**DPT Research Day**

Abstracts for Poster and

Platform Presentations

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**Department of Physical Therapy**

**College of Health Professions**

**Class of 2014**

**Friday, July 11, 2014**

**8:30– 3:30 PM**

**Loosemore Auditorium**

**DeVos Campus**

**Grand Rapids, MI**

**Platform Presentations**

**THE EFFECTIVENESS OF MANUAL THERAPY TECHNIQUES IN THE TREATMENT OF PATIENTS WITH HIP OSTEOARTHRITIS: A SYSTEMATIC REVIEW.** Johnson KL, Patterson RA, Poirier AJ, Kinne BL; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Osteoarthritis (OA) of the hip causes pain and impaired functional abilities. In addition, it often leads to a total hip replacement in many older adults. Several different treatment approaches are used to control pain and preserve function in individuals with hip OA. Manual therapy has been shown to be an effective intervention for many different pathologies. Although there are two recently published systematic reviews that assess the effects of physical therapy on OA, the first systematic review only included one study that dealt with hip OA; and the second systematic review only included two studies that dealt with manual therapy. Therefore, the purpose of this systematic review was to evaluate the effectiveness of manual therapy on functional outcomes and/or pain in patients with hip OA. **METHODS:** A search of the CINAHL Plus with Full Text, ProQuest Medical Library, and SPORTDiscus with Full Text databases was performed. The search terms utilized for these databases were “hip osteoarthritis” AND “manual therapy” AND “randomized”. The inclusion criteria for this systematic review consisted of: (1) patients with hip osteoarthritis; (2) an intervention group that received manual therapy as a component of the treatment plan; (3) a comparison group that did not receive manual therapy as a component of the treatment plan; (4) function and/or pain as the outcome measure; and (5) randomized controlled trials. The exclusion criteria consisted of: (1) patients with a diagnosis other than hip osteoarthritis; (2) an intervention group that did not receive manual therapy; (3) a comparison group that received manual therapy; (4) outcome measures other than those outlined in the inclusion criteria; and (5) studies other than randomized controlled trials. The approach used to evaluate evidence level was the Oxford 2011 Centre for Evidence-Based Medicine Levels of Evidence. The approach used to evaluate methodological rigor was the PEDro Scale. **RESULTS:** A total of 2,047 articles were identified through a database search. Three additional records were identified through other sources. After removing the duplicates and screening the records, all but four studies were eliminated. These four studies were included in the qualitative synthesis. Three of the included studies investigated the short-term effects of manual therapy. Two of these studies demonstrated significant results in favor of manual therapy. Three of the included studies investigated the long-terms effects of manual therapy. Two of these studies demonstrated significant results in favor of manual therapy. **DISCUSSION:** In the short-term, positive outcomes appeared to be related to a greater frequency, duration, and intensity of the manual therapy application. In the long-term, positive outcomes appeared to be related to the prescription of a home exercise program in addition to the application of manual therapy. **CONCLUSION:** This systematic review found that manual therapy is generally effective in the treatment of patients with hip OA.

**3-D KINEMATIC, KINETIC, AND EMG ANALYSIS OF THE OVERHEAD DEEP SQUAT: A DESCRIPTIVE STUDY.** Tisdall RE, Victor JN, Wolbert CD, Hoogenboom BJ, Alderink GJ; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Clinicians commonly utilize functional movement screen components, such as the overhead deep squat (OHDS), in order to assess an individual’s mobility and stability throughout the kinetic chain. Despite the overwhelming use and application of the OHDS for movement assessment, there is limited research describing the movement. The purpose of this study was to utilize three-dimensional kinematic, kinetic, and electromyographic (EMG) techniques to analyze the OHDS in order to obtain objective measurements that thoroughly describe the kinematics and muscular activation patterns that occur during the movement. **METHODS:** Twenty (10 male/10 female) healthy participants between the ages of 18-35 volunteered. To be included, subjects had to (1) be able to pass a deep squat screen, (2) be void of any orthopedic surgery, (3) be void of any orthopedic injury in the past 6 months, (4) be void of any somatosensory balance deficits, and (5) demonstrate no pain during the Functional Movement Screen. The Vicon Motion Lab System 600 series and two AMTI force plates were utilized to record three-dimensional kinematic and kinetic data of the upper extremities, trunk, and lower extremities during the OHDS. The combined Upper Limb, Plug-In Gait, and Oxford Multi-Segment Foot marker sets totaled 73 retro-reflective markers that were placed on each subject. The Motion Lab Systems MA-300 16-channel Electromyography system was used to collect surface EMG activity of six paired muscles in the trunk and lower extremities. **RESULTS:** Five phases of the OHDS were operationally defined by the authors as ‘initial squat’, ‘descent phase’, mid-squat position’, ‘ascent phase’, and ‘terminal squat’ using calculated results. At the mid-squat position, the deepest portion of the squat, mean pelvic tilt was 20.1 ± 10.7 deg in an anteriorly tilted position. Other pelvic movements observed during the OHDS were unremarkable. At the mid-squat position, mean hip flexion was 121 ± 11 deg, mean hip abduction was 21.7 ± 5.45 deg, and mean hip internal rotation was 21.7 ± 10.9 deg. At the mid-squat position, mean knee flexion was 132 ± 12.8 deg, mean knee varus was 4.69 ± 6.8 deg, and mean knee internal rotation was 32.3 ± 14.4 deg. At the mid-squat position, mean ankle dorsiflexion was 37.2 ± 6.13 deg, mean ankle eversion was 14.8 ± 8.2 deg, and mean ankle internal rotation was 11.8 ± 6.86 deg. Internal hip extension and knee extension moments increased until mid-squat and then decreased through OHDS completion. Recorded EMG data was collected but was not statistically analyzed. Raw EMG data was used to describe general muscle recruitment and firing patterns. **DISCUSSION/CONCLUSION:** The kinematics and kinetics observed during performance of the OHDS occurred simultaneously in all three planes of motion. Kinematics of greatest interest were observed at the pelvis, hips, and knees. As hip flexion increased during the OHDS, hip abduction and internal rotation also increased. Similarities between pelvic and knee kinematic patterns indicated regional interdependence or kinetic linking during the OHDS. Explanations could be attributed to muscle activation, recruitment patterns, or biomechanical alignment of the skeletal system.

