PLATFORMS

RELIABILITY AND VALIDITY OF THE RAPID STEP UP TEST IN INDIVIDUALS WITH PARKINSON’S DISEASE AND HEALTHY ADULTS.
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INTRODUCTION: Parkinson’s disease is a common neurodegenerative disorder with clinical manifestations including postural instability, bradykinesia, gait disturbances and strength decline, leading to functional limitations and a high incidence of falls. A clinically feasible outcome measure that is valid, reliable and sensitive for assessing functional mobility in the PD population is needed to add to the current battery of gait and balance measures. The Rapid Step Up test (RST) is a salient functional performance measure with embedded strength and dynamic balance demands. The purpose of this study is to examine the test psychometric properties of the RST in community dwelling individuals with Parkinson’s disease and healthy adults. METHODS: Two groups met inclusion criteria and participated in this study: 1) forty individuals with idiopathic Parkinson’s disease (PD) on stable PD medication regimen (mean age = 66.30 (8.07)) and 2) fifty-five age and gender-matched healthy adults (mean age= 64.75 (8.50)). Test-retest reliability was examined by administering the RST twice over a 10-day period. Interrater reliability was examined by having three raters simultaneously time RST performance. Intraclass correlation coefficients, standard error of measurement and minimal detectable change for RST were calculated for both cohorts. Concurrent validity was examined using Pearson correlation coefficients by comparing RST times with gait measures [10 Meter Walk Test (10MWT) and Six Minute Walk Test (6MWT)], clinical balance measures [Functional Gait Assessment (FGA) and MiniBEST] and force platform measures [Limits of Stability test (LOS), Motor Control Test (MCT), and Sensory Organization Test (SOT)]. Discriminative validity was assessed using Independent t tests to determine if there was a significant difference in RST between the PD and healthy groups. Stepwise multiple linear regression analyses assessed the relationship between RST time and age and PD characteristics. Alpha level <.05 was utilized. RESULTS: A significant difference in RST performance was found between PD and healthy adults (p<0.0001, T=-4.44, CI-95%=. 2.88 to 7.57). Test-retest and interrater reliability were excellent in both groups (PD: ICC=0.91, 1.00; healthy: ICC=0.88, 1.00, respectively). In the PD cohort, there were moderate correlations (p< 0.50) found between the RST and all gait and balance measures. Moderate correlations were found in the healthy group between RST and gait and balance measures, but weak to no correlations with FP measures and the 10MWT-fast. Age and stage of disease in the PD cohort significantly contributed to RST performance, with age, disease stage and duration accounting for 43% of the variance in RST times. DISCUSSION: Our findings support that the RST is a reliable and valid measure that discriminates between PD and healthy cohort. Persons with PD performed significantly slower than healthy adults, particularly with advancing age and disease stage. The motor and speed demands of the RST and the objective scoring enhances the sensitivity to assess functional mobility decline in PD. The moderate relationship between RST and the clinical balance measures lends support that the RST may be a sensitive measure to detect dynamic balance deficits in PD. CONCLUSION: While the RST should not function as a stand-alone measure, our research supports that it is a clinically feasible, valid and reliable measure that has an additive value to a battery of established measures for assessing balance and functional mobility in persons with PD.

A HOME-BASED BODY WEIGHT SUPPORTED TREADMILL TRAINING PROGRAM FOR CHILDREN WITH CEREBRAL PALSY: A PILOT STUDY
INTRODUCTION/CLINICAL RELEVANCE: Although attaining or improving ambulation is often a desired therapeutic outcome for children with cerebral palsy (CP), many children with CP also may have lower levels of cardiorespiratory endurance and fitness than their typically developing peers. Children with CP, however, may have difficulties sustaining movement at the intensity and duration necessary to improve cardiorespiratory endurance and therefore may not be able to reap the innate health benefits of uninterrupted activity. The purpose of this pilot study was to explore the impact of a home-based body weight supported treadmill training (BWSTT) program on cardiorespiratory endurance and functional mobility in children with CP.

