**DPT Class of 2016**
**Case Presentation Abstracts**

## ***Session 1: Stroke, Brain Injury, & Vestibular Dysfunction*** *(1.75 CEUs)*

***Wednesday December 14th, 2016 (PM Sessions)***

***The Use of Interactive Visual Feedback Training to Address Pusher Syndrome in an Individual with a Right Hemorrhagic Stroke: A Case Report*** - Colleen Bouchard

**Background:** The use of computer-generated interactive visual feedback training to treat pusher's syndrome is sparsely citied in the literature. Interactive visual feedback training allows for real-time quantification of results. Current interventions used to treat pusher's syndrome rely on visual aids making results unable to be quantified[1]. **Case Description:** The patient was a 79-year-old male status post an acute right hemisphere hemorrhagic stroke. He presented with severe pusher's syndrome that limited his ambulatory and functional progress. **Intervention:** Computer-generated interactive visual feedback training was performed with the patient standing with focus on weight shifting to the right in all three planes. The patient completed 3-5 repetitions each lasting 2 minutes on 3 separate occasions. **Evidence-Based Component:** Does quantified feedback affect the rate of motor skill learning and performance[2]? Interactive visual feedback training has been shown to improve motor skill learning and performance compared to mirror visual feedback[2]. The difference may be due to its ability to provide external feedback and quantification of results[2]. **Outcome Measures:** The patient's interactive visual training scores within sessions improved each time. The Berg Balance scale and Functional Independence Measures (FIM) scores also increased after the initiation of interactive visual feedback[3]. **Discussion:** This case report describes the use of computer-generated interactive visual feedback training as an intervention to treat pusher's syndrome. Current interventions rely more on internal feedback and cannot be quantified, while interactive visual training uses external feedback and quantification of results. The improvement in outcome measures may suggest that using computer-generated interactive visual feedback training can be used as an intervention to aid recovery of pusher's syndrome, and potentially allow for a quicker recovery.

***The Use of Robot-Assisted Gait Training in Conjunction with Traditional Interventions for a Subacute Stroke Survivor: A Case Report*** - Laura (Rapp) Boraas

**Background:** Robot-assisted gait training is a newer method used to provide repetitive, task-specific training and maximize recovery of functional gait after stroke. This case report critically evaluates gait-related outcomes of a stroke survivor who used the Ekso GT™ exoskeleton in addition to usual care during inpatient stroke rehabilitation. **Case Description:** The patient is a 64-year-old male with left-sided hemiparesis and neglect, resulting in severe gait dysfunction. **Intervention:** Interventions included over-ground gait training, therapeutic exercise, PENS, and robot-assisted gait training. Several measures were used to track patient progress, including the 30-Second Sit-to-Stand, Berg Balance Scale (BBS), Timed Up and Go (TUG), and Functional Independence Measures (FIMs). **Outcomes:** The patient demonstrated improvement on his 30-Second Sit-to-Stand, TUG, BBS, and FIM scores. Based on the therapist's observation, the quality and efficiency of the patient's ambulation made minor improvements, but the patient's mobility remained functionally limited. **Discussion:** The combination of robot-assisted gait training combined with other interventions yielded increased functional lower extremity strength, gait speed, balance, and most FIMs, but did not improve the patient's overall quality of gait. Several factors could have contributed to the results, including medical complications, increased impulsivity and left-sided neglect, and changes in motivation and adherence throughout the episode of care.

***Using the Bioness L300 Plus as a Supplement to Treatment for a Patient with Right Hemiparesis Following a Left Corona Radiata Stroke***. - Clare Goeken

**Background:** Every year 800,000 people are affected by strokes in the United States. Many of these people experience residual functional deficits following discharge from acute care facilities. The purpose of this case report was to assess the effectiveness of functional electrical stimulation (FES) on improving mobility-related activities of daily living (MRADLs) in a patient with hemiparesis in the inpatient rehabilitation setting. **Case Description:** The patient was a 71 year-old male who presented to inpatient rehabilitation status post a corona radiata stroke with resulting right hemiparesis. At the time of the evaluation, the patient presented with gross right lower extremity weakness, balance deficits, and decreased functional mobility. Physical therapy interventions included lower extremity strengthening, over ground gait training, bodyweight supported treadmill training (BWSTT), and FES. **Evidence-Based Component:** A comprehensive literature review was performed to determine the effectiveness of FES on gait in the subacute stroke population. To date, there are limited large, randomized controlled trials targeting the acute stroke population. **Outcomes:** Throughout his inpatient rehabilitation stay, the patient exhibited increased independence with MRADLs as evidenced by increased Functional Independence Measures (FIM) scores. Additionally, the patient had increased right lower extremity strength, balance, and endurance upon discharge as evidenced by manual muscle test scores, Berg Balance Scale scores, Postural Assessment Scale for Stroke (PASS) scores, and increased ambulation distance. Following 22 days in inpatient rehabilitation, the patient was able to discharge home with the recommendation of continuing physical therapy via outpatient rehabilitation. **Discussion:** FES has the potential to improve functional mobility in the inpatient rehabilitation setting when used as a supplement to treatment with traditional physical therapy interventions.

***Comprehensive Physical Therapy Outcomes of an Individual with Gunshot Head Trauma and Subsequent Severe Brain Injury: A Traditional Case Report***. - Brent Corum

**Background:** Traumatic brain injury (TBI) has a severe impact on an individual's recovery, creating neuromotor and neurobehavioral complications. Third-party payers are decreasing the allowed length of stay, and patients are being allotted less time to make functional gains in Inpatient Rehabilitation. Short-term, intensive therapy may lead to beneficial outcomes in this era of shorter therapy allotment. Rehabilitation may help to reduce disability, deconditioning, dysfunction, and falls risk. **Case Description**: A 30 year old male, previously independent, received care and therapy for complications resulting from a gunshot wound to the head/face. The subject was diagnosed with severe TBI and left vision loss. This individual was in Acute Care for 22 days prior to Inpatient Rehabilitation admission. During the 29 days spent in Inpatient Rehabilitation, the subject was found to have physical, cognitive, and social impairments. This report outlines the interventions used by physical therapists during his stay to improve functional status. **Outcomes**: Improvements in 6-minute walk test, Berg balance scale, gait speed, Functional Independence Measure scores, as well as physical assistance were found between initial and discharge assessments. **Discussion**: A comprehensive, intense approach to treating TBI has been found beneficial in speeding up patient outcomes and improving functional mobility for transfers, gait, and balance. Although dosage is unknown, higher amounts of activity have been found to be beneficial for outcomes. An interdisciplinary approach, including a variety of high dosage physical therapy, was found to improve functional and mobility outcomes. The subject progressed with increasingly more challenging tasks. A high dose of practice may have been beneficial towards his independence and recovery.

***Using Prism Glasses with Balance Training to Improve Functional Independence in an Elderly Patient with Severe Balance Deficits after Sustaining a Traumatic Brain Injury in a Motor Vehicle Accident***. - AJ Crone

**Background:** When traumatic brain injury (TBI)occurs often visual perceptions can be altered, interfering with a person's ability to maintain balance and complete functional activities. The use of prism glasses with balance training is an intervention that can be utilized to realign visual perception and improve balance needed for everyday life. **Case Description:** The patient was a retired male over the age of 65 with significant balance deficits after suffering a traumatic brain injury in a motor vehicle accident. **Intervention:** Interventions for this patient involved application and continuous use of yoked prisms with balance exercises focusing to improve functional independence. **Outcomes:** The patient was treated for four weeks with a 7-point improvement in functional independence measurement (FIM) score for physical therapy relevant tasks.
**Discussion:** This case report describes the use of a multidisciplinary interventions for improving functional independence in a patient with significant balance deficits and the reasoning behind use of these interventions. By using yoked prisms along with balance training, the patient was able to improve his ability to ambulate, transfer into and out of bed, and ascend and descend stairs. Cognitive deficits due to injuries sustained during the motor vehicle accident (MVA) hindered further improvement in functional score.