**THE EFFECTIVENESS OF MDT (MECHANICAL DIAGNOSIS AND THERAPY) ON PATIENTS WITH SHOULDER PAIN: A CASE SERIES.** Czerniak I, Grady M, Hirsch C, Vaughn D; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Shoulder pain has been identified as a common medical condition that alters an individual’s ability to perform functional activities. There is limited evidence regarding the effectiveness of the Mechanical Diagnosis and Therapy (MDT) method on shoulder pathologies. Due to the limited evidence regarding MDT treatment of the extremities, the purpose of this case series was to present the assessment, clinical intervention, and outcomes of three patients presenting with an apparent shoulder problem using MDT principles. **CASE** **DESCRIPTIONS:** Patient 1 was a 24-year-old male with intermittent right shoulder/upper trapezius pain and neck pain. His symptoms were provoked by right side-lying, lifting, overhead activities, and using his arm away from his body. Diagnoses of cervical derangement with a directional preference of extension and a right shoulder articular dysfunction were confirmed. Patient 2 was a 58-year-old female with intermittent neck pain, left arm pain, and left hand numbness. Her symptoms were provoked by overhead activities, donning/doffing personal garments, putting on her seatbelt, and carrying/lifting groceries. She was diagnosed with a cervical derangement with a directional preference of flexion and a separate left shoulder derangement with a directional preference of internal rotation. Patient 3 was an 18-year-old female with bilateral shoulder and scapular pain. Her symptoms were provoked by overhead activities, prolonged sitting, and side-lying. Diagnoses of thoracic derangement with a directional preference of extension and separate bilateral shoulder derangements with directional preferences of extension were confirmed. Each patient was evaluated and treated by a physical therapist with a diploma in MDT. An individualized treatment program was developed for each patient based on symptomatic and mechanical responses to repeated movement testing. **OUTCOMES:** After the completion of physical therapy ranging from 4-8 visits over a 7-12 week time period, all patients showed improvements in strength, range of motion (ROM), functional ability, and outcome measures. Although all of the patients were discharged from physical therapy with minimal to moderate ROM restrictions, they were able to independently manage their deficits with an individualized home exercise program. **DISCUSSION:** The patients in this case series demonstrated symptomatic and mechanical improvements suggesting that MDT may be an effective method of categorizing, evaluating, and treating shoulder disorders.

**PEDIATRIC ACL REVISION WITH CONTRALATERAL HAMSTRING AUTOGRAFT AND ALLOGRAFT USING AN ALL-EPIPHYSEAL TECHNIQUE; TREATMENT AND IMPLICATIONS FOR THE PHYSICAL THERAPIST: A CASE REPORT.** Lettinga LD, Goehring M, Houze M; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** In the past two decades, there has been an increase in anterior cruciate ligament (ACL) injuries in young athletes. It is often recommended that these individuals undergo specialized ACL reconstruction surgery followed by a rehabilitation protocol for return to sport. There is a wide variability in protocols used in the adult population, and this variability is even greater when adapting protocols to the skeletally immature. Rates of re-injury are higher in the young athlete, reaching as high as 30%. The purpose of this case report was to present the rehabilitation and progression back to sport of a pediatric male soccer player who underwent his second all-epiphyseal ACL reconstruction. **CASE DESCRIPTION:** The patient was a 12-year-old male soccer player who underwent an all-epiphyseal surgical revision of a previously failed ACL reconstruction. He presented with a 4/10 pain level along with range of motion, strength, gait, edema, and neuromuscular recruitment deficits affecting function. **OUTCOMES:** The patient successfully progressed through phases 1 and 2 of a modified 10-month, 5-phase protocol of quantitative and qualitative measures for advancement. **DISCUSSION:** Successful outcomes for this patient population should address the many factors influencing the rehabilitative plan of care, including the psychosocial domain. A strict protocol of quantitative and qualitative measures for progression should be used and adopted in order to minimize the risk of re-injury. Future research is needed on time frames and outcome measures in this population for a successful return to sport.

**THE PERSPECTIVES OF FEMALE COLLEGIATE CROSS COUNTRY RUNNERS ON EATING BEHAVIORS AND ATTITUDES TOWARD HEALTH: A QUALITATIVE STUDY.** Armstrong T, Polso A, Smith M, Stickler L; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Recent literature has explored eating behaviors throughout the female collegiate cross country runner population, and this literature has found that often nutritional knowledge is not optimal and that both disordered eating and the female athlete triad exist. However, the relationship between nutritional knowledge and eating behaviors is unclear. The primary purpose of this study was to explore the perspectives of female collegiate cross country runners on eating behaviors and attitudes toward health. **METHODS:** During the 2013 cross country season, five NAIA and five Division II female cross country runners, ages 18 to 22, participated in this qualitative research study. The relationship between eating behaviors and attitudes toward health was examined through individual, semi-structured interviews. After transcription of the interviews, each student researcher independently developed themes and sub-themes and then met to negotiate the findings. **RESULTS:** The following four themes were identified: health behaviors, nutritional knowledge, influences, and health attitudes. The participants’ statements suggested that influences, nutritional knowledge, and attitudes all affected the health behaviors of the cross country runner. Not only did they change health behaviors, but influences, nutritional knowledge, and attitudes also intertwined with each other and affected one another. **DISCUSSION:** While nutritional knowledge does play a role in the health behaviors of the female runner, it is not the sole contributor. Complex and interconnected relationships between eating behaviors and attitudes toward health were identified and were unique in each female collegiate cross country runner. **CONCLUSION:** The development of the health behaviors of female collegiate cross country runners was exposed throughout this qualitative study. This in-depth understanding may assist in interpreting the behavioral causes of the female athlete triad and therefore the management as well as prevention of this disorder. **ACKNOWLEDGEMENTS:** Barbara Hoogenboom, Cynthia Grapczynski, participating women’s cross country teams, athletic directors, and coaches.

