN PEOPLE WITH CEREBRAL PALSY**

*Hiroko Matsumoto, MA, PhD; Heakyung Kim, MD; Daniel Linhares, MD; Wade Shrader, M.D.; David Roye, MD; Darcy Fehlings, MD, MSc, FRCP(C)*

**Purpose:** 1. To discuss the current state of pain assessment in verbal and non-verbal patients, and describe ongoing research in improving pain evaluation; 2. To understand current modalities of operative, non-operative & pharmacologic management of pain for pediatric and adult patients with CP; 3. To describe optimized management of pain in people with CP; 4. To present and discuss cases with audience
Target Audience: Physicians, nurses, PA, PT, OT, and other medical professionals caring for the population with cerebral palsy. Patients with cerebral palsy and family members will also benefit from this course.

Course Summary: ~20-60% of people with Cerebral Palsy (CP) have daily pain. Nearly 70% of adults with CP report chronic pain; 33% of these patients are discontent with their pain management. Given its subjective nature, pain evaluation & management is challenging. Many patients with CP have difficulty expressing their pain, adding an extra layer of complexity. As a result, treatment may be inadequate or delayed, leading to an increased burden of care for families, caregivers and the health system. Thus, there is a need for investigation & improvement in the evaluation and treatment of pain in people with CP.

Learning Objectives:
1. Discuss the current state of pain assessment in verbal and non-verbal patients and to have a general understanding of the ongoing research in improving pain evaluation
2. Describe the available modalities for operative, conservative, and pharmacological management of pain for both pediatric and adult patients with cerebral palsy
3. More accurately recognize the symptoms of pain in patients with cerebral palsy and to be able to form a comprehensive differential for the cause of pain
4. Identify commonly utilized and validated instruments for evaluating pain

IC16: BRAIN STRUCTURE AND FUNCTION IN CHILDREN WITH CEREBRAL PALSY: STATE OF THE CLINICAL SCIENCE
Roslyn Boyd, PhD, MSc (PT), BAppSc (PT), BSc (Anatomy), Pgrad (Biomech); Andrea Guzzetta, PhD, MD; Alex Pagnozzi, BEng

Purpose: This multidisciplinary group (Neurologist, Physicist, Neuroscientist) from Italy and Australia will provide a scientific and clinical update on the evaluation of brain structure and function in children with Cerebral Palsy. The workshop will present recent published validation, reliability of a new semi-quantitative scale of brain structure and relate this to use of automated analysis of structural imaging which has utility for measurement of brain structure and function in both clinical and research settings.

Target Audience: All health professionals involved in the research and clinical management of children with cerebral palsy (including Child Neurologists, Neuroscientists, Physicians, Physical and Occupational Therapists, Psychologists and Orthopaedic Surgeons).

Course Summary: The Fiori semi-quantitative scale of brain lesion severity has reliability, validity (concurrent with diffusion MRI) and is related to motor (gross and fine motor (unimanual/bimanual) manual ability, communication, oropharyngeal dysphagia, growth, school readiness and hip development. Co-utilisation of Fiori scale and qualitative classifications of brain lesions into aetio-pathogenic categories (e.g. Krägeloh-Mann (KM) will be discussed. Optimisation of the Fiori scale and current development where scans will be quantitatively assessed in a fully automated fashion using the latest cloud computing technology will be presented.

Learning Objectives:
1. Describe current methods for classification/evaluation of structural MRI images using the Fiori Semi-Quantitative scale and Krägeloh-Mann aetiological pathogenic classification for brain lesion severity in children with CP
2. Understand use of the Fiori Semi-Quantitative scale to measure brain lesion severity in children with both unilateral and bilateral Cerebral Palsy
3. Understand the relationship between brain structure using the Fiori Semi-Quantitative scale to measure brain lesion severity and the relationship to function (Motor, manual ability, school readiness) in CP
4. Identify and understand the current state of the science of Advanced techniques including automated analysis to analyses brain micro and macro structure in children with CP
IC17: ETHICAL ISSUES IN NEURODEVELOPMENTAL DISABILITY: AN OPEN FORUM ON PROCESSES TO ADDRESS THEM

Peter Rosenbaum, MD, FRCP; Gabriel Ronen, MD, FRCP(C); Eric Racine, PhD; Jennifer Johannesen, MS Bioethics and Health Policy; Bernard Dan, MD, PhD

Purpose: A few years ago AACPDM colleagues and other developmentalists and child neurologists participated in an international survey that identified the myriad moral issues with which people in our field wrestle every day. (These contributions were essential in the creating of a book on the subject.) Our goal in this two-hour course is to offer people the opportunity to bring personally challenging clinical situations forward for discussion. The aims are (i) to model a process in which people feel comfortable to address and consider questions, situations and dilemmas collaboratively in a secure and an ethically-informed manner, and (ii) to discuss ways to address, analyze and resolve those cases and their relevance to clinical practice in an ethical framework.

Target Audience: All clinicians in the field of neurodisability.

Course Summary: Moral issues pervade every aspect of human interaction. They are especially important in clinical situations where uncertainty, ambiguity, and varying perspectives and values can and should create discomfort for patients, families and service providers. Though there are no easy formulas by which to identify, let alone resolve, these dilemmas, there are well-established principles to guide clinical thinking and promote ethical approaches to these uncomfortable situations. This interactive course is designed to offer insights into some of these approaches.

Learning Objectives:
1. Bring to people’s attention the reality that ethical issues and dilemmas abound all around us in everyday clinical practice
2. Reflect on the challenges we all experience as clinicians when faced with these issues
3. Model approaches to a process to articulate the clinical and personal aspects of these issues and to consider them in the safety of a collegial group discussion
4. Offer frameworks by which ethical dilemmas can be framed and addressed.

IC18: EVALUATION OF ORTHOSIS FUNCTION IN CHILDREN WITH NEUROMUSCULAR DISORDERS USING MOTION ANALYSIS OUTCOMES

Sylvia Ounpuu, MSc; Kristan Pierz, MD

Purpose: The purpose of this course is to demonstrate the use of gait analysis in the understanding of orthosis function and prescription in children and adolescents with neuromuscular disorders.

Target Audience: Physicians, orthotists, physical therapists and kinesiologists who are involved in making prescriptions and evaluating the function of orthoses in persons with neuromuscular disorders.

Course Summary: The course will begin with a brief overview of the principles of joint kinematics and kinetics with a focus on the ankle. Typical joint kinematic and kinetic patterns will be reviewed, followed by an interactive exercise in identification of atypical joint kinetic patterns for ambulatory persons with neuromuscular diseases. The kinematic and kinetic goals of brace function will be discussed.

In the second half of the tutorial, the impact of ankle foot orthoses (AFO’s) on joint function in terms of joint kinematics and kinetics will be discussed using multiple case examples. The impact of the orthoses (supramalleolar (SMO), posterior leaf spring (PLS), solid AFO’s, floor reaction (FRO) and hinged AFO’s) will be determined by direct comparison of kinematic and kinetic data collected during brace and barefoot walking. Emphasis will be on effect of orthosis design rather than material properties. Cases from a variety of neuromuscular disorders (cerebral palsy, myelomeningocele and Charcot-Marie-Tooth) will be reviewed in an interactive format with the assistance of video records.

Learning Objectives:
1. Be familiar with basic tools needed to interpret joint kinematic and kinetic data
2. Be familiar with typical and atypical joint kinematic and kinetic patterns
3. Be familiar with the goals of orthosis function in terms of joint kinematics and kinetics
4. Understand the clinical utility of incorporating joint kinetic concepts in orthosis prescription and decision-making
IC19: GAIT ANALYSIS AT YOUR FINGERTIPS: ENHANCING OBSERVATIONAL GAIT ANALYSIS USING MOBILE DEVICE TECHNOLOGY AND THE EDINBURGH VISUAL GAIT SCALE

Jon Davids, MD; Vedant Kulkarni, MD; Leslie Torburn, DPT

Purpose: Optimizing and improving gait for children with neuromuscular disorders requires accurate observational gait analysis. Mobile devices such as smartphones and tablets now allow for frame-by-frame video analysis using the device’s built-in camera and low-cost or free video editing applications. Systematic evaluation of the gait video is best performed by using the Edinburgh Visual Gait Scale (EVGS), which has undergone extensive psychometric testing. (Read et al, J Pediatr Orthop 2003; 23:296-301) With these tools gait analysis can be expanded to a large variety of clinical settings outside a formal 3D Gait Analysis Lab. Accurate and meaningful observational gait analysis can be truly at your fingertips.