**The Use of Vestibular Rehabilitation Techniques for Complete Unilateral Vestibular Hypofunction: A Case Report** - Dani Greiner

**Background and Purpose** Vestibular rehab has been shown to have positive effects in those with vestibular hypofunction, however efficacy of specific interventions is largely under cited in the literature. This case study focuses on the rationale for interventions provided for a patient with acute complete vestibular hypofunction and compares the treatment plan with literature to determine possible variations that could have led to different outcomes. **Case Description** The patient was a 46 year old woman who presented acutely with 100% unilateral vestibular hypofunction status post labrynthitis. Her dizziness, which she described as constant rocking movement, limited her participation in functional activities such as driving and attending work. **Interventions** Interventions primarily consisted of gaze stabilization exercises, habituation interventions targeted towards functional activities that provoked symptoms, and both static and dynamic balance training. Secondary complications of back and neck pain due to changes in posturing were also addressed with manual therapy. **Outcomes** The patient was seen over a period of 6 months, but this case report will look at outcomes for the first 4 months of treatment. The Dizziness Handicap Inventory was primarily used, but the patient only improved 2 points (minimal clinically important difference is 18). This will be analyzed further in discussion. Other objective measures, such as single leg stance time and qualitative gait analysis did show improvement. **Discussion** This case study looks at neural adaptation after complete vestibular loss and compares interventions performed in vestibular rehab to evidence cited in the literature. Psychosocial factors associated with vestibular loss are also discussed with their implication to recovery. Finally, areas for further research of vestibular rehabilitation techniques will be explored.

## ***Session 2: SCI & Nervous System Disorders*** *(1.5 CEUs)*

### *Wednesday December 14th, 2016 (PM Sessions)*

***A Case Report: Using the Wheelchair Skills Test as an intervention to develop long-term independence and function in an acute SCI.*** - Justin Rumpza

**Background:** Wheelchair (WC) safety and mobility are crucial in community integration and independence for those with spinal cord injury (SCI) and require mastery of a variety of WC skills. [1] The Wheelchair Skills Test (WST) evaluates the proficiency of these skills that have been associated with improved quality of life (QOL), community integration, and independence.[2] However, there is currently no universal method of teaching these skills following SCI. **Case Description:** The patient described in this case report was a 25-year-old male with an acute T3 American Spinal Injury Association Impairment Scale (AIS) A classification SCI. The patient underwent use of the WST as an intervention to improve his manual WC skills. **Evidence-Based Component:** Manual WC skill performance is positively associated to participation in daily life following SCI.[3] Can the WST be used as an intervention to train manual WC users following acute SCI in crucial WC skills to effectively predict long-term independence, function, and community integration? **Outcomes:** The patient was treated for 7 weeks with a WST improvement from 34% to 97%. The patient also demonstrated improvement in the 6-minute walk (push) test (6MWT), 10-meter walk (push) test (10MWT), and an evaluative functional activity. **Discussion:** This case report describes an evaluation of the use of the WST as an intervention to determine the level of mastery of WC skills and their predictive value of long-term independence, function, and QOL after discharge. The improvement in total capacity score of the WST paralleled with improvements in other functional outcome measures may suggest that individuals with a higher score on the WST may also be predictive of better outcomes in long-term independence, community integration, and QOL.

***The Use of Powered Exoskeleton as a Supplement to Treatment of an Incomplete Spinal Cord Injury: A Case Report.*** - Drew Voss

**Background:** Recovery of locomotion is a main priority for patients that have suffered a spinal cord injury. Although recent studies have investigated the use of robot-assisted gait trainers as an alternative intervention, there is no clear evidence of its effectiveness when used to supplement traditional interventions in terms of a patient's daily functional outcome. **Case Description:** The patient was a 24-year-old male that sustained an incomplete spinal cord injury as a result of a motor vehicle accident. Interventions consisted of ten sessions utilizing the Ekso Skeleton robotic-assisted gait trainer in addition to twenty-one traditional physical therapy sessions. **Outcomes:** Although the patient's ASIA classification did not change (C5, ASIA C), there was a manual muscle test score improvement in bilateral hip flexors (1 to 2), knee extensors (2 to 3), and ankle dorsiflexors (1 to 2). The patient also demonstrated improvements in the mobility section of SCIM by one point and spasticity of bilateral knee extensors and ankle dorsiflexors on Modified Ashworth Scale (2 to 1+). **Discussion:** This case report describes the clinical reasoning for using an exoskeleton robot-assisted gait trainer as a supplemental intervention for a patient with an incomplete spinal cord injury. While the patient was unable to ambulate at discharge, improvements in lower extremity strength and spasticity positively impacted the patient's functional mobility and thus suggest the significance of utilizing robot-assisted gait trainers as a supplemental intervention.

***Use of Core Stabilization to Improve Gait Distance in a Patient with Guillain-Barre Syndrome*** - David Holte

**Background:** Guillain-Barre Syndrome (GBS) is a rare neurologic condition that causes ones own immune system to attack their peripheral nervous system. There is limited research involving rehabilitation and patients with GBS. Patients with GBS have decreased muscular strength and endurance resulting in an overall decreased functional capability. Full recovery is possible, but rehabilitation can take years. **Case Description:** The patient is a 23-year-old male who presented to the emergency room, initially, with respiratory distress. The emergency room doctors believed he contracted GBS from the Zika virus; however, there is no conclusive evidence to support this hypothesis. He presented to inpatient rehabilitation fully dependent for all activities of daily living (ADL). **Evidence-Based Component:** A literature review was conducted to determine whether core strengthening along with conventional inpatient physical therapy can increase a patients gait distance in patients with neurologic conditions. Research is limited for patients with GBS. Core strengthen has been shown to be beneficial for patient with other neurologic conditions. This case study serves to describe the effects of core strengthening and effects on gait. **Outcomes:** After the patient was able to ambulate with an assistive device and minimal assistance, we started his core-strengthening program. We noticed an improvement in gait mechanics, distance, and a decrease in loss of balance episodes. We encouraged the patient to continue his core-strengthening program at home and to progress with his outpatient physical therapist. **Discussion:** Adding core strengthening to conventional inpatient physical therapy may be beneficial at increasing gait distance and reducing number of falls in patients with GBS. Further research is needed to validate a strengthening program for patients with GBS.

***Outpatient Interventions to Improve Balance in a Patient with Bilateral Knee Hyperextension Secondary to Multiple Sclerosis: A Case Report*** - Gerry Robles

**Background and Purpose:** Individuals who are diagnosed with the neurological disorder of multiple sclerosis (MS) live with complex symptoms that cause negative effects on mobility and balance which may lead to increased falls. This case report documented the rehabilitation of an individual who suffers from MS and to investigate balance interventions that may lead to favorable outcomes. **Case Description:** This case report presented a 56 year old female with a known history of MS. This patient presented with severe bilateral knee hyperextension causing knee pain. Furthermore, she had increased fatigue and impaired balance which led to a history of falls. Skilled interventions for this patient focused on regaining stability in her lower extremities along with improving balance. **Evidence Based Component:** The research presented in this case focused around the interventions, mainly balance interventions to assess if any significant changes were seen in the patient. Evidence is presented citing the possible effects of the interventions that were used along with exploring ways which may have led to better outcomes. **Outcomes:** After 12 weeks, the patient was able to complete four of her six goals. Her single limb stance time (SLS) increased by 1 second on her right lower extremity and 2 seconds on her left. Also, her Timed Up and Go (TUG) time improved by 2 seconds. Her Lower Extremity Functional Scale (LEFS) score improved from 33 to 45. **Discussion:** Although the patient made functional gains during her rehabilitation, deficits were still present at the time of discharge. A longer, more comprehensive program along with future research focusing on additional types of balance interventions may be necessary to achieve more favorable outcomes in this population.