**EFFECT OF EXTREMITY STRENGTH TRAINING ON FIBROMYALGIA SYMPTOMS AND DISEASE IMPACT IN AN EXISTING MULTIDISCIPLINARY TREATMENT PROGRAM.** Rogowski K, Stern M, Willett E, Vaughn D; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Fibromyalgia (FM) continues to be a poorly understood diagnosis, and a gap in knowledge remains regarding best practices in the management of its symptoms. The purpose of this study was to compare whether the implementation of strength training to a pre-existing multidisciplinary program had clinically significant effects on the symptoms of FM. **METHODS:** This comparative study design incorporated a retrospective analysis of patient data from past charts in order to form the control group. A prospective analysis was also used with patients new to the facility to form the experimental group. Patients: All of the patients were between the ages of 18-65 and had a medical diagnosis of fibromyalgia. Procedure: Participants entering the fibromyalgia program for the first time were included in the experimental group. This group received the same multidisciplinary treatment as the control group until the fifth week of treatment, at which time the treating physical therapists added upper and lower extremity strengthening exercises to the usual physical therapy program. At the beginning and the end of treatment, patients were given the Fibromyalgia Impact Questionnaire (FIQ); and the overall change in score was examined. The age of the patient and the number of physical therapy visits were also recorded. Statistical analysis: Independent t-tests were used with an alpha level of 0.05 to examine both within and between group data. **RESULTS:** In the control group, the differences between the initial FIQ score and the FIQ score at discharge had a mean of 19.30 (p=<0.0001). In the experimental group, the differences had a mean of 27.88 (p=<0.0001). Between groups, the 95% confidence intervals had a significant overlap; and there was not a statistically significant difference between the groups’ mean change scores (p=0.0567). Age (p=0.165,-0.142) and number of visits (p=0.255, -0.124) had very weak correlations to the difference in FIQ scores. **DISCUSSION:** The correlations between age, number of visits, and the difference in FIQ scores between the two groups are weak and do not fully explain the change in scores. The mean difference in scores for the individual groups are significant, indicating that the overall program is successful and produces significant changes in FIQ scores. There is not a statistically significant difference in FIQ scores between patients given the strength program versus those who did not perform extremity strengthening exercises. The strength of this analysis was affected by the discrepancy between group size (control = 28, experimental = 12) and the variation between the groups. **CONCLUSION:** The interdisciplinary program appears to produce significant changes in FIQ scores related to changes in disease symptoms. However, adding an extremity strength-training program to the physical therapy sessions does not produce a statistically significant difference in the FIQ scores. Further research is warranted as this study was limited by participation at this time. **AKNOWLEDGEMENTS:** Teresa Miller, PT, Dr. Sango Otieno, the Mary Free Bed Rheumatology and Pain Clinic, and the Pain Clinic therapy staff.

**ACUTE CARE REHABILITATION OF PATIENTS FOLLOWING LEFT VENTRICULAR ASSISTIVE DEVICE IMPLANTATION AND THE ASSOCIATION BETWEEN EARLY AMBULATION, LENGTH OF STAY, AND DISCHARGE TO HOME.** Gaskell A, Sefton D, VandeBunte K, Shoemaker M; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** No prior study has specifically investigated the effects of early mobility following left ventricular assistive device (LVAD) implantation. The purpose of the present study was to determine whether earlier mobilization and ambulation were significant predictors of shorter length of stay (LOS) and discharge (DC) home. **METHODS:** A retrospective chart review of the initial acute care stay of 98 consecutive patients with first-time HeartMate II or HeartWare implantation was performed. Hierarchical linear and logistic regression models were used to control for the confounding effects of the following variables on LOS and DC home: INTERMACSTM Profile, Model for End-Stage Liver Disease score, serum albumin, number of post-operative days of impaired cognition, mechanical ventilation, and total number of adverse events. **RESULTS:** The number of post-operative days until first ambulation was an independent, statistically significant predictor of both shorter LOS and odds of DC home, explaining an additional 15% of the variance in LOS and an additional 14% of the variance in odds of DC home. The number of days until first time standing was not a statistically significant predictor of LOS or DC home. **DISCUSSION/CONCLUSION:** Earlier ambulation after LVAD implantation was predictive of shorter LOS and odds of DC home, even when controlling for several other well established pre- and post-operative determinants of clinical outcome. **ACKNOWLEDGEMENTS:** A special thanks to co-investigators Jessica McLeod, PT, DPT, ATC, Darshak H. Karia, MD, Michael G. Dickinson, MD, FACC, and Asghar Khaghani, MD, FRCS.

**APPLICATION AND EFFECTIVENESS OF TARGETED INTERVENTIONS FOR REMEDIATION OF PUSHER SYNDROME IN AN INDIVIDUAL POST-STROKE: A CASE REPORT.** Hudson K, Harro C; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Pusher Syndrome (PS) is a unique, postural control impairment seen in 10% of persons post-stroke. PS is characterized by a patient’s misperception of postural orientation in relation to gravity. Diagnostic criteria for PS include (1) a tilted spontaneous body posture, (2) active pushing towards the hemi-paretic side, and (3) resistance to passive correction. PS adversely affects functional skills and slows the rate of recovery during rehabilitation. The etiology underlying PS is unknown, and there is little evidence regarding effective intervention strategies for this clinical population. The purpose of this case report was to describe the application of targeted intervention strategies to remediate PS and to examine the effectiveness of these strategies on functional recovery in a patient with sub-acute stroke in the inpatient rehabilitation (IPR) setting. **CASE DESCRIPTION:** Subject: The patient, DS, was a 68 year-old female who suffered a large, left hemorrhagic stroke with subsequent midline shift. Following a complicated acute medical course, DS was admitted to IPR four weeks post-stroke for intensive multi-disciplinary training. The physical therapy (PT) initial evaluation revealed that DS had severe right-sided hemiparesis, had expressive and receptive aphasia, had markedly impaired postural control in sitting and standing with evidence of PS, and required maximal to total assistance for all functional skills. Intervention: PT interventions emphasized postural control re-training and functional skill training with the application of three key intervention principles to remediate the PS that included: (1) recalibration of impaired internal reference of vertical through the use of external sensory and environmental cues, (2) forced-use of early upright postural demands and balance training, and (3) forced-use of postural control demands in the context of task specific training and dual tasks. Systematic withdrawal of external cues and progression of task demands were demonstrated in this case report. Outcome measures implemented to monitor recovery in IPR were: (a) The Scale for Contraversive Pushing (SCP) to assess change in pushing behavior, (b) The Function in Sitting Test (FIST) to assess sitting balance recovery, and (c) Functional Independence Measure (FIM) to assess level of functional independence. **OUTCOMES:** The patient demonstrated notable improvements in postural control, sitting/standing function, and functional mobility skills following an eight-week stay in IPR. A significant reduction in pushing behavior was evident based on SCP, with a 70% improvement at discharge (adm= 5.75, d/c= 1.5/6 pts). DS had a 34% improvement in the FIST (adm= 28, d/c= 47/56 pts), reflecting significant gains in sitting balance. Most notably, she had a FIM gain of 44 points (adm=23, d/c= 67/126 pts), requiring only minimal assist for a majority of functional skills except locomotion and dressing. **DISCUSSION:** Patients with PS are responsive to intensive rehabilitation including the use of external environmental cues, postural control re-training, and task-specific practice. PS needs to be objectively diagnosed and measured throughout rehabilitation in order to determine the effectiveness of intervention strategies. It is important for therapists to advocate for patients with this clinical problem. PS may contribute to delayed functional gains, but these patients have the potential for functional recovery.