Target Audience: All clinicians who perform observational gait analysis.

Course Summary: This course provides the foundation for performing observational gait analysis enhanced by mobile app technology using the Edinburg Visual Gait Scale. The course will begin with an overview of normal gait and a summary of the most common gait deviations seen in children with neuromuscular disorders. Then, the optimal techniques for acquisition and analysis of gait videos using a mobile device will be presented. The Edinburg Visual Gait Scale will be reviewed, and case examples will be utilized to illustrate the principles of video acquisition, processing, and analysis.

Learning Objectives:
1. Understand the phases and sub-phases of the normal gait cycle in the sagittal and coronal planes
2. Identify the most common gait deviations seen in children with neuromuscular disorders
3. Understand the principles of accurate video acquisition of gait in the sagittal and coronal planes using a mobile device
4. Participate in hands on learning using your own mobile device to systematically analyze gait videos and classify gait deviations using the Edinburgh Gait Visual Scale

IC20: HOW TO INCORPORATE MOTOR LEARNING STRATEGIES INTO MOTOR SKILLS-BASED INTERVENTIONS FOR CHILDREN WITH CEREBRAL PALSY

Jennifer Ryan, PT; Virginia Wright, BSc(PT), MSc, PhD

Purpose: This course focuses on application of motor learning strategies (MLS) in motor skills-based interventions for children with cerebral palsy (CP). There is growing evidence supporting the use of MLS in CP. The course will define motor learning and MLS, and outline how MLS can be intentionally incorporated into a motor skills-based intervention. Twenty MLS from the revised Motor Learning Strategies Rating Instrument (MLSRI-20), which was developed to document MLS use within therapy sessions, will be presented. This workshop will help clinicians adopt a motor learning-based focus in their interventions and expand their “toolbox” of MLS techniques for children with CP.

Target Audience: Pediatric physiotherapists and occupational therapists who teach motor skills to children with CP

Course Summary: A common goal of physiotherapy intervention for children with CP is acquisition of motor skills and transfer of these skills into daily activities (Valvano, 2004). Despite these goals, paediatric physiotherapists are often unsure how to intentionally apply motor learning principles in their interventions (Hayes, 1999). One approach is to apply MLS, the observable therapeutic actions of the therapist that involve selection, application, and manipulation of motor learning variables based on task- and child-specific factors (Levac, 2011). The MLSRI-20 is an assessment tool used to rate the extent to which 20 MLS are observed in a video of a motor skills-based physiotherapy session. The rating provides an objective profile of a clinician’s MLS practice style as tailored to the child and intervention. Video examples, case studies from the presenters’ research, and small group discussions will help participants identify MLS they already use in their interventions, reflect on why they use them, and provide new MLS they can consider in future. Upon completion of this course, participants will be given unlimited, registered access to an online training module that outlines these MLS and how to use the MLSRI-20, and provides an option for the user to becomes MLSRI-20 certified.
Learning Objectives:
1. Understand how to incorporate motor learning principles into their clinical practice when teaching motor skills to children with CP
2. Describe 20 different MLS and understand how each is operationalized
3. Explain how a therapy session can be organized to promote motor learning through the use of MLS
4. Identify the MLS used by therapists, as viewed from videos of treatment sessions

IC21: INTRODUCTION TO THE NEW AACPDM HIP SURVEILLANCE CARE PATHWAY FOR CHILDREN WITH CEREBRAL PALSY: WHAT’S THE CONSENSUS? HOW CAN IT BE IMPLEMENTED?
Maureen O’Donnell, MD MSc FRCP; Tanja Mayson, MS; Stacey Miller, PT; Kate Willoughby, B Physio, D Physio; Pamela Thomason, MPT; Benjamin Shore, MD, MPH, FRCSC

Purpose: This basic level course will provide an overview of the new AACPDM Care Pathway on Hip Surveillance for Children with CP, created through international multi-disciplinary collaboration. Differences between international approaches, clinical “sticky wickets” and implementation tips from the perspective of multiple disciplines and clinical settings will be provided.

Target Audience: Therapists, rehabilitation physicians, developmental pediatricians, orthopedic surgeons

Course Summary: Hip surveillance has been shown to reduce the incidence of hip dislocations and the need for salvage surgeries. A number of leading approaches to hip surveillance have been developed across the globe. In 2016, the AACPDM invited a multi-disciplinary group of experts from Australia, Canada, Scotland and the US to collaborate and develop a hip surveillance care pathway for children with CP. This course will present the final consensus from that endeavor. Elements of the pathway include eligibility for surveillance, commencement and discharge criteria, frequency of surveillance (clinical and radiographic) by GMFCS level and criteria for referral to an orthopaedic surgeon. “Sticky wickets” as well as suggestions for “Hip Health” adjuncts from the consensus group will be provided. Practical “how to” tips will be provided by the international panel, presenting their suggestions re successful surveillance. Views will be presented from the perspectives of different disciplines and different healthcare settings and systems. Time for open discussion with the panelists will be provided.

Learning Objectives:
1. Describe the evidence in support of hip surveillance and the clinical components of hip surveillance
2. Understand the evidence behind, process for development of and content of the new international pathway
3. List additional “hip health” adjunctive tips that were created by the international consensus group and may be useful to clinicians
4. Describe practical “tips” for implementing hip surveillance from the perspectives of a variety of disciplines, a variety of practice settings, including clinic, community, and state/province, and various health systems

IC22: MEASURING THE QUALITY OF LIFE (QOL) OF CHILDREN WITH CEREBRAL PALSY: CHOOSING THE BEST INSTRUMENTS
Elise Davis, PhD; Elena Swift, MRes; Dinah Reddihough, MBBS

Purpose: To enhance the understanding of the measurement of QOL of children with cerebral palsy and assist with selecting the most appropriate instrument for research, clinical and evaluation purposes.

Target Audience: Health care professionals, including physiatrists, orthopedic surgeons, pediatricians, pediatric neurologists, physical and occupational therapists who are involved in research with children with cerebral palsy.
Course Summary: There are now 30 generic QOL instruments and 64 condition-specific instruments available for children and it is difficult for clinicians and researchers to choose an instrument. This workshop will include a discussion of how QOL is measured, including the unique issues for children with a disability. This discussion will be guided by a recent review of generic QOL instruments conducted by the authors to support clinicians and service providers to identify the best instrument for them. Furthermore, this workshop will include an in-depth evaluation of all of the condition-specific QOL instruments for children with cerebral palsy, including our own instrument, the Cerebral Palsy Quality of Life Questionnaire for Children (translated into 25 different languages). Findings from two new qualitative studies with children with cerebral palsy and their parents on the domains of life that are important to children and parents today will also be presented. Case studies will be presented and discussed with participants in groups to highlight and discuss the challenges involved in choosing an instrument, implementing and interpreting it.

Learning Objectives:
1. Understand the measurement challenges inherent in the area of children's QOL, with a focus on children with a disability
2. Critically appraise existing generic instruments for children with cerebral palsy, examining criteria important for researchers, clinicians and service providers
3. Critically appraise existing condition-specific instruments for children with cerebral palsy, examining criteria important for researchers, clinicians and service providers
4. List the important areas of life for children with cerebral palsy and their parents and understand how these areas have changed over the last 10 years

IC23: ORTHOPAEDIC SURGERY FOR THE SPINE AND LOWER LIMB IN CHILDREN WITH CEREBRAL PALSY
Robert Kay, MD; Lindsay Andras, MD

Purpose: To educate attendees regarding current methods for Orthopaedic evaluation and non-surgical and surgical orthopaedic treatment of spine and lower extremity problems in children with cerebral palsy (CP).

Target Audience: Physicians and physical therapists

Course Summary: Faculty will discuss state-of-the-art and established evaluation and surgical and non-surgical treatment techniques of spine and lower extremity problems in children with CP. Discussion will focus on common challenges encountered at the spine, hip, knee, long bones, and foot and ankle. Surgical indications and contraindications will be discussed. Emphasis will be placed on common challenges in problem identification and treatment recommendations, and ways to minimize errors and maximize patient outcomes. Content will be based both on the presenters' clinical expertise and evidence-based review of literature. The presenters will use x-rays, photographs and videos and handouts will be provided. Group discussion of difficult cases and clinical problems will be encouraged.