***Outpatient Rehabilitation for Post-Operative Partial Meniscectomy in a Patient with Transverse Myelitis and Increased Fall Risk: A Case Report*** - Chelsea Moore

**Background** Meniscal surgery is a commonly performed orthopedic procedure. Patients often present to physical therapy after surgery with comorbidities that affect their treatment. The purpose of this case report is to present the outpatient plan of care for a patient following a partial meniscectomy who was previously diagnosed with transverse myelitis. **Case Description** The patient was a 59-year-old woman who underwent a knee scope with partial meniscectomy. She reported currently falling three times per day and was diagnosed with transverse myelitis seven years earlier. She presented with weakness, tremors, pain, decreased endurance, and impaired balance and range of motion. Interventions consisted of direct treatment to the knee and global treatment to reduce falls consisting of education, strengthening, stretching, functional exercise, and manual therapy. **Evidence-Based Component** The literature regarding post-operative therapy following meniscectomy is controversial. Some studies suggest that a home exercise program (HEP) focusing on knee extensor strengthening results in greater knee function. A HEP was also found to decrease fall risk in patients with neurological diagnoses. Currently, there is limited research specifically regarding therapy and transverse myelitis. **Outcomes** Treatment consisted of 14 visits with a 6.7 second improvement in the Timed Up and Go, a 72 degree improvement in knee flexion range of motion, a 0.3 centimeter improvement on the visual analog scale, and an improvement from 36% to 40% on the CareConnections Functional Index. **Discussion** This case demonstrates how an “orthopedic” case can be complicated by an underlying neurological condition. It illustrates the importance of using a global treatment approach to address impairments and functional limitations. This is one example of rehabilitation for post-operative knee meniscectomy in someone who has transverse myelitis.

**DPT Class of 2016**
**Case Presentation Abstracts**

***Session 3: Neuro - Related Pediatrics (1.75 CEUs)***

**Thursday, December 15th, 2016 (AM Sessions)**

***Physical Therapy Interventions for the Management of Hypoxic Ischemic Encephalopathy Following Neonatal Therapeutic Hypothermia: A Case Report*** – Taylor Brandenburg

**Background:** In every one to three live births, perinatal hypoxic ischemic encephalopathy occurs. Of those, approximately 15 to 20% will die in the post-natal period and 25% will develop devastating neurophysiological sequela. Neonatal therapeutic hypothermia has been shown to reduce cerebral injuries and improve neurological symptoms after asphyxia (Lai and Yang, 2010). **Case Description:** The patient is a 19-month-old child born at 34 weeks 6 days gestation and underwent neonatal therapeutic hypothermia when she was 6 hours old due to depression at birth and respiratory failure. She was later given the diagnosis of hypoxic ischemic encephalopathy (HIE) due to an MRI revealing several hypoxic cerebral injuries. Interventions have included physical therapy for gross motor development, occupational therapy for fine motor development and feeding skills, and speech therapy for communication abilities. **Evidence-Based Component:** There is little to no research available that discusses specific examples of physical therapy treatment options following therapeutic neonatal hypothermia. However, research is available regarding treatment ideas for children with similar neurological injuries which can be applied to the diagnosis of HIE. **Outcomes:** The child scored 5-6 points on the Alberta Infant Motor Scale at 6 weeks chronological age placing her between the 5th and 10th percentile for other infants her age. Since the child is now 19 months old and can independently ambulate, she has outgrown the AIMS. Her developmental maturity will likely be re-evaluated utilizing a different outcome measure such as the Peabody Developmental Motor Scale. **Discussion:** This case report describes the use of therapeutic hypothermia to provide a neuroprotective intervention to prevent the inflammatory response triggered by asphyxia as well as the physical therapy treatment strategies used following to promote motor skill acquisition and prevent developmental delay.

**Assessing Ambulatory Function with a Reciprocal Gait Orthosis in a Young Child with Myelomeningocele** – Addison Bates

**Background:** Myelomeningocele is a type of spina bifida in which vertebrae do not form properly in utero and the patient is born with protruding spinal cord and meningeal tissue, creating an upper motor neuron injury. Positive effects of early weight bearing and ambulation for children with myelomeningocele may include increased bone mineral density and age-appropriate independence secondary to improved mobility. Physical therapists may be involved in recommending an orthosis for ambulation in young children (<age 5) and will need to assess functional outcomes as part of evidence-based practice. **Case Description:** A 3-year-old female with myelomeningocele at level L2 previously ambulated using bilateral hip-knee-ankle-foot-orthoses (HKAFOs) and a gait trainer. When the patient outgrew her current orthoses, the reciprocal gait orthosis (RGO) was recommended due to lower extremity weakness and pelvic instability. The physical therapist will need an appropriate outcome measure to assess potential progress or decline in ambulatory function after future gait training with the RGO. **Evidence-Based Component:** Assessing muscle strength in a young child with myelomeningocele is necessary to determine the appropriate orthosis but can be difficult due to cognitive ability and cooperation. Additionally, most outcome measures for assessing ambulation in patients with myelomeningocele were created for adults and the available pediatric-specific outcome measures do not generally include young children, making it difficult for physical therapists to choose an appropriate measure to assess ambulatory function in this population. **Outcomes:** The most appropriate outcomes for the patient in this case were determined to be total distance ambulated,

number of consecutive reciprocal steps, and the Hoffer Scale of Functional Ambulation based on financial constraints, available equipment, and the age of the child. **Discussion:** While there are many tools for assessing ambulatory function, few have been validated for young children with myelomeningocele. The purpose of this case is to present multiple options for assessment of ambulatory function in a young child with myelomeningocele to contribute to the knowledge base for future evidence-based care in this population.

***Physical Therapy Management and Changes in Gait Following Multilevel Surgery in Child with Spastic Diplegic Cerebral Palsy: A Case Report*** – Amanda Paulson

**Background.** Spastic diplegia is the most common form of cerebral palsy and is characterized by motor incoordination, primarily in the lower extremities, that impairs many functional abilities, most notably ambulation. Procedures to reduce spasticity and improve bony alignment are commonly performed in children with cerebral palsy to decrease pain and maximize function. However, recommendations for gait retraining and strength training protocols following multi-level surgical intervention are sparsely cited in the literature. **Case Description.** The child presented in this case study was a 9-year-old boy diagnosed with spastic diplegia cerebral palsy who underwent a selective dorsal rhizotomy and multi-level orthopedic surgery. **Intervention.** Interventions performed in this case study aimed to improve physical mobility by addressing gait abnormalities and reducing energy costs through strength training in order to achieve independent functioning. **Outcomes.** The Observational Gait Scale was used to analyze and measure the amount of change in gait pattern following multi-level surgery and therapeutic intervention. The patient demonstrated greater than a 7-point increase on the Observational Gait Scale and a corresponding increase in functional strength. **Discussion.** This case report describes the clinical reasoning and outcomes of surgical intervention augmented by physical therapy management in a child with spastic diplegia cerebral palsy where impaired motor control and muscle weakness were affecting normal gait progression. The changes in gait and corresponding improvements in functional strength suggest the importance of an interdisciplinary approach for managing patients with cerebral palsy who present with delayed onset of gait and impaired motor control due to spasticity, muscular weakness and torsional deformities.