**SITTING BALANCE MEASURES IN NON-AMBULATING INDIVIDUALS DIAGNOSED WITH MULTIPLE SCLEROSIS: DETERMINING THE EXISTENCE OF A CORRELATION BETWEEN THE FUNCTION IN SITTING TEST AND SMART EQUITEST®.** Casterline MD, Decker JM, VandenBerg MT, Baker BJ; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Multiple Sclerosis (MS) is a progressive demyelinating disease affecting over 2.1 million Americans. One-third of these individuals will require future wheeled mobility which requires sitting balance for postural maintenance. There is currently a dearth of evidence on objective sitting balance measurement tools for persons diagnosed with MS. The purpose of this study was to determine the existence of a correlation between the Function in Sitting Test (FIST) and SMART EquiTest® in non-ambulating individuals with MS. **METHODS:** The research design was a correlation study between the FIST and SMART EquiTest® of the sitting balance performance in non-ambulating individuals with MS. Nine subjects were recruited and passed inclusion and exclusion criteria pertaining to their level of function with MS. FIST and SMART EquiTest testing was performed per documented protocols in random order for each subject. Data was collected and analyzed using SPSS 18 statistical software. **RESULTS:** This study found a good to excellent correlation (0.892, p=0.003) between the FIST and SMART EquiTest® across eight subjects after the removal of one subject who was a qualitative outlier. Across all subjects, this study found a moderate to good correlation (0.591, p=0.094). Dynamic sitting tasks and scooting tasks on the FIST were found to have a stronger correlation with the SMART EquiTest® than were static and reactive sitting items on the FIST. **DISCUSSION:** There is no “gold standard” available to which either the FIST or SMART EquiTest® can be compared in this population. This study included a small sample size, limiting the power of the statistical results. Numerical values were not available for those marked “fall” or “not scored” on the SMART EquiTest®, and this fact limited the data analysis of those results. **CONCLUSION:** There is a good to excellent correlation between the FIST and SMART EquiTest® when measuring dynamic sitting in the non-ambulating population with MS. Therefore, either test can be effectively used to assess sitting balance in this specific population. **ACKNOWLEDGEMENTS:** We would like to formally acknowledge each of the determined and courageous subjects who volunteered for this study. We admire you and thank you for assisting us in this research as well as providing us with an excellent learning opportunity. We would like to thank Gerald Shoultz for his creative and charismatic statistical assistance and expert input to this project. We extend our utmost gratitude to Barb Baker for her seasoned guidance, patience, and wonderful sense of humor throughout this process. We greatly appreciate her tutelage and her ability to impart her expertise in so many ways to make this a wonderful learning experience.

**DEVELOPMENT OF A TOOL TO AID CLINICIANS IN CREATING POWER MOBILITY INTERVENTIONS FOR CHILDREN.** Cain B, King E, VandenBerg A, Kenyon L; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Current tools to measure an individual’s ability to operate a power mobility device focus on determining readiness to use power mobility. Existing tools are also only valid for use with individuals able to operate a joystick. The purpose of this study was to develop the Power Mobility Training Tool (PMTT), an observational assessment that can assist clinicians in designing intervention programs to help children with multiple, severe impairments develop beginning power mobility skills. **METHODS:** Initial items on the PMTT were developed based on a review of literature and consultation with clinicians experienced in the use of power mobility. Individual items were trialed in clinical settings, reviewed, and refined. Items were then operationalized, and an administration manual detailing scoring for each item was created. Qualitative and quantitative methods as outlined by Veneziano and Hooper were used to establish content validity of the PMTT. A 15-member, international expert panel consisting of seven researchers in pediatric power mobility and eight clinicians who used power mobility with children was electronically convened for this aspect of the project. Qualitative feedback was received from 14 of the 15 panelists. Qualitative feedback related to the items and the draft administration manual was thematically analyzed, and revisions were made to items based on the qualitative feedback provided. The revised items were then sent back to the panelists for quantitative review. A dichotomous scale of “Essential to Include” and “Not Necessary to Include” was used in this process. Panelists’ responses for each item were tallied and used to calculate the content validity ratio (CVR) for each item using the formula: CVR=(ne-N/2)/(N/2) where ne equaled the number of panelists indicating that the item was essential to include on the PMTT and N equaled the total number of panelists who reviewed the specific item. **RESULTS:** Of the original 19 items, 12 achieved minimum CVR values at a <.05 level of significance and were included in the final version of the PMTT. Items related to awareness of obstacles and environmental hazards as well as the use of a switch outside of a power mobility device did not achieve CVR values at a <.05 level of significance and were not included in the final version of the PMTT. As proposed by the panelists, items related to maneuvering a power mobility device were merged as well as an item related to the number of switches used concurrently to operate a power mobility device were added to the PMTT. **DISCUSSION:** Although establishing validity is an on-going process, this study finalized item selection and established the initial content validity of the PMTT. The PMTT is the first tool created specifically for use with children who may use switches to access a power mobility device. **CONCLUSION:** The PMTT may aid clinicians in creating intervention programs to help children with multiple, severe impairments develop beginning power mobility skills.