Learning Objectives:
1. Accurately identify the most common spine and lower extremity problems in children with CP
2. Identify common pitfalls in surgical and non-surgical care of these children
3. Define one or more ways to avoid common treatment errors
4. Gain perspective on the complexity of surgical planning for children with CP

IC24: PEARLS AND PITFALLS OF PARTICIPATION-FOCUSED INTERVENTIONS FOR CHILDREN WITH PHYSICAL DISABILITIES
Leanne Sakzewski, PhD, BOccThy; Sarah Reedman, BPhy (Hons); Catherine Elliott, PhD, BSc (OT); Claire Willis, BExSc(Hons)

Purpose: This course will present the processes and challenges of delivering a participation-focused intervention to increase active physical leisure participation for children with cerebral palsy. Attendees will gain a practical understanding of developing participation-focused goals, evaluating barriers and enablers to participation, developing and delivering a goal-directed, family-focused multi-strategy intervention to enable children and families to meet participation goals.

Target Audience: Physical Therapists, Occupational Therapists
Course Summary: This course brings together a panel of clinician researchers with experience and knowledge of participation for children with physical disabilities. We present new data about consumer needs and preferences for participation-focused interventions, current state of the evidence for participation interventions, and results from a randomized controlled trial (RCT) of an intervention aimed to increase active physical leisure participation. Attendees will participate in case discussions to develop an intervention plan based on a family’s unique participation goals, barriers and enablers to participation, and initial readiness for physical activity behavior change.

Learning Objectives:
1. Upon completion, participants will be able to understand consumer needs/preferences for participation focused interventions for children with physical disabilities
2. Upon completion, participants will be able to understand the processes and challenges of delivering participation focused interventions for children with physical disabilities
3. Upon completion, participants will be able to develop an participation focused intervention plan, including framing participation goals, exploring barriers and enablers to participation and linking intervention strategies to modifiable barriers
4. Upon completion, participants will have an understanding of a new paediatric self-report tool to explore a child’s participation in home, school and community settings

IC25: PROVIDING POWER MOBILITY FOR CHILDREN WITH MULTIPLE, SEVERE DISABILITIES: TRAINING METHODS AND OUTCOMES
Lisa Kenyon, PT, DPT, PhD, PCS; John Farris, PhD

Purpose: Children with severe motor, cognitive, and communication deficits are limited in their ability to use self-initiated movement and yet are frequently dismissed as “too involved” or “too low functioning” to use power mobility. This course will provide details related to the interventions and outcomes in our power mobility training program for individuals who have multiple, severe disabilities (ages 9 months to 26 years).

Target Audience: Physical and occupational therapists, developmental pediatricians, special educators, etc.

Course Summary: Intervention techniques focused on creating an engaging environment customized to target the emergence of basic power mobility skills through environmental exploration and play will be presented. Case studies and examples from our program will be used to illustrate key concepts. Consideration of outcomes and expectations for the use of power mobility interventions in this unique population will be discussed. Findings from our work exploring changes in the spectrum of electroencephalography (EEG) activity and the possible development of functional neural networks following power mobility training in this population also will be explored.

Learning Objectives:
1. Describe the components of power mobility interventions designed to meet the individual needs of children with multiple, severe disabilities
2. Discuss potential outcomes of power mobility use in children with multiple, severe disabilities
3. List 3 means by which to evaluate outcomes of power mobility interventions in this unique population
4. Discuss the potential impact of power mobility training on the spectrum of electroencephalography (EEG) activity in children with multiple, severe disabilities

IC26: TRANSFORMING HEALTHCARE FOR WOMEN WITH DISABILITIES: EDUCATIONAL TOOLS TO PROMOTE SEXUAL AND REPRODUCTIVE HEALTH FOR YOUNG WOMEN WITH CEREBRAL PALSY
Laurie Glader, MD; Susan Gray, MD

Purpose: To share newly developed SMART tools for promoting sexual and reproductive health for female patients with cerebral palsy.

Target Audience: Pediatricians, developmental pediatricians, physiatrists, nurses, physical therapists, occupational therapists.

Course Summary: Many young adults with CP receive some reproductive health education from schools, parents, media, or peers about topics such as birth control and sexually transmitted infections, but only a small percentage receives specific information about disability and sexuality. Through work with the multi-site Transforming
Healthcare for Women with Disabilities research team, several new tools have been created to encourage both young women and their providers to begin conversations about sexual and reproductive health concerns. These tools include a) a SMART tool to help guide providers in conducting visits with young women with CP, b) a SMART tool for young women with CP to empower them to start conversations with their healthcare providers, and c) a series of short films (digital stories) showcasing the personal experiences of young women with CP. In this workshop, we will present these tools and model how they could potentially be integrated into clinical work. Throughout, audience participation will be solicited, including a break out session for small group work.

Learning Objectives:
1. Identify data from the literature documenting need for improved education about sexual health for young women with CP
2. Be able to list high priority areas for sexual and reproductive health care discussion for young women with cerebral palsy
3. Identify resources for both patients and providers that expand upon sexual health topics broached at a health visit
4. Develop skills to use the SMART mnemonic to facilitate conversations with young women with CP about sexual and reproductive health concerns

IC27: TROUBLE-SHOOTING FOR CAREGIVERS OF CHILDREN WITH TRACHEOSTOMIES OR HOME CARE VENTILATORS IN THE OUTPATIENT SETTING
Beverly Lullo, MS RRT-NPS; Luanda Rodriguez, RN
Purpose: Many children with neurological and neuromuscular disorders have respiratory complications. Some children progress to a tracheostomy due to upper airway obstruction or anomaly, while others may additionally require home care ventilator support. These children often present with potentially serious safety issues that require prompt recognition and management. In our complex care program, we care for over 50 patients, about 50% of which have tracheostomies and 33% of which have home mechanical ventilation. Our respiratory therapist identified over 40 safety issues related to respiratory care over one year after opening our program and was able to tailor and streamline subsequent education provided to families, home care providers and clinic-based staff. In light of these findings, this course/hands on workshop will present assessment skills and strategies to quickly recognize and troubleshoot potentially serious problems with the child’s tracheostomy tube and/or home ventilator in the outpatient setting.

Target Audience: Anyone who cares for medically complex children who have a tracheostomy tube or home ventilator to include parents.

Course Summary: This course is a hands-on workshop where a variety of tracheostomy tubes, their adjuncts such as in-line suction, and their applications will be reviewed and discussed. Safe, routine care of the child with a tracheostomy and/or ventilator and prevention of safety issues associated with having an advanced airway will be discussed through the use of clinical cases. Attendees will work through simulated cases to determine if the child is experiencing an emergency related to the tracheostomy tube or the home care ventilator. Presenters will also review troubleshooting techniques that can be employed for ventilators and strategies to ensure respiratory-related safety in the home setting.

Learning Objectives:
1. Understand appropriate applications for different types of tracheostomy tubes as well as basic tracheostomy care including the use of various tracheostomy adjuncts
2. Understand of the basics of mechanical ventilation in the home setting and perform ventilator troubleshooting skills
3. Demonstrate ability to use trouble-shooting algorithms to determine the cause of device-related respiratory emergencies
4. Describe respiratory-related safety issues as related to the Child with a Tracheostomy and preventative measures to avoid them
Breakfast Seminars (21-30) 7:00am – 8:00am

BRK21: BRIDGING THE GAP BETWEEN NEUROSCIENCE AND CLINICAL RESEARCH IN UNILATERAL CEREBRAL PALSY
Ellen Jaspers, PT, MSc, PhD; Katrijn Klingels, PT, MSc, PhD; Cristina Simon-Martinez, PT, MSc; Adam Kirton, MD, MSc, FRCP

**Purpose:** To bridge the gap between neuroscience and clinical research in unilateral CP and discuss the added value of understanding the reorganisation of the brain in these children, based on mirror movements and neuroimaging, and how this knowledge can contribute to treatment optimisation.

**Target Audience:** occupational therapists, physiotherapists, paediatric neurologists

**Course Summary:** Children with unilateral cerebral palsy (CP) are characterised by a large heterogeneity in upper limb function and treatment response. Due to the early nature of the brain lesion, these children present with a unique “re-wiring” of the sensorimotor system, i.e. the corticospinal tract (CST). Structural reorganisation of the CST has been proposed to play a crucial role in the clinical heterogeneity and might offer a valuable therapeutic target. However, the CST-wiring pattern is not immediately apparent from the child’s clinical presentation. During this course, we will provide a concise overview of the role of mirror movements in typically developing children and unilateral CP (Prof. Dr. K. Klingels). Next, we will discuss various ways to probe the motor system and identify the CST-wiring pattern in these children, based on transcranial magnetic stimulation, a quantitative mirror movement assessment, and different neuroimaging techniques including diffusion imaging and resting state fMRI (Dr. E. Jaspers, MSc C. Simon-Martinez). Finally, most recent work will be presented on the added value of non-invasive brain stimulation to improve upper limb function in children with unilateral CP (Prof. Dr. med. A. Kirton).