METHODS: This study used a within-subjects, repeated measures design. Subjects: Ten children with CP between the ages of 6 and 16 years old (Mean age=11.4 years) participated in the study. Inclusion criteria were as follows: a diagnosis CP - Gross Motor Function Classification System (GMFCS) Levels II-III, access to a treadmill, the ability to take unassisted steps on a treadmill when supported by a harness, and the ability to follow simple instructions. Exclusion criteria included: medical restrictions on physical activity, any surgical intervention within 3 months, orthopedic or neurosurgery within 6 months, and any acute injury impacting ambulation. Methods/Procedures: This study consisted of pre and post-intervention testing sessions, an initial home training session, and a 12-week home-based BWSTT program conducted 3-4 times per week by a parent/caregiver for up to 20 minutes each session. The following measures of functional mobility and cardiorespiratory endurance were administered pre and post-intervention: Six-Minute Walk Test (6MWT), Physiological Cost Index (PCI), Functional Mobility Scale (FMS), Mobility Domain of the Pediatric Evaluation of Disability Inventory - Computer Adaptive Test (PEDI-CAT), Gillette Functional Assessment Questionnaire (FAQ), and the Canadian Occupational Performance Measure (COPM). Statistical Analysis: The Wilcoxon signed-rank test or Sign Test were used to determine statistical significance (p<0.05). RESULTS: Both the 6MWT and the PCI showed significant improvements following the 12-week intervention program (p=0.001; and p=0.001, respectively). Significant improvements were also seen in the COPM for both performance and satisfaction (p=0.001; p=0.001, respectively), the FMS at a distance of 50m (p=0.016), and the FAQ (p=0.016). DISCUSSION: As a group, subjects demonstrated significant improvements in cardiorespiratory endurance and functional mobility at the completion the 12-week intervention program. This study suggests that a 12-week home-based BWSTT program may be an effective exercise program for children with CP (GMFCS Levels II-III). CONCLUSIONS: Further research is warranted to further investigate the effects of a home-based BWSTT program on cardiorespiratory endurance and functional mobility in children with CP.

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EFFECT OF A COMMUNITY-BASED EXERCISE (CYCLING) INTERVENTION ON FINE-MOTOR DEXTERITY IN PARKINSON’S DISEASE
INTRODUCTION/CLINICAL RELEVANCE: Parkinson’s disease (PD) is characterized by motor symptoms, such as tremor and muscle rigidity, that can negatively affect the fine-motor dexterity necessary for ADLs and recreational activities. While medications are used to treat PD motor symptoms, their effectiveness is limited and decreases over time. Exercise has shown promising potential as an adjunctive therapy to improve PD symptoms beyond medication alone; however, few studies have considered feasible exercise options outside of the laboratory. Pedaling for Parkinson’s™ (PFP) is a community-based exercise program where individuals with PD ride stationary bicycles while maintaining specific exercise goals (60-80% of their maximum heart rate and 80-90 pedal revolutions/minute). PFP occurs three times per week, for an hour, at local YMCAs. The current study tested the effectiveness of PFP for improving fine-motor dexterity in PD patients METHODS: Twelve PFP riders completed the Purdue Pegboard task to assess fine-motor dexterity. Measurements were taken at baseline and after 4- and 8-weeks of PFP; participants were OFF their PD medications for the testing sessions. We analyzed performance, separately, for PD patients hand most- and least-affected (MA and LA, respectively) by PD. PD patients’ data were compared to 18 age-matched controls for comparison purposes. A 2 x 2 x 3 ANOVA assessed the potential interactions between participant group, affected side and time of testing. We also looked at individual percent changes to more clearly quantify improvements. RESULTS: We found unimanual improvements in fine-motor dexterity for PFP participants after 8 weeks of PFP, but no improvements in bimanual dexterity. We also evaluated the clinical importance of these improvements. On average, the PFP group showed 20-30% improvements in unimanual dexterity compared to controls, who showed no change. These improvements were greatest for the LA-hand in PD patients. DISCUSSION: Unimanual fine-motor dexterity improved over 8 weeks of participation in PFP. Notably, these improvements were observed while PFP participants were OFF PD medications and cannot be explained by repeated testing effects. Finally, the improvements we observed were clinically meaningful. CONCLUSION: Our findings suggest that PFP is an effective community-based exercise intervention for improving unimanual dexterity in PD. Small improvements in unimanual dexterity can have significant functional improvements in ADLs and recreational activities. ACKNOWLEDGEMENTS: The Blue Cross Blue Shield of Michigan Foundation and NIH-NCATS (UL1TR000433) funded portions of this work. The authors would like to acknowledge the Ann Arbor and Jackson Michigan YMCAs for hosting PFP and their support. We would also like to thank Tina Wu and Brittany Gluskin for assistance with data collection.

Introduction/Clinical Relevance: The Nustep total body recumbent stepper is widely used by clinicians to improve cardiovascular health and physical performance. There is a lack of information regarding the effects of seat position and stepping cadence on muscle activation when exercising on the Nustep. The purpose of this study was to investigate changes in electromyographic (EMG) activation in lower extremity muscles while exercising at two different seat positions (and at two speeds) in subjects with chronic stroke.