**GAIT CHANGE REASSESSMENT THREE YEARS FOLLOWING A TRAUMATIC BRAIN INJURY: A CASE REPORT.** Ezinga KM, Green M; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Traumatic brain injury (TBI) affects individuals of all ages and can range in severity from very mild to very severe. The majority of literature on TBI has focused on the acute and sub-acute stages of management with limited long-term follow-up. Patients with severe TBI have demonstrated functional recovery even in the chronic phase. The purpose of this case report was to provide an example of a patient returning for gait assessment and rehabilitation well into the chronic phase of TBI. **CASE DESCRIPTION:** Subject: The subject was a 70-year-old male with a referral for gait reassessment more than three years after his initial diagnosis of TBI caused by a motor vehicle accident. He demonstrated a shortened left lower extremity following femur fracture and surgical repair, and he used a wedged sole lift and dorsiflexion assist ankle foot orthotic. The subject demonstrated significant range of motion and strength deficits, particularly on the left. Exercise tolerance was severely limited, and he demonstrated an increased risk of falling on both the Berg Balance Scale and Functional Gait Assessment. The subject primarily used a four-wheeled walker for household and community ambulation, and he demonstrated shortened stance time on the left and flat foot initial contact. With a standard cane or independent walking, energy expenditure increased and the gait impairments became more marked. The subject demonstrated independence in activities of daily living, but he noted that he could not perform cooking or shopping activities. Intervention: The subject received physical therapy services 2-3 hours per week for a total of 10 weeks. Intervention included mobilizations and stretching of the left ankle to improve range of motion, strengthening activities for both lower extremities, pre-gait and balance activities that targeted weight shifting and single limb support, and a progression to over-ground walking. **OUTCOMES:** The subject demonstrated minimal gains in strength and functional outcome measures. Gait speed and activity endurance were increased, and the subject reported that he was able to perform cooking activities. **DISCUSSION:** Based on the subject’s complicated injury and extended course of recovery, the prognosis was unclear. The subject demonstrated important functional gains in the home setting. This case demonstrates the importance of continued follow-up of patients in order to minimize long-term impairments and to maximize function.

**A HOME-BASED BODY WEIGHT SUPPORTED TREADMILL TRAINING PROGRAM FOR CHILDREN WITH CEREBRAL PALSY: A CASE SERIES.** Hefferan A, McCrary P, Westman M, Kenyon L, Baker B; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Contemporary approaches to the treatment of children with cerebral palsy (CP) advocate a task-specific approach that emphasizes repetition and practice of specific tasks. Recent studies suggest that children with CP may demonstrate improvements in over-ground ambulation following the use of body-weight supported treadmill training (BWSTT) in clinical settings. To begin exploring the potential impact of greater opportunities for practice and repetition of walking tasks, this case series was undertaken to (1) develop an intervention and measurement protocol and (2) execute and analyze the outcomes of a home-based BWSTT program to improve functional ambulation in three children with CP. **CASE** **DESCRIPTIONS:** Three children with CP at Gross Motor Function Classification System (GMFCS) levels III or IV participated in this case series. Examination procedures included the use of the Functional Assessment Questionnaire (FAQ), the 10-meter walk test, the Gross Motor Function Measure (GMFM-66), the Pediatric Evaluation of Disability Inventory Computer Adaptive Test (PEDI-CAT), and the Caregiver Priorities & Child Health Index of Life with Disabilities (CPCHILD). The Wingman Multi-Sport harness and accompanying ceiling mount kit was used to set up the body-weight support apparatus over a treadmill in the participants’ homes. At the outset of the case, Participant 1 required physical assistance and manual cueing to take steps on the treadmill when using the harness for support. Participants 2 and 3 were able to take steps on the treadmill when using the harness. Parents received education and training regarding the safe use of the harness system and the execution of the home-based BWSTT program. Parents carried out the intervention with their children over an 8-12 week period at a suggested frequency of 3 times week for 15-20 minute sessions with rest breaks as needed. Parents documented details regarding each session (length of time walking on the treadmill, number and length of breaks, motivational activities used during the session, etc.). Outcomes were assessed within 10 days of completing the intervention program. **OUTCOMES:** All of the families and children reported enjoying the home-based activity and found the harness system easy to use. Participant 1 did not demonstrate improvements in any of the outcome measures administered. Participant 2 increased from a score of 2 to a score of 4 on the FAQ and progressed from a GMFCS level IV to a GMFCS Level III. Participant 3 did not show significant improvements in gait speed over the 10-meter walk test but increased from a score of 6 to a score of 7 on the FAQ and was able to transition from using a posterior walker as his primary assistive device to using bilateral walking poles. **DISCUSSION:** Although not attaining the scope of a research study, the results of this case series indicated that a home-based BWSTT program has the potential to benefit children with CP at GMFCS levels III and IV. Participants in this case who were able to take steps on the treadmill when using the harness at the outset of the intervention appeared to achieve greater functional gains. In addition to functional gait and mobility outcomes, future research should explore the potential health and wellness benefits of the cardiovascular exercise provided though a home-based BWSTT program.