**Learning Objectives:**
1. Understand the role of mirror movements in typically developing children and unilateral cerebral palsy
2. Describe different ways of probing the motor system, based on behavioral, neurophysiological and neuroimaging assessments
3. Understand how the different behavioral, neurophysiological and neuroimaging assessments can be implemented in clinical practice
4. Understand the added value of non-invasive brain stimulation in upper limb rehabilitation

BRK22: CHALLENGING CLINICAL SCENARIOS WHERE RETINAL SCANNING FOR COMMUNICATION CAN BE SUCCESSFUL
Aloysia Schwabe, MD; Betsy Furler, MS, CCC-LP; Rochelle Dy, MD

**Purpose:** Many individuals utilize retinal scanning technology for communication, but there are challenging clinical scenarios where retinal scanning may not be considered. Individuals with dyskinetic movements, limited volitional control of eye movements and those with apraxia may be initially viewed as ineligible for this technology. With appropriate supports and training many individuals not previously considered candidates for this type of technology can demonstrate success using retinal scanning devices.

**Target Audience:** SLP/PT/OT and physicians, nurses and social workers

**Course Summary:** Case presentations will illustrate different clinical scenarios where retinal scanning was proven successful. Strategies for optimizing device access and motivating the client will be reviewed as well as teaching methods to enhance mastery. Screening tools for candidacy will also be reviewed.

**Learning Objectives:**
1. Identify atypical clients who are candidates for augmentative communication devices
2. Categorize barriers to successful use of augmentative communication
3. Recognize the importance of adaptations and training to ensure success
4. Utilize resources to facilitate acquiring a device
BRK23: DYSTONIA, SPASTICITY AND CHOREOATHETOSIS: HOW TO RECOGNIZE, DISCRIMINATE AND MEASURE THEM IN CEREBRAL PALSY?

Elegast Monbaliu, PhD; Josse Decat, MSc; Bernard Dan, MD, PhD

**Purpose:** This instructional course overviews definitions, classification, pathophysiology and clinical presentation of dystonia (D), spasticity (S) and choreoathetosis (CA) in cerebral palsy (CP). Participants will leave the session with an up-to-date clinical picture and a practical framework for recognizing and discriminating D/S/CA. The instructional course is built up as a practical and interactive session based on the current scientific findings and illustrated with clinical cases.

**Target Audience:** medical doctors, therapists, kinesiologists, orthotics

**Course Summary:** Dystonia, spasticity and choreoathetosis predominate in spastic and dyskinetic CP but are present globally in 95% of individuals with CP. Over the last decade, consensus specific definitions, increasing insights in pathophysiology and measurements have been suggested. However, because D/S/CA are often simultaneously present in CP, clinical discrimination is often experienced as difficult and challenging. Yet, good recognition of the condition is vital for targeted medical interventions and rehabilitation in order to improve daily life activities and quality of life. In the first part, participants will be introduced to the definitions and classification of D/S/CA and pathophysiology will be overviewed based on recent neuroimaging findings. In the second part clinical discrimination and measurement of dystonia, spasticity and choreoathetosis will be overviewed. In the final part, cases of D/S/CA will be interactively discussed.

**Learning Objectives:**
1. Describe definitions and classification of Dystonia/Spasticity/Choreoathetosis
2. Understand the pathophysiology of Dystonia/Spasticity/Choreoathetosis
3. Recognize clinical characteristics of Dystonia/Spasticity/Choreoathetosis
4. Acquire a practical framework for discriminating and evaluating Dystonia/Spasticity/Choreoathetosis

BRK24: FACILITATING PARENT PARTICIPATION IN INTENSIVE THERAPIES: THE PARENTS AS PARTNERS APPROACH

Amy Darragh, PhD, OTR/L, FAOTA; Elizabeth Koss, MOT; Sharon Ramey, PhD; Stephanie DeLuca, PhD

**Purpose:** Describe a Parent as Partner Approach to promote parent participation in and satisfaction with therapist-recommended home programs for intensive therapies. The seminar will educate clinicians and scientists about key ingredients for a successful therapist-parent partnership and discuss strategies to integrate the practice of highly specific and complex interventions into everyday family life

**Target Audience:** Research scientists, therapists, physicians, other clinicians

**Course Summary:** Shaping is a core component of intensive therapies such as pediatric constraint induced movement therapy. Shaping requires that therapist and parent provide a child with well-planned and deliberate opportunities for repeated practice. Practicing new skills in natural environments promotes generalization of skills and preservation of newly learned behaviors. Parent involvement in the delivery of intensive therapy, therefore, is a powerful tool to both increase repetition and enhance generalization. However, providing this type of intervention may prove challenging for busy families balancing multiple demands on their time. Parent practice is a crucial component of our current multisite clinical trial evaluating the effect of an intensive intervention on UE motor performance in infants and toddlers with hemiplegia. Participants receive in-home, intensive therapy 5 days/week for 4 weeks. Parents provide an additional 45 minutes of practice/day, 7 days/week using activity recommendations provided by their child’s therapist. All parents receive a 2 – 3 hours of in-home training prior to initiation of treatment, engage in shared goal setting, and communicate with therapists in-person and through a Parents as Partners Worksheet at least several times a week. Therapists provide individualized, daily recommendations for home-based activities using Parents as Partners Worksheets and communicate with parents about integrating these activities into everyday life.

This approach has been very successful. To date, parents have provided almost 300 hours of therapy practice to 16 infants and toddlers, for an average of 47 minutes per day. Parents typically implement therapist recommendations in the context of play and mealt ime activities. Practice is often organized into small blocks of time, 5 – 15 minutes, during typical family activities (e.g. mealt ime, play time).
Participants will learn about this process and participate in a discussion of benefits and challenges in research and clinical settings. From a scientific perspective, this approach ensures adequate practice of new skills, generalization of learning, and integration of activities into a family routine. From a clinical perspective, this approach fosters communication between therapist and parent, empowers parents in the delivery of a complex intervention, and supports a successful transition between therapy sessions and family life.

**Learning Objectives:**
1. Articulate the supports for and challenges of parent participation in home therapy programs
2. Define the essential elements of parent-therapist partnerships
3. Discuss benefits and challenges of parent and/or family responsibility for implementing complex therapies outside therapy visits

**BRK25: INCORPORATING RESISTANCE TRAINING INTO EPISODIC CARE IMPROVES FUNCTION AND PARTICIPATION IN YOUTH WITH CEREBRAL PALSY**
*James Hedgecock, PT, DPT, PCS; Nicole Harris, PT, PCS, BOCO*

**Purpose:** The purpose of this presentation is to describe successful implementation and outcomes of an individualized resistance and functional skill training program in a large, pediatric hospital based setting.

**Target Audience:** This presentation is targeted for clinicians interested in successful application of evidence surrounding resistance and functional skill training for youth with cerebral palsy across a large hospital system.

**Course Summary:** Functional independence in youth with cerebral palsy (CP) is expected to plateau after the age of 7-8 years depending on severity. This expectation is based on standard treatment dosing of weekly therapy. Strength impairments in youth with CP have been shown to be one of the most significant factors impacting function, and the previous conventional approach does not provide appropriate stimulus to increase strength to improved functional independence. Recent evidence, however, has shown that power-based strengthening results in improved strength, function and participation.

Dr. Hedgecock and Ms. Harris will discuss a new physical therapy service delivery model which targets individualized patient goals and incorporates appropriately dosed resistance training and intensive functional skill practice into brief episodes of care. Evidence about the importance of strength for functional independence in youth with CP, the use of resistance training as an intervention in this population, and appropriate dosing using current training parameters will be reviewed. The process of implementing the new program across a large, pediatric hospital system will be discussed including clinician training, systematic use of outcome measures to monitor progress, and transitioning patients to episodic models of care. Additionally, aggregated patient outcomes of 40 participants will be presented demonstrating improvements in impairment, function and participation due to this intervention. Case studies and family testimonials will also be presented.