***The Addition and Implementation of an Aquatic Therapy Program to the Physical Therapy Intervention of a Child with Spastic Cerebral Palsy*** – Jared Gerber

**Background** Cerebral palsy (CP), the most common physical disorder affecting children, is often treated with traditional land-based physical therapy. There is limited evidence to suggest that the addition of aquatic therapy will increase a child's gait capabilities. **Case Description** This patient, AP, is an eleven year old boy with diplegic spastic cerebral palsy. AP was seen for aquatic therapy with stretching, functional activity, strengthening, swimming, and games, in addition to traditional land therapy sessions. **Evidence-Based Component** While individual research studies point to a possible improvement in gait with aquatic therapy, systematic reviews cite the lack of volume in studies as a cause to prevent researchers from drawing conclusions regarding the effectiveness of aquatic therapy. **Outcomes** This patient was seen once on land and once in the pool every week for nine weeks with ambulation distance increasing from 25 feet to 150 feet and assistance needed decreasing from maximum assist for three losses of balance to minimum assist for steadying. While the GMFM is the best tool to note motor change in children with CP, this was not completed with this patient. **Discussion** This case report details the aquatic therapy intervention used to assist this patient with ambulation and efficiency on land. Quantitatively, AP increased distance ambulated while decreasing assistance needed. Qualitatively, this patient had a renewed excitement for physical therapy, which has been lost by the ten years plus of therapy he had received throughout his life. The results seen by this patient may suggest that aquatic therapy as a directed and purposeful intervention can be a useful adjunct to traditional land therapy for the improvement in gait.

***Hippotherapy as Adjunct Treatment for a Patient with Spastic Quadriplegia Cerebral Palsy GMFCS Level V Status-post Bilateral Hip Osteotomy***. – Amanda Clark

**Background:** Cerebral palsy is the most common cause of physical disability in children and can lead to a range of functional limitations and participation restrictions depending on severity. Hippotherapy utilizes horses as a dynamic base to challenge a patient's neuromuscular system and is often used in the cerebral palsy population to improve gross motor function, postural control, and gait. **Case Description:** The patient is a 6-year-old female with spastic quadriplegia cerebral palsy GMFCS Level V with a complicated medical and surgical history. She was 9 weeks status-post bilateral varus derotational osteotomy (VDO) due to acquired hip dysplasia. At evaluation, the patient's postural control and functional mobility was decreased compared to baseline pre-surgical levels. Due to these deficits, the patient was determined to be a good candidate for hippotherapy. **Evidence-Based Component:** A comprehensive literature review was performed using PubMed to determine the effectiveness of hippotherapy as a treatment for patients with cerebral palsy to improve postural control and overall gross motor function. A recent systematic review of interventions for children with cerebral palsy has identified hippotherapy as an effective intervention. **Outcomes:** Following 5 sessions of hippotherapy in addition to clinic based physical therapy treatment the patient demonstrated increased tolerance for upright sitting and improved use of assistive technology such as a gait trainer and stander. These improvements allowed for greater participation in school and family activities. **Discussion:** Hippotherapy may aide in the improvement of postural control and gross motor function in children with cerebral palsy. Further research would be beneficial to identify the most effective dosing parameters, ideal candidates, and optimal outcome measures for hippotherapy treatment.

***Physical Therapy Management, Including Aquatic Therapy, of an Adolescent status post Acetabuloplasty and Derotational Osteotomy*** – Jackie Wells

**Background:** Hip subluxation and dislocation is common in patients with cerebral palsy due to hip deformity developing from spasticity. Femoral varus derotation and osteotomy combined with pelvic osteotomy is the treatment of choice for patients over the age of six. Proper postoperative management following hip surgery is necessary to maximize functional gains and outcomes of the procedure. **Case Description:** The case patient was a 9-year-old female with cerebral palsy status post acetabuloplasty and femoral derotational osteotomy. The patient was 12 weeks, non-weight bearing, and required complete assistance for bed mobility, transfers, and used a dependent stroller for transportation. The patient and mother's main goal was to be able to walk again. **Evidence-based component:** The purpose of this case report was to investigate if aquatic therapy in combination with land based physical therapy improves standing time and walking distance following an acetabuloplasty and femoral derotational osteotomy. A literature search revealed task specific training and strengthening on land improves mobility. Further, aquatic therapy is indicated for patients with cerebral palsy and patients following hip surgery and is shown to improve strength, gait efficiency, and mobility. **Outcomes:** Primary outcomes for this case included standing time and walking distance. Upon discharge the patient had no complaints of pain, and had improved her functional mobility. She was independent in bed mobility, transfers, stair negotiation, and was standing and walking independently with her front wheel walker. **Discussion:** There is limited evidence available on rehabilitation following acetabuloplasty and femoral derotation osteotomy. In this case, the combination of land based physical therapy and aquatic therapy positively impacted the patient's functional mobility, including her goal to walk independently.

## ***Session 4: Pain & Musculoskeletal Disorders*** *(1.5 CEUs)*

**Thursday, December 15th, 2016 (AM Sessions)**

***Assessing Functional Outcomes for a Child with a Rare Form of Skeletal Dysplasia who Received a Spinal Fusion*** - Emily McKeever

**Background:** Campomelic Dysplasia (CD) is a rare form of skeletal dysplasia that is often lethal in infancy due to respiratory complications. However, advances in the medical management of CD have improved life expectancy. As these children age, it appears that spinal deformities are common and surgical intervention is often required to prevent future complications. **Case Description:** The patient is a 6-year-old male born with campomelic dyplasia. He began physical therapy (PT) at age 2, but his progress in PT became limited as he grew older due to the development of a severe and progressing kyphoscoliosis. He underwent a spinal fusion at age 5 to address this issue. **Evidence-Based Component:** A literature review was completed to compare various pediatric outcome measures to decide the most appropriate one that could demonstrate the patient's functional progress post-surgically. It was determined that the Pediatric Balance Scale (PBS) was best suited for this child as it allowed him to perform various functional tasks important for activities of daily living (ADLs). **Outcomes:** The PBS was not utilized for this patient prior to his surgery, so his pre-op score was estimated based on past PT progress notes. Pre-operatively he scored 3/56 on the PBS, compared to a score of 24/56 after the surgery. **Discussion:** Though the PBS was able to provide some insight to the patient's functional progress after surgery, it still had its limitations. The patient required use of an assistive device (AD) to complete the test, which was technically not allowed and likely affected the test's validity. Future research should go into creating an outcome measure more suited for physically disabled children that require use of an AD for ADLs.

**The Emergence and Interdisciplinary Treatment of Adolescent Chronic Regional Pain Syndrome After Surgical Intervention: A Case Report** - Cody Walkup

**Background and Purpose:** To report on the efficacy of physical therapy interventions for Chronic Regional Pain Syndrome and the need for interdisciplinary collaboration. **Case Description:** A sixteen-year-old female presented to an outpatient physical therapy clinic after surgical resection of first rib/scalenes. In subsequent visits, the patient presented with sensory, motor, trophic, and autonomic irregularities. This case report highlights both the physical therapy interventions employed and the need for early involvement of a multifaceted healthcare team. **Intervention:** Nearly a year of outpatient therapy was focused on desensitization techniques, stress management, exercise, and strengthening components. Subsequently, a three-week intensive regimen of multidisciplinary therapy was employed. **Evidence-based Component:** Current literature suggests that physical therapists should be highly involved in the treatment of CRPS, but to what extent and dosing recommendations is unclear. Current evidence suggests that graded motor imagery, mirror therapy, and intensive exercise therapy programs are effective in the treatment of CRPS. **Outcomes:** After one year and three months, the patient's NDI disability score decreased from 71% to 33%, an outcome demonstrating a four-fold improvement in terms of clinically important differences. Additionally, qualitative improvements were noted in social involvement, sleeping and eating habits, balance, strength, and several autonomic irregularities. **Discussion:** Evidence for conservative and non-conservative management is lacking in regards to the treatment of adolescent CRPS. This case study reveals a need for further research and efficacy of treatments in all ages of individuals diagnosed with CRPS.