**IMPACT OF VARIOUS ANKLE-FOOT ORTHOTIC DESIGNS ON CROUCH GAIT: A RETROSPECTIVE REVIEW OF COMPUTERIZED GAIT ANALYSIS DATA FROM A SINGLE U.S. REGIONAL MOTION ANALYSIS LABORATORY.** Dull AT, Holtz KM, Matousek SAC, Barr K, Lenz A; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Crouch (excessive stance phase knee flexion) is a common gait pathology seen in gait analysis laboratories. Persistent crouch gait (CG) has been shown to contribute to reduced walking speed, knee pain, increased energy expenditure, and reduced walking capacity. One common intervention utilized to treat CG is an ankle-foot orthosis (AFO). However, little is known about the relative effectiveness of different AFO types on CG. The purpose of this study was to examine subjects in their prescribed AFO, who present with CG while barefoot, in order to determine the effects of various AFO types on CG during single limb stance. **METHODS:** Data was collected in a computerized gait analysis laboratory of a regional rehabilitation hospital between August of 2005 and February of 2014. Five hundred thirty (530) AFO-wearing limbs were identified, of which 253 were deemed to demonstrate CG during barefoot walking. The mean age of the patients was 11.4 years (standard deviation +/- 4.0 years). Diagnoses included cerebral palsy (71.5%), spina bifida (20.2%), traumatic brain injury (4.0%), and other (4.4%). CG was operationally defined as a minimum knee flexion during the stance phase (MKFS) >14.5° (>2 standard deviations above normal). The various AFOs worn were classified as solid (SAFO/48.2%), hinged (HAFO/23.7%), ground reaction (GRAFO/18.9%), dynamic (DAFO/3.9%), and posterior leaf spring (PLS/5.1%). PLS and DAFO data were not analyzed due to insufficient power. The difference in MKFS for each patient when barefoot versus braced was averaged for the three most common brace types, SAFOs, HAFOs, and GRAFOs. A Pearson Chi-Square analysis was performed to compare the likelihood of improvement of CG by the three types. Those limbs in which MKFS decreased by ≥2.5° in the brace were defined as being “improved,” and those limbs in which MKFS increased by ≥2.5° were defined as having “deteriorated” (those ±2.5° were regarded as unchanged). A one-way ANOVA with Tukey’s Post-Hoc analysis was also performed to determine significant differences between the three types (p<.05). **RESULTS:** MKFS improved (CG decreased) by an average of 8.90 deg in GRAFOs, by 4.19 deg in SAFOs, and by only 0.40 deg in HAFOs. Chi-Square analysis revealed GRAFOs to be significantly more likely to improve crouch (86.7%) than SAFOs (50.6%) and SAFOs to be significantly more likely to improve crouch than HAFOs (32.3%), p<.001. CG was unchanged or worsened in 67.7% and 49.4% of limbs wearing HAFOs or SAFOs, respectively. Only 13.3% of GRAFO limbs showed no improvement in CG. **DISCUSSION:** This study is the first to analyze a large retrospective sample of patients with CG looking specifically at the effect AFOs have on MKFS. All three brace types analyzed contained limbs ranging in CG severity from mild to severe. Without consideration of brace type, the overall trend showed decreased CG severity from barefoot to braced, indicating that AFOs do, in general, positively influence crouch gait. **CONCLUSION:** GRAFOs were determined to be the most effective AFO for improving CG. The SAFO also improved CG (50% of the time) while the HAFO yielded mixed, potentially detrimental, results. **AKNOWLEDGEMENTS:** We would like to thank Gordon Alderink as well as the Motion Analysis Center (MAC) intern, Alisha Laing, for her assistance with data collection. Special thanks to the Mary Free Bed MAC Team for your excellence and dedication to our professional growth and learning.

**Poster Presentations**

**INCOMING AND GRADUATING PHYSICAL THERAPY STUDENTS’ ATTITUDES TOWARDS OLDER ADULTS.** Robinson JR, Sproat CL, Wilkins JL, Baker BJ; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** This study was designed to compare the attitudes towards the geriatric population of Grand Valley State University’s incoming physical therapy students to those who are graduating and who have completed the full curriculum, including a course in geriatrics as well as five clinical experiences. **METHODS:** This study consisted of 50 entering first-year and 45 exiting third-year Grand Valley State University Doctorate of Physical Therapy students who completed two surveys: the Revised Aging Semantic Differential (RASD) survey and a demographic survey developed by the researchers. The demographic survey included questions about gender, prior exposure to the geriatric population, and intent to work (ITW) with the geriatric population. The survey was administered during times in which student attendance was mandatory in order to ensure a higher rate of return. **RESULTS:** It was found that ITW with the geriatric population depended on the amount of exposure to the geriatric population in the graduating third-year students (p=.044). No other statistical significance was found with regards to gender, RASD score, or ITW with the geriatric population. **DISCUSSION:** The relationship between ITW with the geriatric population and the number of exposures may have been attributed to the exposure the third-year students received during their clinical experiences as part of the curriculum. Our findings may justify adding more opportunities for students to interact with geriatric individuals throughout the curriculum in order to increase ITW with the geriatric population and to meet the needs of the growing geriatric population. **CONCLUSION:** Contrary to previous research attitude, RASD scores did not have an impact on the students’ ITW with the geriatric population nor did these scores differ between the first-year and third-year students. While our research did not show a relationship between attitude and ITW with the geriatric population, student attitudes toward the geriatric population are important to acknowledge due to the increased likelihood of encountering these individuals in a wide variety of clinical settings.

**CONSERVATIVE TREATMENT OF DROPPED HEAD SYNDROME: A CASE REPORT.** Patterson KJ, Sobeck CM; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Dropped Head Syndrome (DHS), a rare condition with an unknown etiology, is characterized by severe cervical extensor muscle weakness. To date, treatment for this condition includes surgical fixation, bracing, and conservative rehabilitation. The purpose of this case report was to outline the treatment of a patient with DHS using the conservative option of physical therapy. **CASE DESCRIPTION:** A 69-year-old female was referred to outpatient physical therapy with signs and symptoms consistent with the insidious onset of DHS of a two-month duration. She presented wearing a soft cervical collar due to difficulties holding her head upright against gravity, decreased cervical strength, and limited active range of motion. At initial evaluation, she reported having to limit her driving to less than 30 minutes and having to pace herself with household chores secondary to cervical fatigue. Physical therapy was utilized once per week for six weeks to address her functional limitations. Treatment sessions focused on strengthening activities of the cervical and scapular musculature, education on proper posture, and instruction in, review of, and modification of a home exercise program. **OUTCOMES:** This patient made improvements in cervical active range of motion and strength measurements. She reported wearing the soft cervical collar less frequently and experiencing less difficulty with driving for at least 30 minutes by the end of the episode of care. Improvements in her Neck Disability Index score from initial (32%) to final (18%) were clinically significant, moving the patient from the moderately to the mildly disabled category. **DISCUSSION:** This case suggests that physical therapy may be an effective treatment option in the early stages of DHS. However further research of this topic is warranted.