**Learning Objectives:**
1. Demonstrate understanding of the role of muscular strength in determining functional independence in youth with cerebral palsy
2. Complete a clinical assessment to select the most ideal training parameters to achieve a patient's specific functional goals
3. Design a resistance and functional skill training program using appropriate dosing and outcomes assessment to address individualized goals for youth with cerebral palsy
4. Develop a plan to initiate a resistance training program for youth with cerebral palsy at their institution
BRK26: MOTOR LEARNING IN PEDIATRIC REHABILITATION: THEORY, RESEARCH AND PRACTICE
Rachel Toovey, MPHTM, PT; Jennifer Ryan, PT; Virginia Wright, BSc(PT), MSc, PhD

Purpose: To describe motor learning (ML) theory, give an update on the evidence and current ML research in pediatric rehabilitation, and explore application of ML approaches in clinical practice.

Target Audience: Physical therapists, occupational therapists, scientists, specialists in pediatric rehabilitation

Course Summary: There is growing awareness of the potential for neuroplastic change and functional improvement through application of ML principles in therapeutic intervention. ML is the acquisition of new motor skills that can be generalized to new learning situations. Application of ML principles in a treatment session may be an important factor in goal attainment in children with neuromotor disorders such as cerebral palsy (CP). ML research is well represented in scientific fields such as exercise sciences, neuroscience, and psychology, but despite growing interest in ML theory application in rehabilitation science, the extent to which it has been studied in pediatric rehabilitation is limited. There is potential to optimize ML content within therapeutic intervention by applying motor learning strategies (MLS) best suited to a child’s characteristics and type of intervention. MLS are observable actions of the therapist during an intervention, involving selection, manipulation, and application of motor learning variables based on child- and task-specific factors. MLS that a therapist can apply include practice, feedback, mental imagery and strategies targeting implicit and explicit learning processes. Each of these MLS is modifiable in dosage, specificity and variability.

The presenters will describe ML theory and evidence for application of ML principles in pediatric rehabilitation. A case will be made for use of consistent terminology in the literature and practice. Current research projects exploring ML for children with CP will be highlighted (i.e., two-wheel bicycle skills training, robotic assisted gait training, and use of a dynamic functional electrical stimulation device). Practical application of ML, including MLS selection and reflective evaluation, will be discussed.

Learning Objectives:
1. Understand motor learning theory
2. Become up-to-date on motor learning evidence and current motor learning research in pediatric rehabilitation
3. Reflect on ways to increase the application of motor learning strategies in their own clinical practice
4. Access resources to improve their literacy in motor learning terminology

BRK27: NEUROPATHIC PAIN IN CHILDREN WITH CEREBRAL PALSY
Deepak Sharan, MD; Shyam Kishan, MD

Purpose: The diagnosis of NP is established by quantitative or qualitative sensory assessments, which is often a challenge in children with CP because of issues with communication, cooperation and cognitive functioning. This presentation will include an overview of NP including the definition, prevalence and incidence rates, causes, clinical symptoms and signs of NP in children with CP; Diagnostic criteria for NP; Difference between nociceptive pain and NP. Description of SEMLS; Listing out the possible risk factors for NP; Possible mechanisms for the progression of an acute NP to a chronic NP; A review of quantitative and qualitative assessment methods available for diagnosis of NP in children with CP; Comorbidities of NP in children with CP (depression, sleep disturbance, fatigue); Differential diagnosis; Assessment methods followed in our centre with examples and case studies; Outcome measures to monitor the progress of treatment in NP; Factors affecting prognosis of NP in children with CP, The treatment of NP in children with CP requires a protocol based, staged, systematic, intensive multidisciplinary and multimodal rehabilitation. Self or parental management strategies and home program to be followed.

Target Audience: Orthopedic surgeons, Rehabilitation physicians, Pain Physicians, Neurologists, Physiotherapists, Occupational therapists and other professionals involved in management of CP.
Course Summary: Neuropathic pain (NP) is a pain that results from direct consequence of a lesion or disease affecting the somatosensory system (International Association for the Study of Pain). NP is not well documented or researched in children. NP is a clinical diagnosis that can be difficult, especially in younger children and non-communicative children with CP. Nevertheless, it is important to recognise NP, as pain mechanisms and consequently management and prognosis differ from other types of chronic pain. Recent studies indicate that the incidence of NP in children with CP is on the rise, especially in non-ambulatory children with severe CP (GMFCS levels IV and V) and after musculoskeletal surgical approaches. NP affects the child’s ability to function physically (e.g., weight bearing) and mentally and hence reduction in their performance or activity level. This has severe implications in the rehabilitation phase post Single Event Multi Level Surgery (SEMLS). Høiness PR, et al (2014) reported 5 children with CP, who developed Complex Regional Pain Syndrome after osteotomies of ankle and feet. In spite of highly specialized multidisciplinary care, all had poor functional outcomes 5 years after surgery. Lauder GR and White MC (2005), reported NP in 6 of 40 children with CP who underwent SEMLS. Five children improved in pain and functioning with physiotherapy. The authors recommended that the possibility of NP should be included in informed consent for SEMLS and NP should be considered as a differential diagnosis when managing postoperative pain in children with CP. Sharan D (2016), the presenter of this workshop, reported that 16% of 500 children with CP post SEMLS developed NP. This course is aimed at presenting an overview of NP in children with CP and would cover the causes, assessment and diagnostic methods, and prevention and management strategies of NP.

Learning Objectives:
1. Understand the causes and predisposing factors for neuropathic pain in children with cerebral palsy
2. Learn the diagnostic features of neuropathic pain in children with cerebral palsy
3. Know the preventive measures for neuropathic pain in children with cerebral palsy and the factors affecting the prognosis
4. Appreciate the role of a multidisciplinary team and the management strategies for neuropathic pain in children with cerebral palsy

BRK28: STEP INTO THEIR SHOES: BURNOUT WITHIN FAMILIES CARING FOR CHILDREN WITH SPECIAL NEEDS
Mackenzie Brown, DO; Sarah Evans, MD; Morozova Olga, MD

Purpose: To bring awareness to the dilemma of burnout within families caring for the pediatric complex care population. To identify the features of burnout and the impact it has on the family unit. To educate on addressing burnout and supporting healthy family functioning in the busy clinic setting.

Target Audience: Clinicians, Therapists, Educators, Social Workers, Psychologists

Course Summary: Caring for a medically complex child can be physically, emotionally, economically and spiritually demanding. Our medical system is becoming increasingly cumbersome and difficult to navigate. The challenge of living with a functional impairment is shared among the patient, the caregivers and family unit. This course will explore the impact that disability has on the family experience. The speakers will identify the risk that caregiver burnout places on the families caring for children with special needs. The discussion will cover what tools are currently available to evaluate for burnout. The speakers will additionally explore what practices health professionals can implement to support healthy family functioning when caring for children with special needs.

Learning Objectives:
1. Identify and describe the features of burnout within the family unit of children with special needs
2. Recognize the importance of burnout prevention to protect both the child and the family from associated risks
3. Describe currently available tools to screen, intervene and provide support to the families caring for children with special needs
4. Understand what can be done in the future to improve support for families caring for children with special needs in the clinical setting
**BRK29: TACTILE INTERVENTION FOR CHILDREN WITH CEREBRAL PALSY: A FRAMEWORK TO GUIDE CLINICAL REASONING AND FUTURE RESEARCH**

*Megan Auld, PhD, BPhty (Hons 1); Leanne Johnston, PhD, BPhty(Hons1)*

**Purpose:** This course aims to review what is currently known about tactile intervention in children with cerebral palsy and provide therapists with a framework to guide both clinical reasoning and future research into tactile interventions.

**Target Audience:** Occupational therapists and physiotherapists working with children with cerebral palsy.

**Course Summary:** Many children with cerebral palsy are known to experience tactile impairments, however research evaluating specific interventions to manage this is minimal. This course seeks to consolidate current literature and provide a framework to help clinicians and researchers think strategically about tactile treatment selection and future research planning. The framework is described via a novel analogy - ‘The Apartment Block Theory’. The theory describes the relative effectiveness of three intervention strategies aimed at overcoming a poorly responsive tactile system: 1) Pressing the buzzer – providing repeated passive tactile stimulation at the periphery; 2) Sneaking in the door – providing active tactile-enhanced motor training that capitalises on the opportunity to provide high-dose tactile input during motor interventions; and 3) Connecting another way – providing visually enhanced touch strategies with the aim of enhancing tactile function, which can be compared to phoning the apartment as an alternative to using the buzzer. Using this theory, the course will then discuss which sub-groups of children with CP may benefit from each intervention strategy when considering their capabilities in visual, motor and attention domains. This course aims to assist clinicians to provide effective interventions and researchers to make informed future research decisions to optimise tactile function for children with cerebral palsy.