***Physical Therapy Evaluation and Treatment of Amplified Musculoskeletal Pain Syndrome in an Outpatient Setting: A Case Report***. - Becca Adams

**Background:** Amplified Musculoskeletal Pain Syndrome (AMPS) is an umbrella diagnosis given to children who fall on a continuum of chronic pain conditions. Due to the challenges of diagnosing this condition, research is limited. While current research focuses on treatment in intensive inpatient programs, this case report will examine how research was utilized to design an evaluation and treatment plan for a patient with AMPS who presented to an outpatient orthopedic clinic. **Case Description:** The patient was a 13-year-old female who presented with the diagnosis of AMPS. The patient's chief complaint was chronic, severe, widespread pain. Deficits included allodynia, limited mobility, and decreased function that limited her ability to participate in school. **Interventions:** Interventions consisted of 30-40 minutes of intense aerobic exercise performed three times a week. Functional aerobic exercises were targeted towards joints that were reported as most painful. Sensory desensitization was also utilized at each session. **Outcomes:** The Functional Disability Inventory (FDI), Bruce Treadmill Protocol, and manual muscle testing (MMT) were utilized as outcome measures. The patient experienced a decrease of 7 points on the FDI, representing a shift from "severe" to "moderate" disability. MMTs on average improved from a 3+/5 at initial evaluation to a 5/5 at discharge. Subjectively there were no reports of decreased pain, but the patient did report improvement in function. **Discussion:** This case report describes the use research to evaluate and treat a patient with AMPS in an outpatient setting. Improvements in function suggest functional aerobic exercise is a positive intervention. Future research will be required to determine further recommendations for dosing, as well as the potential role of outpatient clinics in the management of this condition.

***Implementing a Multimodal Program for an Individual with Psoriatic Arthritis*** - Drew Gibson

**Background** Psoriatic arthritis (PsA) is an inflammatory arthritis associated with psoriasis and joint manifestations. Current practice guidelines have recommended a combination of pharmacological and non-pharmacological treatment for optimal management (Ritchlin et al., 2009). Evidence shows many benefits of physical activity for individuals with PsA (O'Shea et al., 2014; Dagfinrud et al., 2008), however, the majority are not physically active due to many disease-specific barriers. (Falkenback, 2003). The purpose of this case report is to further address the role of a physical therapist in implementing a multimodal program for an individual with PsA. **Case Description** Patient is a 54 year old male diagnosed with severe PsA in 2009 and various comorbidities. Patient had not been referred to physical therapy until he suffered a right femoral neck fracture in 2016, resulting in a total hip arthroplasty. **Intervention** A multimodal physical therapy program under the supervision of a physical therapist was implemented in conjunction with routine medical management. **Evidence-Based Component** Recent literature (O'Dwyer et. al., 2014; O'Shea et al., 2016) have shown exercise-based interventions, led primarily by physical therapists, to be effective in improving physical function, spinal mobility, disease activity, and quality of life for individuals with spondyloarthropathies, including PsA. **Outcome Measures** Patient reported outcomes used were the composite psoriatic disease activity index (CPDAI), psoriatic arthritis quality of life index (PsAQoL), and the psoriatic arthritis impact of disease (PsAID) (Orbai and Ogdie, 2016). **Discussion** Due to the chronic nature of PsA, consistent physical activity is recommended. Appropriate physical therapy can be beneficial, regardless of the disease duration or extent of disease, however, appears to be generally underutilized by physicians and patients (Elyan et al., 2008).

***Physical Therapy Management of an Individual with Dermatomyositis in a Transitional Rehabilitation Program: A Case Study***. - Derek Klein

**Background**: Dermatomyositis is an inflammatory myopathy with associated cutaneous findings. Individuals with dermatomyositis present with weak proximal musculature and a skin rash presenting on various body parts. It is an incurable, rare condition that individuals may be acutely or chronically affected by, and evidence shows that exercise may be beneficial in reducing primary symptoms and secondary complications. ***Case Description:*** A 43-year old woman was followed for the first four weeks of physical therapy in a transitional rehabilitation program (TRP). At evaluation, she presented with decreased lower extremity strength and difficulty with several functional tasks, including transfers, ambulation, and climbing stairs. Interventions focused on task-specific training, general strengthening, endurance training, and aquatic therapy. She participated in one hour of physical therapy on five to six days per week. ***Outcomes:*** The woman in this case study required decreased assistance with functional tasks and demonstrated increased strength with manual muscle testing following four weeks of interventions. ***Literature Review:*** Different training methods were used in various studies to analyze the effects of exercise on dermatomyositis. Strength training and endurance training, as well as a combination of the two, have demonstrated improvements in health, reduction in disease activity, and increased strength. ***Discussion:*** This case study showed that a multimodal intervention approach to physical therapy in a TRP was safe and effective for the individual described. Although she demonstrated increased strength and independence with activities during this time, additional outcome measures would aid in assessing progress made during continued physical therapy. Though several limitations exist in the literature regarding optimal exercise interventions, this study suggests a combination of task-specific, strength, endurance, and aquatic training may benefit individuals with dermatomyositis.

## ***Session 5:*** *Orthopedics – Foot & LE Rehabilitation (1.75 CEUs)*

**Thursday, December 15th (PM Sessions)**

***Physical Therapy Assessment and Management of Cuboid Syndrome in the Outpatient Rehabilitation Setting*** - Carmen Ertz

**Background.** Cuboid syndrome is an easily misdiagnosed source of lateral foot pain and is believed to be a minor disruption of the calcaneocuboid joint of the midfoot. Once diagnosed, cuboid syndrome responds well to conservative treatment including specific cuboid manipulation techniques, therapeutic exercise, therapeutic modalities, low dye arch tapping, and padding. After the correct diagnosis is made and the appropriate interventions are applied, the prognosis is excellent. **Case Description.** The patient was a 72 year-old male with an insidious onset of lateral foot pain for 4 months duration. Interventions consisted of a cuboid whip manipulation, and strengthening and neuromuscular exercises with the goal of stabilizing the calcaneocuboid joint. **Outcomes.** The patient was treated with a total of five manipulations and an improvement in the Care Connections outcome measure from 20% to 2% deficit and NPRS from 9/10 to 3/10 with activity. **Discussion.** This case report describes the clinical reasoning, assessment, and interventions for cuboid syndrome in an athletic individual with long standing lateral foot pain. The resolution of symptoms and return to recreational activities in a limited number of treatments may suggest the importance of considering this pathology when examining an individual with lateral foot pain.