**ACTIVITY AND PARTICIPATION LEVELS IN 6-12 YEAR OLD CHILDREN WITH CEREBRAL PALSY: A PILOT STUDY, YEAR TWO.** Carter K, Schwenk K, Ullery L, Peck J, Kenyon L, Shoemaker M; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Cerebral palsy (CP) is the leading cause of developmental delay and disability in children. As compared to typically developing peers, previous research has shown that children with CP may demonstrate passive patterns of activity and preference for informal, less structured activities. Presently, few studies have investigated activity and participation levels in a child with CP from a “whole person” model. The purpose of this study was to examine the intensity and nature of functional and recreational activity levels in ambulatory children with CP as qualified by their manual dexterity, communication abilities, and personal preferences for activity. **METHODS:** Five males and one female with a medical diagnosis of CP, ages 8-11, were classified using the Gross Motor Function Classification System – Expanded and Revised (GMFCS – ER), the Manual Ability Classification System (MACS), and the Communication Function Classification System (CFCS). Each child wore an RT3 tri-axial accelerometer for two school days and two weekend days and completed an associated daily activity log with caregiver assistance. Activity and participation preferences were measured using the Children’s Assessment of Participation and Enjoyment/Preferences for Activities of Children (CAPE/PAC). **RESULTS:** The GMFCS, MACS and CFCS classification results were as follows: Child I: II, I, I; Child II: I, I, II; Child III: I, II, I; Child IV: III, II, I; Child V: I, I, I; Child VI: I, II, I. Four of the six participants demonstrated increased activity counts on weekend days as compared to school days, and two participants demonstrated increased activity counts on weekdays. The majority of physical activity counts for all children fell within the light category, defined as 41-950 counts/minute. Participants with a GMFCS level I demonstrated a higher number of moderate/vigorous activity counts as compared to children at GMFCS levels II and III. All participants, except for Child I, achieved the Center for Disease Control’s recommended 60 minutes of moderate to vigorous physical activity per day. All six participants preferred individual, low intensity home-based activities and reported high enjoyment when completing these activities. The male participants showed a greater interest in recreational and physical activities, while the female participant showed a greater interest in social and recreational activities. **DISCUSSION:** Five of the six children met the guideline of 60 minutes of moderate/vigorous activity per day. However, all six demonstrated lower physical activity levels as compared to their typically developing peers, placing the participants at an increased risk for secondary impairments. Four of the six children demonstrated their highest activity counts during the weekend, specifically when playing with other children. This finding suggests that these children may demonstrate increased activity levels when interacting with their typically developing peers as compared to when participating in solitary activities. No relationship between GMFCS and physical activity was found, suggesting that factors such as parenting style and environment may greatly impact physical activity level in children with CP. **CONCLUSION:** All participants demonstrated lower physical activity levels as compared to typically developing, age-matched peers and functioned predominantly in the light physical activity category. While most of the participants showed preference for solitary, low intensity activities, all participants expressed different interests. Knowledge of a child’s preferred interests may allow teachers and health professionals to individualize class and treatment sessions, respectively, and to promote increased physical activity and participation levels.

**CONSERVATIVE TREATMENT OF AN ACETABULAR LABRAL TEAR: A CASE REPORT.** Broadworth ES, Hoogenboom B, Miller S; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** Acetabular labral tears (ALTs) of the hip were first reported by Peterson in 1957. There has been an increase in the frequency of ALT diagnoses made over the last two decades because of an increased awareness due to improvements in radiologic imaging and research with regard to examination tests used to diagnose ALT. However, there is limited research as to whether surgical or conservative treatment results in the best functional outcome. With the rise in prominence of an ALT diagnosis, the purpose of this case report was to describe the physical therapy conservative management of ALT and the outcomes associated with the interventions and treatment. **CASE DESCRIPTION:** The patient, a 36-year-old female, presented with a diagnosis of right hip pain and bilateral ALTs diagnosed with magnetic resonance imaging. She also presented with a secondary complaint of low back pain. Physical therapy interventions focused on correcting positional faults, enhancing lower extremity and core strength, neuromuscular re-education, and balance, and restoring lumbar and hip range of motion. **OUTCOMES:** After 13 weeks of physical therapy, the patient improved in range of motion, strength, and the Lower Extremity Functional Scale score which increased from 46/80 to 55/80. Deficits remained in 10 out of the 20 activities described, and there was no change in her ability to run on uneven ground. **DISCUSSION:** This patient did not require surgical intervention immediately following physical therapy. However, it is unknown if surgical intervention may be required in the long-term. Although the short-term outcomes of the described conservative interventions were positive, they may not continue long-term. Positive outcomes in range of motion, strength, and self-reported function were associated with conservative treatment of a patient with ALT. Future research is needed to determine the appropriateness of and effectiveness of physical therapy as a conservative treatment approach for patients with ALT.

**THE EFFECTIVENESS OF LUMBAR MANUAL TRACTION ON PAIN DURING THE SLUMP TEST IN PATIENTS WITH LUMBAR RADICULAR PAIN.** Basore TM, DuBois SE, Graney EL, Sobeck CM, Manrose EJ, Anderson KW; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** Currently, there is a large gap in the literature regarding the efficacy of lumbar manual traction. However, previous research suggests that a subset of patients with low back pain (LBP) or lumbar radiculopathy may benefit from traction. Despite the lack of evidence supporting traction as a treatment for LBP, various types of traction are frequently used in clinical practice. The purpose of this study was to examine manual traction as a component of treatment for the management of patients with lumbar radicular pain. **METHODS:** A test-retest design was used to identify the effects of lumbar manual traction on pain during the slump test. Subjects (n=7; aged 46-74 years) were selected by participating clinicians as they presented with lumbar radicular symptoms and were deemed appropriate to receive lumbar manual traction. Data were collected over consecutive treatment sessions for up to five weeks, and each week was analyzed separately. The standardized slump test was administered immediately before each manual traction intervention. During the test, subjects rated their pain on the Numeric Pain Rating Scale (NPRS) and described the presence of numbness/tingling. Lumbar manual traction was performed on the involved segment with the subject side-lying on the uninvolved side. Subjects again rated their pain and numbness/tingling to assess the immediate impact of the intervention. Secondary analyses were performed on myotomes, dermatomes, knee angle of provocation during the slump test, and Modified Oswestry Questionnaire (MOQ) scores at the initial and final assessments. Two-tailed Wilcoxon Signed-Rank tests were used to analyze NPRS pain ratings, myotomes, knee angle provocation during the slump test, and MOQ scores (α<0.05). McNemar’s test was used for the analyses of dermatomes and the presence of numbness/tingling. **RESULTS:** Changes in NPRS pain scores were not found to be statistically significant pre- to post-traction treatment during any week (p=0.066-0.180). A clinically significant improvement of at least two points was observed for the final three weeks. Secondary analyses revealed statistically significant myotomal strength changes (p=0.018) and changes in pain provocation angle during the slump test (p=0.037) between the initial and final sessions. No statistically significant differences were found in dermatomal light touch sensation (p=1.000), the presence of numbness/tingling (p=0.500-1.000), or pain-related disability based on the MOQ (p=0.116). However, a clinically significant improvement of 10 points was observed on the MOQ. **DISCUSSION/CONCLUSION:** A preliminary analysis of results for this clinical outcome study found that lumbar manual traction did not result in immediate, statistically significant improvements in radicular pain during the slump test. The results appeared to show a trend toward decreased pain, but continued data collection is needed to obtain a more representative sample and conduct appropriately powered statistical analyses. The underpowered nature of the study may have contributed to the lack of statistical significance. The use of lumbar manual traction may be beneficial to immediately reduce radicular pain and neural tension for patients with lumbar radiculopathy.