**Learning Objectives:**
1. Describe a simple framework for treating tactile deficits (Apartment Block Theory) based on thorough assessment
2. Share ideas for tactile treatment based on current literature and practice
3. Work through a series of cases and develop appropriate treatment plans for tactile impairment according to evidence-based frameworks for assessment and treatment
4. Utilise a toolbox of systematic tactile treatment ideas based on discussion of the framework and current literature

**BRK30: TRANSITIONING ADOLESCENTS AND YOUNG ADULTS WITH CEREBRAL PALSY INTO THE ADULT MILIEU OF HEALTH CARE AND THE WORLD BEYOND**

*Amy West, MD, EdM; Donna Nimic, MD*

**Purpose:** To identify key issues in the transition experience of young adults with cerebral palsy through the use of videotaped interviews of actual young adult patients.

**Target Audience:** Healthcare Providers MD, NP, RN, etc

**Course Summary:** The transition from pediatric to adult care can be a challenging time for young adults with cerebral palsy. After graduating high school, many young peoples experience numerous obstacles including increasing workload, social adjustment, and integration into the work force. Studies have shown that these issues can be especially anxiety-provoking for young people with physical disabilities. In this course, the audience will hear from young adults with cerebral palsy firsthand (via videotaped interview) in the midst of this transition period. The audience will learn how these patients have navigated the various systems, of which they are now a part. Drs. Nimic and West will discuss with participants the issues and problems facing young adults and providers in the transition from pediatric to adult care and strategies for how to address them.

**Learning Objectives:**
1. Identify the challenges from transitioning from high school to college-level work and acquiring academic accommodations
2. Identify beneficial opportunities to optimize success for integration into the workforce, school, and social groups
3. Identify the benefits of work and volunteering for young adults with cerebral palsy
4. Understand what young adults with cerebral palsy value when discussing and planning transition of care
**IC28: ADAPTIVE SPORTS AND ACTIVITY TRACKING FOR INDIVIDUALS WITH CEREBRAL PALSY (CP)**

Jennifer Miros, MPT; Sarah Hickey, PT, DPT

**Purpose:** To assist health care professionals, children with CP or other childhood-onset disabilities (COD) and parents overcome barriers to fitness and adaptive sports to improve their physical and mental health. We have developed an adapted sports program for individuals with CP and implemented various activity tracking methods. Our goal is to present strategies developed in our program to optimize participation. This course will teach the various tracking devices that have been trialed with participants.

**Target Audience:** This course is relevant to clinicians treating individuals with CP and other COD and parents raising children with CP and other COD who want to become more independent with adaptive sports activities.

**Course Summary:** Sports can teach sportsmanship, teamwork, social skills, confidence, and risk taking. It is important as medical clinicians to promote adaptive sports skills and physical fitness. All children need to have the chance to learn how to play sports and interact with others. Participation in adaptive sports benefits individuals with CP and other COD by improving their independence through enhanced mental and physical fitness. Also, physical activity in sports can help prevent co-morbidities associated with sedentary behavior later in life. We will discuss numerous program formats that we have piloted and implemented. Various approaches for children in all the Gross Motor Function Classification Scale (GMFCS) levels will be discussed and many examples provided. We will provide detailed information on resources and equipment that can be utilized to facilitate maximal participation regardless of skill level. We will also discuss the social and psychological benefits of sports participation. Knowledge will be shared from working with individuals with cerebral palsy and other COD in an adaptive sports program format. Three different types of programs will be discussed: 1) an intensive sports day camp program, 2) weekly offerings of different sports activities, and 3) adaptive triathlon. Input will be offered on what has been successful in motivating individuals with cerebral palsy and other COD and their families to become energized about being more independent and physically fit through adaptive sports activities and activity tracking.

**Learning Objectives:**
1. Demonstrate an understanding of how to adapt sports for individuals with CP or other childhood-onset disabilities (COD)
2. Describe resources and equipment needed to assist with making sports accessible to individuals with CP or other COD
3. List ways to objectively measure physical activity in participants of an adaptive sports program
4. Differentiate between the role individual one on one physical therapy, group exercise classes and adaptive sports play as well as identify the role of the therapist, patient, and parent

**IC29: ASSESSMENT AND TREATMENT OF ADULT PATIENTS WITH CEREBRAL PALSY AND COMORBID DEPRESSION**

Daniel Linhares, MD; Hiroko Matsumoto, MA, PhDc

**Purpose:** To discuss how to properly assess and treat adult patients with Cerebral Palsy (CP) presenting with depressive symptoms

**Target Audience:** Physicians and medical providers of adult patients with cerebral palsy.

**Course Summary:** Cerebral palsy (CP) is a common disability, with prevalence ranging from 2-3 per 1000 live births. Increasing numbers of these patients are surviving into adulthood, with more than 500,000 adults in the US alone. Our research at the Weinberg Family Cerebral Palsy Center (Columbia University Medical Center) identified that a significant proportion of adult patients had documented depressive symptoms in their clinical charts. This course will present the results of our research, including the prevalence of depression in adult patients with CP treated at our institution. We also identified risk factors associated with depression and commonly used psychotropic medications in this population. Additionally, we will discuss the potential advantages and disadvantages of different antidepressant medications, and how to tailor these medications to address specific psychiatric symptoms. Finally, we will discuss the use of various validated screening tools to identify depression in the medical setting.
Learning Objectives:
1. Properly assess patients for depression and utilize validated screening tools
2. Understand the prevalence of depression in the adult population with CP and potential risk factors
3. Understand the prevalence of different psychotropic medications being used for adult patients with CP
4. Understand the difference between multiple antidepressant medications and how to use their individual properties to more precisely target the depressive symptoms of each individual patient

IC30: BEYOND RCTS: PRODUCING HIGH LEVEL EVIDENCE USING SINGLE CASE EXPERIMENTAL DESIGN TRIALS
Peter Rosenbaum, MD, FRCPC; Helene Polatajko, BOT, MEd, PhD; Lynne Romeiser-Logan, PT, PCS, PhD; Hortensia Gimeno, MSc, OT

Purpose: This workshop offers an high level evidence alternative to randomized controlled trials (RCTs) using CONSORT Guidelines for single case experimental design (SCED) (SCRIBE) (Tate et al., 2016) and CONSORT guidelines for N-of-1 trials (CENT) (Vohra et al., 2016, Shamseer et al., 2015).

Target Audience: This workshop will be of interest to clinicians and researchers in all areas of neurodisability, both adult and paediatric populations.

Course Summary: The proposed instructional course, hosted by Professor Rosenbaum, will have 3 presenters: Professor Polatajko, Dr Lynne Romeiser-Logan, and Ms Hortensia Gimeno. These experienced researchers have used SCEDs extensively to examine the effectiveness of interventions with a variety of populations including dystonia, cerebral palsy, stroke, developmental coordination disorder, acquired brain injury and the study of evidence based practice.

The host, Professor Rosenbaum will outline the challenges of running RCTs to establish new rehabilitation interventions, particularly in populations with high heterogeneity; variability in performance, or rare disorders.

The course will use data from published studies led by the presenters and from studies currently in progress in Canada, USA and UK. The data will include video footage from these intervention studies to demonstrated the nature of data capture in SCEDs As well, graphs and outputs used in this methodology will be provided to enable the attendee to understand and explore how results can be analyzed. This will provide participants with an insider’s view of how this design could be implemented in clinical research and applied in their own work.

We will explore examples of research questions that can be addressed with this methodology and invite participants to think of situations in their clinical services that would be appropriate for studies using SCED. In this course, we will propose a way to implement multi-centre clinical trials using this methodology, potentially allowing the rapid evaluation and implementation of international research while reducing the financial and recruitment burdens for single institutions.