***Use of Radial Extracorporeal Shockwave Therapy as a Supplement to Treatment in a Patient with Chronic Plantar Fasciitis*** - Nick Mergen

**Background:** Plantar fasciitis is one of the most common conditions affecting the lower limb, with approximately 2 million Americans receiving treatment each year. 90% of patients can be treated conservatively, but for those who do not have successful outcomes following conservative treatment, surgery is commonly the only remaining option. Radial Extracorporeal Shockwave Therapy (rESWT) may be a safe and effective alternative to surgery for patients who do not respond to traditional conservative treatment. **Case Description:** The patient was a middle-aged female who presented to physical therapy with a prolonged history of right heel pain. Onset of pain was insidious and limited her ability to perform job duties and run recreationally. Treatment consisted of education, lower extremity stretching, strengthening, joint and soft tissue mobilization, as well as various modalities. **Evidence-Based Component:** A literature review using PubMed was performed to determine the efficacy of rESWT for treating patients with chronic plantar fasciitis. Current evidence suggests that rESWT results in comparable functional outcomes to surgical treatment and physical therapy. **Outcomes:** Following interventions, the patient demonstrated a notable decrease in pain as well as increased standing tolerance and resumption of a recreational running program. **Discussion:** rESWT may provide a safe and effective alternative to surgery for patients suffering from chronic plantar fasciitis that has not responded to traditional conservative treatments. Further research is needed to determine optimal dosing parameters as well as the feasibility of incorporating rESWT into the standard of care for plantar fasciitis.

***Use of Aquatic Therapy in the Treatment of Post-Radiation Pathological Fracture of the Lower Extremity*** - Molly King

**Background and Purpose** – Research on the rehabilitation of radiation-associated fractures, pathological fractures due to cell injury and vascular damage occurring during radiation therapy, is limited. These fractures often result in long-term non-weight bearing. Aquatic therapy is a safe and beneficial treatment for non-weight bearing patients due to the scientific principles of water. The purpose of this case study was to examine the therapeutic effects of aquatic therapy for radiation-associated fracture of the lower extremity. **Case Description** – The patient was a 56-year-old female with radiation-associated fractures of her right lower leg following treatment of a soft-tissue sarcoma. Due to her fractures, her right lower extremity weight bearing had been limited for two years. Physical therapy evaluation revealed limited right ankle range of motion, pain, and edema, weakness in bilateral lower extremities, poor balance, and gait abnormality. The patient's plan of care focused on aquatic therapy to attenuate the local and systemic effects of long-term non-weight bearing while maintaining weight bearing precautions. **Outcomes** – In 18 visits, she demonstrated improvements in active and passive right ankle eversion range of motion, bilateral lower extremity strength, gait pattern, edema, balance, pain, and functional mobility and activities of daily living per the Lower Extremity Functional Scale. **Discussion** – While it is unclear if these improvements were due to the aquatic nature of her rehabilitation or due to the innate healing of her fracture in conjunction with increased activity level, regardless of a land or aquatic basis, the long duration of her fracture and disability suggest that this intervention lead to improved function and goal attainment. This case highlights the safety of using aquatic therapy for a complex lower extremity fracture requiring non-weight bearing.

**Task-Specific Exercise Progression to Improve Transfer Performance in a Morbidly Obese Patient with Calcaneal Fracture: A Case Report**– Erica Geerdes

**Background:** Improving sit to stand transfer (STS) ability increases independence, reduces risk of falls, and decreases burden on caregivers. Options to improve STS performance vary from task-specific to traditional resistance exercises. In this case, STS training is complicated by high BMI and the presence of calcaneal fracture. **Case Description:** A 69 year old male with a BMI of 62kg/m$^2$ was admitted to the hospital with a fractured calcaneus. A non-weight bearing restriction necessitated the use of a mechanical lift for transfers. The patient was previously able to walk short distances and perform bed and wheelchair transfers. **Intervention Selection:** An exploration of pre-existing literature indicates the use of task-specific versus generalized strengthening to improve transfer performance remains debatable. However, there is research supporting the use of task-specific training in older adults. The interventions described in this case report consist predominantly of task-specific exercises selected to impact STS performance. Initial exercises included shallow squats with the support of a mechanical lift. This was progressed to repetitive STS with use of a walker and advanced via decreasing transfer surface heights. **Outcomes:** The patient's mobility was measured using the Functional Independence Measure (FIM). Transfer surface height, ambulation distance, and required levels of assistance were recorded to guide treatment progression. After 8 weeks, the patient's motor subscale component of the FIM improved by 34 points. **Discussion:** This case is unique in that task-specific exercises, targeted to improve transfer performance, were initiated using the support of a mechanical lift due to the patient's weight and the presence of a fractured calcaneus. Concepts from this report are relevant for use in the geriatric and overweight populations in a variety of settings.

***Use of Anti-gravity Treadmill as an Adjunct Intervention in Rehabilitation Following Intramedullary Nailing of the Proximal Femur: A Case Report*** - Jonny Arnold

**Background:** Common impairments after undergoing intramedullary nailing of the femur include hip abduction weakness, quadriceps weakness, anterior knee pain, gait dysfunction and decreased walking endurance. There is limited research exploring the use of an anti-gravity treadmill in conjunction with traditional physical therapy methods to aid in gait dysfunction at this time. **Case Description:** The patient is a 27-year-old male who suffered a left femoral neck fracture and intramedullary nailing due to a motocross accident. **Intervention:** Interventions consisted of therapeutic exercise, a home exercise program, and gait training performed on land as well as with use of an anti-gravity treadmill. **Evidence-Based Component:** Does the use of an anti-gravity treadmill aid in gait training in a post-op IM nailing patient? After a review of available literature, exercise interventions and progressions were guided by a proposed clinical practice guideline for this population and anti-gravity treadmill progressions were based on similar progression criteria of other studies and case-reports. **Outcomes:** Outcome measures used include manual muscle tests, range of motion of the hip and knee, the timed-up and go assessment, and the lower extremity function scale. He has shown increases in strength and range of motion but final outcomes will be assessed after completing 10 anti-gravity treadmill sessions. **Discussion:** There is some variance in studies on the practicality of translating gait while in the anti-gravity treadmill to gait on land, but the patient seems to be responding well to treatment. The unweighting effects have allowed pain free, proper gait mechanics to be practiced. He reports subjective improvement in addition to tolerating greater body weight on the treadmill. As previously stated, this report is currently on going.

***Physical Therapy Interventions to Improve Gait Performance of a Bilateral Amputee Patient with Recently Fitted Prostheses*** - Abigail Jergenson

**Background:** Amputations are extremely common within the United States; approximately 50,000 lower extremity (LE) amputations are performed annually. Common reasons for LE amputations are the result of complications from peripheral vascular disease. Even though the prevalence of amputations is high, research regarding the most effective therapy interventions remains limited. **Case Description:** A 63-year-old female with a history of bilateral transfemoral amputation was referred to an inpatient rehabilitation hospital for prosthetic training after recently being fitted for new bilateral prosthetics. The patient's main goal was to ambulate a household distance using her prosthetics. **Evidence-Based Component:** A literature review was conducted to determine whether supervised walking combined with exercises to improve impairments has better gait performance outcomes compared to supervised walking alone. Research supported the use of exercises and supervised walking in order to improve gait performance, compared to interventions that only exploited supervised walking. **Interventions:** The patient completed 12 sessions of inpatient therapy over a 2-week period. The interventions were based on suggestions from the Department of Veterans Affairs and Department of Defense such as stretching, positioning, strengthening, balancing, transfers, and walking. **Outcomes:** Throughout her 12 sessions of inpatient therapy the patient demonstrated improvements in ambulation. In addition, she made numerous improvements in range of motion, strength, balance, and functional activities. **Discussion:** Although further research is needed to determine which exercise program has the most beneficial outcomes, this case appears to support the use of exercises in addition to walking during prosthetic training, in order to improve gait performance in patients with LE amputations.