**PHYSICAL THERAPY FOLLOWING A PATELLAR TENDON RUPTURE REPAIR: A CASE REPORT UTILIZING THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY, AND HEALTH.**  Devereaux M, Ozga K; Grand Valley State University, Grand Rapids, MI.

**BACKGROUND AND PURPOSE:** The true incidence rate of patellar tendon rupture has been described as unknown, but it is the third most common disruption of the extensor mechanism of the knee joint. The literature describing prognosis and functional outcomes related specifically to patellar tendon ruptures is limited. The International Classification of Functioning, Disability, and Health (ICF) can be used in the physical therapy setting to organize examination findings and guide interventions. The ICF is comprised of six components: health conditions, body function and structure impairments, activity limitations, participation restrictions, environmental factors, and personal factors. This case report emphasizes intervention approaches and clinical decision making based on the patient’s response to interventions. **CASE DESCRIPTION:** Subject: The patient was a 29-year-old African American male who was seeking physical therapy in an outpatient orthopedic setting following surgical repair of his left patellar tendon. A physical therapy examination revealed body function and structure impairments including left lower extremity (LE) weakness, range of motion limitations, circumferential differences, and decreased left stance time. Activity limitations were present in stair descent, prolonged standing and walking, running, squatting, and jumping. Participation was restricted in work, care of children, and exercise. Intervention: The treatment plan focused on hip strength, hip stability, knee strength, knee stability, knee mobility, and ankle stability. Therapeutic exercises, functional activities, and manual techniques were used to target the patient’s impairments and activity limitations. The patient completed two standardized outcome measures to assess his functional abilities: the Lower Extremity Functional Scale (LEFS) and the Knee Injury and Osteoarthritis Outcome Score (KOOS). **OUTCOMES:** Following eight physical therapy visits, the patient demonstrated improvements in strength, ROM, and symmetry of circumferential measurements when compared to his right LE. His disability score improved on the LEFS from 35% to 7.5% disability at discharge. The KOOS revealed an improvement of scores in three out of five categories including pain, symptoms, and quality of life. The categories of activities of daily living and sport/recreation decreased compared to his initial score. **DISCUSSION:** This patient’s treatment plan and specific interventions were selected based on his presentation and proposed interactions within the ICF model. Many therapeutic activities and exercises that were incorporated related to an activity limitation or participation restriction. This patient’s successful surgical intervention and personal factors contributed to a favorable prognosis and outcome. The ICF model played a role in clinical decision making to develop a comprehensive physical therapy treatment plan that improved this patient’s functional status following a patellar tendon rupture repair.

**THE EFFECTIVENESS OF AQUATIC THERAPY FOLLOWING TOTAL HIP OR TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW.** Bergmooser AB, Decker KJ, Mason NR, Goehring M, Kinne B; Grand Valley State University, Grand Rapids, MI.

**INTRODUCTION:** With an aging population in the United States, the need for total joint replacement is expected to dramatically rise in the next 20 years. Between the years 2007 and 2010, a total of 915,562 total knee arthroplasties (TKA) were performed. Additionally, there were an estimated 230,000 total hip arthroplasties (THA) performed in 2007 alone. Aquatic therapy can provide an alternative intervention for patients who may have difficulty with land-based physical therapy or for whom land-based physical therapy may not be appropriate. The purpose of this systematic review was to determine if aquatic therapy is an effective intervention for patients post-TKA and/or post-THA. **METHODS:** The databases that were searched included CINAHL Plus with Full Text, ProQuest Medical Library, and SPORTDiscus with Full Text. The search terms used were “aquatics” OR “aquatic therapy” OR “pool therapy” OR “hydrotherapy” AND “total knee arthroplasty” OR “total knee replacement” OR “TKA” OR “total hip arthroplasty” OR “total hip replacement” OR “THA” AND “randomized”. The inclusion criteria for this systematic review were as follows: (1) patients who have had a TKA or THA, (2) an intervention group who participated in aquatic therapy, (3) a comparison group who did not participate in aquatic therapy, (4) outcome measures that included pain, functional status, and/or quality of life, and (5) randomized controlled trials. The exclusion criteria for this systematic review were as follows: (1) patients who have had an orthopedic surgery other than a TKA or THA, (2) outcome measures other than those listed in the inclusion criteria, and (3) studies other than randomized controlled studies. Evidence level was determined by The Oxford Center for Evidence-Based Medicine 2011 Levels of Evidence. The methodological rigor of each included study was evaluated using the PEDro scale. **RESULTS:** Through a database search, a total of 1503 articles were identified. Three articles were identified using other sources. After the removal of duplicates and the screening of records, all but six studies were eliminated. Four of the six included studies found several statistically significant differences in favor of aquatic therapy. One of the six included studies found no significant differences between aquatic therapy and land therapy. The remaining study found no significant differences between specific aquatic therapy, non-specific aquatic therapy, and land therapy. **DISCUSSION:** This systematic review revealed that aquatic therapy may be used as an effective alternative or integrated form of intervention for patients who have experienced a total hip or total knee arthroplasty. This finding is especially important for those patients who have a limited ability to initiate and/or participate in land-based therapy secondary to weight-bearing tolerance, pain, stiffness, balance, or fear of falling. All of the studies found that aquatic therapy produced superior, or at least equivalent, outcomes when compared to land therapy or no intervention. **CONCLUSION:** This systematic review indicates that aquatic therapy should be considered a viable therapy for individuals status post-TKA or status post-THA.