Learning Objectives:
1. Identify the limitations of RCTs
2. Understand the basics of SCED methodology
3. Encourage audience participation and discussion
4. Leave participants with a toolkit to apply SCED

IC31: CLINICAL TOOLS FOR ASSESSMENT OF SELECTIVE VOLUNTARY MOTOR CONTROL IN PATIENTS WITH SPASTIC CEREBRAL PALSY: SELECTIVE CONTROL ASSESSMENT OF THE LOWER EXTREMIT Y (SCALE) AND TEST OF ARM SELECTIVE CONTROL (TASC)
Marcia Greenberg, MS, PT, KEMG; Loretta Staudt, MS, PT; Theresa Moulton, Ph.D., DPT; Kristin Krosschell, PT, DPT, PCS

Purpose: To instruct experienced clinicians in the use and administration of two standardized clinical tools for assessment of selective voluntary motor control (SVMC) in patients with spastic cerebral palsy: SCALE (Selective Control Assessment of the Lower Extremity) and TASC (Test of Arm Selective Control). The reliability and validity of the SCALE and the TASC have been established (Fowler et. al. Dev Med Child Neurol 51:607-614, 2009 and Krosschell et al, Conference proceedings, AACPDM, 2015). The tools and their clinical and research applications will be presented.
**Target Audience:** This course is designed for clinicians evaluating patients with cerebral palsy in their practice and individuals conducting research on the clinical or functional characteristics of children and adults with cerebral palsy.

**Course Summary:** The role of SVMC assessment in clinical practice and research will be discussed. The relationship of SVMC to other impairments such as strength and spasticity will be explored. The SCALE and TASC tools will be presented for each joint and the patient positioning, examiner instructions and score sheets will be explained. The criteria for each SVMC grade will be described, providing participants with the knowledge and skill to independently assess SVMC of the upper and lower extremity. Participants will have an opportunity to use the tools to assess joints on a variety of videotaped patient examples exhibiting a range of SVMC. Discussion and feedback on the participants’ skills will be provided. The use of SCALE and TASC scores in research and clinical decision making will be discussed.

**Learning Objectives:**
1. Gain familiarity with the purpose, content and administration of SCALE and TASC clinical tools for evaluation of SVMC
2. Develop skill in scoring of SCALE and TASC
3. Increase knowledge of the literature, clinical relevance and research regarding SVMC
4. Understand the role of SVMC assessment in clinical decision-making, research and evidence-based practice

**IC32: HIP SURVEILLANCE AND MANAGEMENT IN PRACTICE: FROM INITIATION OF SURVEILLANCE TO SURGERY AND BEYOND**

*Pamela Thomason, MPT; Kate Willoughby, B Physio, D Physio; Maureen O’Donnell, MD MSc FRCPC; Vedant Kulkarni, MD; Abhay Khot, FRACS*

**Purpose:** This updated course will focus on the practical application of hip surveillance for children with cerebral palsy (CP). It will guide participants in the surveillance continuum from the initiation of a first x-ray and identifying displacement, to monitoring responses to intervention and long-term outcomes into adolescence and beyond. The course will assist participants to understand the evidence and indicators for hip surveillance and management of hip displacement, be familiar with the available clinical guidelines and pathways, and to implement hip surveillance in their clinical practice.

**Target Audience:** Paediatricians, rehabilitation physicians, physical and occupational therapists

**Course Summary:** This course will provide an overview and practical approach to the surveillance and management of hip displacement in children with CP. The epidemiology of hip displacement will be explored, along with evidence of effectiveness of formalised hip surveillance. Clinical guidelines for hip surveillance will be described and explored, including the Australian Hip Surveillance Guidelines for Children with Cerebral Palsy and an introduction to the newly developed AACPDM Care Pathway. The findings of two new studies exploring the experiences of parents and health professionals when engaging in hip surveillance will be discussed, including the identification of barriers to surveillance. The ‘HipScreen’ app will be presented as an example of a strategy to overcome such barriers. Participants will have the opportunity to explore the app and gain skill in using its migration percentage measurement tool. A significant portion of the course will be dedicated to enhancing participant’s learning through interactive case studies, providing them with rationale to support implementing hip surveillance for children in their care. The utility of serial monitoring of hip displacement will be explored in the contexts of triggering referral for Orthopaedic assessment, joint decision-making about intervention between clinicians and parents, and monitoring the effectiveness of intervention.

**Learning Objectives:**
1. Describe the epidemiology of hip displacement and its relation to gross motor function
2. Familiarity with the evidence for hip surveillance and with the clinical guidelines available to support its implementation, including the newly developed AACPDM Care Pathway
3. Aware of potential barriers to hip surveillance and strategies to overcome such barriers, and develop confidence in applying guidelines for hip surveillance in clinical practice
4. Describe the evidence for non-surgical and surgical approaches to managing hip displacement
IC33: NEURO-ORTHOPAEDIC JOURNAL CLUB: TOP 10 ARTICLES IN THE LAST YEAR RELATING TO THE ORTHOPAEDIC MANAGEMENT OF CHILDREN WITH NEUROMUSCULAR DISORDERS
Amanda Whitaker, MD; Benjamin Shore, MD, MPH, FRCSC; Jon Davids, MD

Purpose: This course will present a journal club style review and analysis of the last year’s most significant scientific articles relating to the orthopaedic management of children with neuromuscular disorders. Articles will be reviewed following a standardized format, with each review followed by a period of open discussion concerning the contribution of the article to the body of knowledge and its potential impact on clinical practice.

Target Audience: Practitioners that treat the neuro-orthopaedic sequelae of neuromuscular disorders.

Course Summary: Each article will be presented by a course faculty member, focusing on structure, content, validity, and significance. Open discussion will follow each article review, moderated by another course faculty member.

Learning Objectives:
1. Introduced to a standardized format for the critical analysis of scientific articles from the medical literature
2. Familiarity with the most significant recent advances in the orthopaedic management of children with neuromuscular disorders
3. Incorporate new techniques and technologies into clinical practice
4. Appreciate current research trends in this area and be inspired to make a contribution to the body of knowledge

IC34: PAIN ASSESSMENT WITHOUT BORDERS: KEEPING CHRONIC PAIN ASSESSMENT AT THE FOREFRONT OF CARE FOR CHILDREN WITH CEREBRAL PALSY
Ashley Townley, MA; Chantel Barney, PhD; Jean Stout, MS, PT; Jean Stansbury, APRN, CNP, CHPPN; Meagan Crary, APRN, FNP

Purpose: This course will describe how the train-the-trainer model was used across international borders to implement the Holland Bloorview Chronic Pain Assessment Toolbox for Children with Physical Disabilities at an American children’s hospital. This workshop will help attendees become familiar with the toolbox, understand how the chronic pain assessments were integrated into three new clinics, and gain an appreciation for the feasibility, utility and clinical impact of collecting pain assessment data.

Target Audience: Physicians, Occupational and Physical therapists, Nurses, Researchers.

Course Summary: This course will touch on the development and implementation of the Chronic Pain Assessment Toolbox within the Canadian context. The presentation will focus on how the presenters used the train-the-trainer model as well as the ‘action’ portion of the ‘knowledge-to-action’ cycle to support the successful integration of the toolbox within a US setting. A key focus of discussion will include strategies for tailoring the toolbox to a new setting, assessing barriers and facilitators to implementation, and monitoring uptake to ensure success. Presenters will highlight the clinical impact of systematically assessing chronic pain and will provide a summary of the chronic pain interference and chronic pain coping data collected during the first year of implementation.

Learning Objectives:
1. Familiarity with the Chronic Pain Assessment Toolbox for Children with Disabilities and understand how it can be tailored to new settings
2. Understand the process of integrating a new practice into a clinical setting using the train-the-trainer model and the knowledge-to-action cycle
3. Understand the clinical impact and feasibility of conducting thorough and systematic chronic pain assessments
4. Understand the benefits of streamlining knowledge translation, patient care, and research efforts while also maximizing collaborations between hospitals
IC35: STEPPING INTO THE ARENA: NEUROPLASTICITY IN CHILDREN AND ADULTS WITH CEREBRAL PALSY
Kathleen Friel, PhD; Bernadette Gillick, PhD, MSPT, PT; Yannick Bleyenheuft, PhD; Andrew Gordon, PhD

Purpose: In this course, an experienced team of neuroplasticity researchers will discuss the most commonly used tools and techniques for studying neuroplasticity in people with CP. These techniques include transcranial magnetic stimulation, diffusion tensor imaging, and functional magnetic resonance imaging. The course will discuss the feasibility and limitations of each of these modalities for examining neuroplasticity. The course will also discuss ways that neuroplasticity impacts function in people with CP, particularly neuroplastic changes to the motor and sensory systems as a result of perinatal brain injury. All presenters will introduce novel, unpublished data. Additionally, this course will discuss optimal ways to design neuroplasticity studies in people with CP. This course will provide the opportunity for participants to become familiar with the current state of neuroplasticity research as it relates to cerebral palsy across the lifespan.