## ***Session 6: Orthopedics – Knee & Upper Extremity Rehabilitation*** *(1.5 CEUs)*

**Thursday, December 15th (PM Sessions)**

***Delayed Complications in a Patient Following Staged Bilateral Total Knee Arthroplasty: A Case Report*** - Katherine Bird

**Background**: It's common to see patients following a total knee arthroplasty (TKA) in outpatient orthopedic physical therapy. This procedure shows good clinical results in about 80% of patients, but the remaining 20% that continue to have pain present a diagnostic challenge (McDowell, 2016). The purpose of this case report is to investigate potential sources for long-term pain after TKA and discuss the role of physical therapy during this time. **Case Description**: The patient is a 61-year-old male who returned to therapy 2 years post staged bilateral TKA, following a left TKA revision. The revision was completed due to recurrent swelling and pain in his left knee. At this time he had decreased range of motion, decreased strength, and impaired gait. **Evidence-Based Component**: There are many potential causes of long-term pain following TKA including intra-articular, peri-articular, and extra-articular factors. When pain is ongoing it's necessary to consider all possible contributing factors and refer to appropriate health care providers for further testing. **Outcomes**: The patient started making progress with physical therapy, but his swelling and pain continued to occur, limiting physical therapy. The patient was given a home exercise program of non-weight bearing exercises and therapy was put on hold until further medical evaluation was completed. **Discussion**: As the number of TKA procedures performed continues to increase, it's important for physical therapists to recognize abnormal symptoms that may indicate abnormal recovery. When this occurs referral is essential for further testing. During this time, therapy should consist of strength and range of motion exercises that the patient can tolerate without increasing symptoms.

***Physical Therapy Assessment and Treatment of an Individual Following a Total Knee Arthroplasty: A Case Study*** - Megan Albee

**Background:** Rehabilitation following a total knee arthroplasty (TKA) continues to pose a challenge for both patients and providers, as there are many accepted post-operative rehabilitation approaches. The lack of clear concise guidelines for TKA rehabilitation may contribute to decreased functional outcomes. **Case Description:** Patient is a 61 year-old female who underwent a voluntary left TKA. She presented with range of motion limitations, soft tissue restrictions and decreased lower extremity muscular strength. **Intervention:** Treatment focused primarily on increasing range of motion, as this was her biggest deficit, soft tissue mobilization, stretching, and progressive strengthening. **Evidence- Based Component:** A literature search of PubMed was completed to determine what interventions provided the most successful functional outcomes following a TKA in respect to strength, range of motion, quality of life, and pain. Research is limited and inconclusive regarding techniques to aid in regaining normal knee range of motion; this report serves to highlight the lack of evidence in current standard practice regarding techniques to aid in regaining normal knee range of motion. **Outcomes:** Throughout rehabilitation, the patient made improvements in range of motion, muscular strength, and pain. However, still lacks sufficient knee range of motion. **Discussion:** Regaining strength and range of motion after a TKA may be achieved by a combination of interventions, as all are not appropriate for each patient and their plan of care needs be individualized for them. Further research is needed to determine the optimal exercise prescription after a TKA specifically in regards to attaining normal range of motion.

***The Use of Aquatic Therapy for Chronic Knee Pain in an Obese Female: A Case Report*** - Emily Ciha

**Background:** Research has shown that weight and quadriceps strength play a significant role in the development of knee osteoarthritis and the progression of disease can be slowed with weight loss. It can be difficult for obese individuals with high pain levels to participate in land-based physical therapy at appropriate intensities to influence weight and strength. **Case Description:** A 51-year-old female presented to therapy with chronic knee pain, obesity and confounding socioeconomic factors in preparation for a total knee arthroplasty. She reported high pain levels, poor pre-operative function and inability to comply with pre-surgical exercises. She was referred to physical therapy for conservative treatment and aquatic therapy. **Evidence-Based Component:** Limited research is available to demonstrate the effects of aquatic therapy in obese populations with chronic joint pain. Current literature was utilized to determine if aquatic therapy is a safe and effective alternative to land-based training and if any protocols existed to increase exercise tolerance and strength while decreasing pain levels and weight. **Outcomes:** Following six weeks of aquatic therapy, the patient's pain level decreased by 3 points, timed up and go score improved by 10 seconds and lower extremity function scale score improved by 25 points. **Discussion:** Aquatic therapy is a safe and effective alternative to utilize with patients as an adjunct to land exercise. An aquatic medium allowed the patient to perform prolonged active exercise with decreased pain while focusing on strengthening, gait training and cardiovascular endurance. This patient also began an independent aquatic program and postponed surgery to focus on weight reduction and lifestyle changes.

***Assessment and Treatment of Chronic Elbow Pain in the Outpatient Setting: A Case for Regional Interdependence*** - Matt Hrvol

**Background:** Lateral epicondylalgia is a prevalent musculoskeletal condition commonly seen by physical therapists in the orthopedic setting. While the underlying cause is most frequently attributed to an overuse injury of the common extensor group, the exact pathophysiology is unknown. Assessment and treatment, especially by the less experienced clinician, is most often based around mechanical dysfunction at the elbow, however, as research has demonstrated, it is critical to include a thorough evaluation of the cervical and thoracic spine. **Case Description:** The case discussed follows that of a 33 year old male presenting with chronic lateral elbow pain of 3 months following minimal gains after 4 weeks of physical therapy with another provider. **Interventions:** Interventions focused on improving hypomobility and mechanical dysfunction of the cervicothoracic region and shoulder girdle through manipulation and mobilization of the bony anatomy and associated soft tissue structures. **Evidence-Based Practice:** Much of the current literature suggests a pathoanatomical connection between instances of lateral epicondylalgia and mechanical limitations or dysfunctions of the cervical and thoracic spine. Such instances may occur with or without specifically reported "neck pain". **Outcomes:** The patient responded well to initial and subsequent treatments in terms of reported pain and clinical outcome reports over the course of 6 weeks. **Discussion:** Physical therapists are taught to focus on the anatomical regions immediately proximal or distal to the affected area. It is critical, however, that patients with instances of lateral elbow pain should receive thorough screening for not only the wrist and shoulder, but cervical and thoracic spine as well. Regional interdependence is an important concept to consider even in common musculoskeletal conditions as proximal limitations often lead to dysfunctions downstream.

***Ipsilateral Trunk Rotation with Shoulder Exercise to Promote Scapular Muscle Balance in Patients*** - Patrick Lewis

**Background:** Improper mobility of the scapula is known to be a contributor to many instances of shoulder pain, dysfunction, or eventual pathology. Rehabilitation efforts to improve scapular rotation and muscle balance are vital to any shoulder rehabilitation protocol. **Evidence-Based Practice:** A recent cross-sectional study looked at the effects of trunk rotation with shoulder exercises on muscle activation and scapular kinematics. The study found that upright exercises improved lower trapezius activity along with scapular external rotation or posterior tilt. Prone exercises showed decreases in upper trapezius EMG response, improving UT/LT activation ratios. The focus of this report is to investigate the practical implementation shoulder exercises with trunk rotation in the clinical setting. **Case Descriptions:** The report presents two patient cases who both began physical therapy due to shoulder pain with different clinical presentations. **Intervention:** Trunk rotations shoulder exercises were implemented with each patient, yet different tolerances to the intervention were noted. **Discussion:** Through differences noted in intervention tolerance between the two cases, clinical considerations such as core stability and accompanying soft tissue injury should be noted prior to implementation. The use of these exercises should be reserved for higher functioning patients or later stages of shoulder rehabilitation protocols.