Target Audience: Parents, caregivers, individuals with cerebral palsy, therapists, researchers, and physicians

Course Summary: Cerebral palsy affects movement and sensory systems in people throughout their lifespan. Neuroplastic changes to these systems occur during development, in response to injury, and in response to rehabilitation. Understanding how neuroplastic changes relate to dysfunction and recovery can inform the development of novel, more effective therapies. During this course, neuroplasticity experts will discuss the key methods of measuring neuroplasticity in people with CP, and how these methods can be used to understand the relationships between brain function and impairments. During this course, participants will also learn about the latest findings in neuroplasticity research, and will understand the methodology behind these findings. In this Instructional Course, attendees will discover the current challenges and promise of neuroplasticity research, to dare greatly to step into the arena.

Learning Objectives:
1. Define the main factors that drive neuroplasticity in people with cerebral palsy (CP)
2. Recognize the main methods, feasibility, and limitations of measuring neuroplasticity in people with CP
3. Understand how neuroplasticity impacts function in people with CP
4. Demonstrate understanding of the key elements for designing a study that examines neuroplasticity

IC36: SUPPORTING THE MENTAL HEALTH OF MOTHERS OF CHILDREN WITH A DISABILITY: BUILDING THE CAPACITY OF HEALTH PROFESSIONALS AND EARLY INTERVENTION SERVICES
Elise Davis, PhD; Dinah Reddihough, MBBS; Kim-Michelle Gilson, MPsysch, PhD; Susan Brunton

Purpose: To discuss the mental health needs of mothers of children with a disability and strategies to support health professionals and early intervention services to better support mothers’ mental health. The authors, including a paediatrician, psychologist, parent and public health researcher conduct research on the mental health of mothers as part of a NHMRC Centre for Research Excellence in Cerebral Palsy in Australia.

Target Audience: Health care professionals, including physiatrists, orthopedic surgeons, pediatricians, pediatric neurologists, physical and occupational therapists who support children with a disability.

Course Summary: Mothers of children with a disability are at increased risk of poor mental health compared to mothers of typically developing children. There is a limited evidence base to guide child health professionals to support mothers’ mental health. This workshop will discuss the mental health care needs of mothers of children with a disability, including our study of 300 mothers. The challenges for health professionals to support mothers mental health will be discussed. Strategies to build the capacity of health professionals to better support mothers’ mental health will be presented, including using a) a resource for mothers on mental health (also adapted for USA), and organizational change to increase health professionals’ job-related wellbeing and knowledge of mental health. Findings from two pilot studies with early intervention services and evaluation data from health professionals and parents will be presented. Participants will engage in discussions to explore the feasibility of strategies to better support mothers’ mental health in their own settings.
Learning Objectives:
1. Understand the mental health care needs of mothers of children and young people with a disability along with their preferences for support
2. Understand and discuss the challenges for health professionals to support the mental health and wellbeing of mothers of children with a disability
3. Describe a range of strategies to build the capacity of health professionals and service providers to better support mothers’ mental health
4. Examine the feasibility of implementing strategies to support mothers’ mental health in the participants’ own settings

**IC37: TREADMILL PROTOCOLS ACROSS AGES AND STAGES: A FRESH LOOK AT DOSAGE**
Katrin Mattern-Baxter, PT, DPT, PCS; Julia Looper, PhD, PT; Kristie Bjornson, PT, PhD, MS; Noelle Moreau, PT, PhD

**Purpose:** This course is designed to bring the audience up to date on current evidence on treadmill training in children with CP. The presenters will explain the theoretical mechanisms behind infant treadmill protocols, describe muscle performance impairments in children with CP and the implications for treadmill training and discuss implementation and outcomes of home-based and short-burst interval treadmill training in pre-ambulatory and school-aged children with CP.

**Target Audience:** Physical Therapists, Occupational Therapists, Developmental Pediatricians, Physiatrists, Nurses, and all others who encounter young children with neuromotor impairment who present with delayed ambulation, but who show walking potential.

**Course Summary:** Treadmill training can be utilized to foster the achievement of walking in young children as well as for optimizing walking activity in older children with cerebral palsy (CP) and other neurodevelopmental diagnoses. But what is the optimal intensity, frequency, duration and type of training at different stages? Does one size fit all? This course is designed to explore the differences in treadmill protocols between pre-ambulatory children who are working on walking acquisition and school-aged children who may be experiencing limitations with walking activity and participation. The presenters will explain the underlying conceptual frameworks of neuroplasticity and muscle plasticity that informed their research. The practical application and results of different training protocols will be shown via the presenters’ research on pre-ambulatory and school-aged children with CP.

**Learning Objectives:**
1. Describe the theoretical and neuroplastic mechanisms behind infant treadmill protocols
2. Describe the available evidence on treadmill training in pre-ambulatory children with CP and neuromotor impairment
3. Describe muscle performance impairments in children with CP and the implications for treadmill training
4. Describe implementation and outcomes of short-burst interval treadmill training in ambulatory children with CP

**IC38: ULTRASOUND GUIDED INJECTIONS USING ALCOHOL AND PHENOL IN SPASTICITY MANAGEMENT**
David Cancel, MD; Monika Desai, MD; Kyle Menze, DO

**Purpose:** This presentation and hands-on workshop will discuss recent updates and guidelines in Ultrasound guided Alcohol and Phenol injections for the management of spasticity. The presentation will include a hands-on workshop for practitioners looking to expand their knowledge of techniques for Alcohol/Phenol injections in selected nerves of the upper and lower extremities.

**Target Audience:** Physiatrists and Neurologists with basic knowledge of Ultrasound guidance looking to expand their knowledge of injection techniques in spasticity management.

**Course Summary:** Ultrasound guided imagery has become widely used in spasticity management. Research has demonstrated the advantages of Ultrasound visualization compared to traditional “blind” injection techniques, resulting in improved patient outcomes. This workshop will provide a background on the use of Ultrasound guided visualization and the benefits of chemodenervation with Alcohol/Phenol in spasticity management. Attendees will learn techniques for the localization of selected muscles and nerves using Ultrasound guidance. Participants will then practice these techniques to improve their spasticity management practice.
Learning Objectives:
1. Provide an evidence based background on the use of Ultrasound guided imagery in spasticity management
2. Discuss the evidence based benefits of Alcohol/Phenol in spasticity management
3. Demonstrate Ultrasound guided injection localization techniques for selected muscles and nerves
4. Employ these techniques in their spasticity management practice with improved patient care, function and quality of life

IC39: WHEN SPASTICITY AND DYSTONIA CO-EXIST: RE-THINKING CP MOTOR CLASSIFICATION AND MEASUREMENT
James Rice, MD, FRACP; Adrienne Harvey, PhD; Felicity Baker, BPhty; Kirsty Stewart, BAPPSc(OT), MAPPSc(OT), DHSc

Purpose: This course will cover issues commonly encountered when both spasticity and dystonia are identified in cerebral palsy (CP), and the dilemma this poses in terms of motor classification, measurement of dystonia and decision-making regarding treatment. This workshop will help attendees to identify and classify tone patterns when more than spasticity or dystonia are present (“mixed” tone).

Target Audience: Physicians, orthopaedic surgeons, neurosurgeons, physical therapists and occupational therapists working with children with CP; CP registry staff.

Course Summary: Classification of motor subtypes in CP is important as it promotes an accurate description of the child’s neuromotor impairments, leading to appropriate and effective treatment choices. This assists in clear communication between treating clinicians and is relevant for use in CP registries around the world in data collection. Current CP classification methods usually result in the identification of a “dominant” motor type, such as spasticity, at the expense of coexistent or secondary motor patterns. Workshop attendees will participate in case discussions highlighting mixed tone and focus on how to both identify and classify in these situations, in particular with the use of the Hypertonia Assessment Tool (HAT) and related measurement tools. Contemporary research will be presented highlighting the issue of varied tone patterns in a large CP population, and a new toolkit will be introduced which aims to assist clinicians and researchers in this challenging process of working with mixed tone.

Learning Objectives:
1. Understand the current range of tools used to classify motor type and measure dystonia in CP in clinical and CP register settings
2. Identify gaps in motor classification in CP related to the picture of mixed tone and strategies to account for this
3. Be familiar with the use of the Hypertonia Assessment Tool (HAT) as part of a toolkit in identifying different tone patterns in clinical settings
4. Participate in discussion on the pros and cons for changes to motor classification systems in CP