## ***Session 7: Orthopedics & Sports Rehabilitation*** *(1.5 CEUs)*

## Friday, December 16th (AM Session)

***Limited Hip Mobility and Strength in a High School Baseball Player with Acute Back Pain: A Case Report*** - Katelyn Bakey

**Background***:* Baseball players injure shoulders and elbows more than any other region in the body. The entire body must work together as one kinetic chain to decrease stress on the upper extremity when throwing. The lower extremity is responsible for generating force to produce adequate ball velocity, which is transmitted to the upper extremity through the pelvis and trunk. If any region of the lower extremity lacks range of motion (ROM) or strength the force must be generated from elsewhere in the kinetic chain, which may lead to an increased risk for injury. **Case Description***:* Patient (JN) is an 18-year old male presenting with severe lateral low back pain and increasing elbow discomfort. He is a right handed high school baseball pitcher who came to the clinic four days after feeling a pull in his back while pitching. The patient was found to have a quadratus lumborum (QL) muscle strain, limited L hip internal rotation (IR) ROM, and decreased R hip abduction strength. **Intervention***:* Exercises were completed in baseball pitching specific positions in order to increase hip abduction strength and hip IR ROM. Core stabilization exercises were also completed to assist in strengthening the QL. **Outcomes***:* Improvements were seen in Modified Oswestry Low Back Questionnaire, hip IR ROM, hip abduction strength, lateral step-down test, and pitching analysis. **Scholarly Discussion***:* JN's lack of hip IR ROM likely resulted in increased lateral trunk tilt and elbow flexion ROM while pitching to generate adequate ball velocity. The increases in joint ROM have the potential to increase the torque felt at the joint throughout the pitching sequence. Improving hip IR ROM may decrease the risk for upper extremity injury.

***Assessment and Management of a High School Softball Player with Bilateral Scapular Dyskinesia and Unilateral Pain: A Case Report****.* - JD Pluim

**Introduction:** Scapular dyskinesia is a term that denotes abnormal position or movement of the scapula and is best diagnosed using visual observation of repetitive shoulder movement. Various treatments of scapular dyskinesis have been demonstrated to improve shoulder symptoms. The best rehabilitation protocol for treating and returning an adolescent female with bilateral scapular dyskinesia back to softball is unknown. **Case Description:** The patient was a 14-year-old softball player who was referred to physical therapy after sustaining a strained rhomboid during competition. She demonstrated abnormal scapulohumeral movement bilaterally consistent with a diagnosis of scapular dyskinesia. She was unable to achieve full left shoulder flexion and abduction. She presented with bilateral weakness of rotator cuff and scapular stabilizing muscles. **Interventions & Evidence-Based Component:** We focused on scapular rehabilitation and strengthening. We utilized an evidence-based approach to selecting strengthening and stretching techniques designed to target her specific deficits and functional requirements. **Outcomes:** The DASH Outcome Measure and the DASH Sports/Performing Arts Module were the primary method of assessing the patient's functional outcome. The initial DASH scores were 23.28 and 100, respectively. Her DASH scores at discharge were 4.3 and 18.8, respectively. These both represent significant improvements based on the MCID and MDC. **Discussion:** The purpose of this report was to demonstrate an evidence-based approach to selecting interventions aimed at scapular rehabilitation of an adolescent overhead athlete. We achieved a positive outcome by addressing strength deficits of the rotator cuff and scapular stabilizers. However, future studies should be aimed at confirming and optimizing the effectiveness of scapular rehabilitation strategies among adolescent females in overhead sports.

***Early Rehabilitative Management of Meniscal Allograft Transplant and Implementation of Advanced Plyometrics with Early Return to Sport: A Case Study*** - Robert Hess

**Background:** Meniscal Allograft Transplantation provides an alternative solution to improved function and decreased pain post knee meniscectomy. Due to current limitations in equipment longevity concerning knee replacement, young to middle aged populations may significantly benefit from allograft transplantation. Allograft transplantation allows these individuals to maintain active, healthy lifestyles with minimal to no pain. Proper timing and implementation of a return to sport program is crucial in optimal rehabilitation and long term outcomes. **Case Description:** Patient is a 29 year old female post medial meniscal allograft transplant with a 4 year history of meniscus tears and most recently a meniscectomy. Pt. goals are to return to prior level of participation in volleyball and softball for coaching purposes. **Intervention:** A multidimensional approach to rehabilitation was utilized with progression to plyometrics and return to sport activities at 16 weeks. **Evidence-Based Component:** A literature review of PubMed was conducted to determine long term functional outcomes following early implementation of plyometrics and return to sport programs following meniscal allograft transplant. Results show with proper patient selection, short to mid-term outcomes do not differ in survival rate or functional outcomes. No long-term evidence is currently available. **Outcomes:** The patient demonstrated significant improvements on the Care Connections functional outcome measure along with significant decrease in pain with activity. **Discussion:** Early return to plyometrics and sport specific training at this time is not contraindicated although no comparison of long term outcomes has been specifically addressed. Currently there appears to be no significant difference in short to mid-term outcomes.

***Performance-based Measures to Guide Return to Sport Decisions Following Anterior Cruciate Ligament Reconstruction*** - Tony Naber

**Background**: A protocol of performance-based measures to determine readiness for return to sport following anterior cruciate ligament reconstruction (ACLR) has yet to be developed. Athletes are being returned to sport following an anterior cruciate ligament tear and only returning to their pre-injury activity level 43-57% of the time. The addition of performance-based measures into the clinical assessment will increase the information available to the clinician and guide the decision making process. **Evidence Based Component**: The Functional Movement Screen (FMS), Lower Quarter Y-balance Test (LQYBT), Hop Testing, Isokinetic Strength Testing, and Vail Sport Test are all performance-based measures. They each have theorized rationale to be included in performance assessments but the verdict of their ability to successfully predict readiness for return to sport is still much within question. **Case Description**: The patient described in this case study is a 16 y.o female who underwent ACLR following a rupture while participating in basketball. This commentary details the performance-based measures involved in her rehabilitation with the end goal of returning to softball. She was able to successfully return to full competition following six and a half months of rehabilitation. **Discussion:** The current research on performance-based measurements has yet to prove conclusively that any of them are effective in predicting injury risk or the ability to return to sport. Each of the discussed performance-based measures does offer increased information about a specific attribute related to sport. This information can be combined with a slow integration into sport specific skills to help the clinician make an appropriate recommendation.

***Rehabilitation after Second Anterior Cruciate Ligament Reconstruction Revision using Quadriceps Tendon Graft: A Case Report*** - Tina Converse

**Background:** Physical therapists often see post-operative primary and revision anterior cruciate ligament reconstruction surgery patients. There is little specific research related to the rehabilitation following a primary, much less a revision surgery as well as what type of grafts have the best outcomes after a primary or revision surgery (Wright, 2014). There is little literature regarding the specifics of rehabilitation associated with each type of graft that may be used. **Case Description:** The patient described in this case was a 28-year-old female who presented after her second anterior cruciate ligament reconstruction revision surgery in which a quadriceps tendon autograft was used. **Interventions:** She was instructed to follow the MOON protocol during her rehabilitation, with extra caution for the quadriceps tendon graft and harvest site. Her rehabilitation focused primarily on regaining range of motion and strength with emphasis on reaching full active terminal knee extension during gait, as this was her main problem throughout her therapy. Eccentric quadriceps strengthening was integrated into her rehabilitation. **Evidence Based Component:** This report discusses current research related to the MOON protocol, as well as current research surrounding anterior cruciate ligament graft choices and surgical success. It will also touch on research regarding eccentric strengthening of very weak or inhibited musculature, and functional outcome measures that are appropriate for anterior cruciate ligament reconstruction patients. This patient was treated over the course of several visits. **Outcomes:** Her outcomes were periodically assessed using the Lower Extremity Functional Scale, along with other evaluative measures. **Discussion:** This case report reviews the interventions, protocol, and outcomes following a secondary anterior cruciate ligament reconstruction revision surgery using an ipsilateral quadriceps tendon autograft.