Methods: Twenty-four participants (16 female, 13 right hemiparesis, and mean age 61 ± 14.5 years) with chronic stroke were recruited from the metro Detroit area. Participants were positioned on the Nustep for the standard (far) position (10-15 degrees of knee flexion at maximum pedal extension) and the near position (30-35 degrees of knee flexion). A 10 minute trial of stepping was performed to determine the self-selected speed (SS). EMG surface electrodes were then applied to the rectus femoris, vastus medialis, semitendinosus, soleus, medial gastrocnemius, and tibialis anterior muscles bilaterally as per Surface ElectroMyoGraphy for the Non-Invasive Assessment of Muscles (SENIAM) recommendations. The force and EMG output during maximal voluntary contraction (MVC) of each muscle were measured simultaneously using surface EMG and a hand-held dynamometer. The participants then performed 4 bouts of 5 minutes of stepping with a 5 minute rest in between each experimental condition (SS speed near seat, SS speed far seat, 80 steps/min near seat, and 80 steps/min far seat). EMG data were recorded at 10 second intervals during the 2nd, 3rd and 4th minutes of each experimental condition and were normalized to MVC. A descriptive analysis was performed followed by a repeated measures ANOVA to examine differences in muscle activation between experimental conditions, hemiparetic side, and muscle groups.

Results: There were no significant differences in muscle activation between the 4 experimental conditions. However there were significant differences in muscle activation based on hemiparetic side (Left p=0.014, Right p<0.001). Post-hoc analyses revealed that participants with right hemiparesis had significantly different muscle activation (p<0.05) in 12/16 comparisons on the non-affected side vs 4/16 comparisons on the affected side. Participants with left hemiparesis had significantly different muscle activation (p<0.05) in 11/16 comparisons on the non-affected side vs 9/16 comparisons on the affected side. The semitendinosus muscle showed the greatest difference in mean muscle activation between the affected and non-affected side in both patients with right hemiparesis (37.7 % of MVC) and left hemiparesis (21.4% of MVC), while the amplitude differences in other muscle groups were smaller.

Discussion: Seat position and stepping cadence did not alter muscle activation significantly. This may be due to the small sample size and large variability observed in normalized EMG amplitudes. Participants with left hemiparesis activated their muscle groups similarly in both lower extremities, compared to participants with right hemiparesis. The semitendinosus muscle, which is often the last to recover in patients with hemiparesis, seemed to be activated more on the affected side, while exercising using a Nustep.

Conclusions: This preliminary study has demonstrated that activation of leg muscles was different between participants with right and left hemiparesis during recumbent stepping. The ability to activate the semitendinosus in the stroke population could be of interest to clinicians, who may want to include recumbent stepping as an intervention during stroke recovery.

THE IMPACT OF CONTROLLED ANKLE MOTION (CAM) BOOT ROCKER ORIENTATION ON TEMPOROSPATIAL GAIT PARAMETERS.
INTRODUCTION/CLINICAL RELEVANCE: The sagittal orientation of the standard CAM boot rocker does not match normal anatomical alignment and biomechanics of the lower limb, potentially creating inefficient compensatory movements observed by clinicians in patient gait. Limb Length Inequality (LLI) may also disrupt normal gait. The impact of rocker orientation on gait has not been studied previously. The purpose of this study was to determine impact of CAM boot rocker orientation on temporospatial gait parameters by gender. METHODS: This study has a quasi-experimental 5x2 mixed factorial design with one repeated measure--boot condition and one attribute variable--gender. Researchers modified the CAM boot, orienting the rocker 22° lateral to the sagittal plane to match the normal plantar flexion vector and added an Even-Up device to the opposite shoe to control for LLI. The GAITRite Electronic Walkway was used to measure stride length, step length differential, step time differential, velocity, cadence, toe in/out on left and right, and toe in/out differential on a convenience sample of 42 uninjured male and female subjects with normal gait. Gait parameters for comfortable walking shoes were measured first and served as the control. Then gait parameters for other boot conditions--modified or unmodified CAM boot with and without the Even-up device on the opposite foot--were measured in random order. Data were analyzed using a 2-way mixed model ANOVA followed by post hoc paired and unpaired t-tests. The significance level for the ANOVA was set at p ≤ 0.05; a Bon Ferroni correction factor was applied to post hoc tests. RESULTS: A statistically significant difference between control and all other boot conditions was found for all temporospatial gait parameters except that stride length was not affected by the unmodified CAM boot with or without the Even-Up device, indicating that any type of ankle immobilization is disruptive to normal gait. There were a number of significant differences among various boot conditions, but gender was a significant factor only for toe in/out on the left foot (not in boot). The modified CAM boot prototype also had increased height and a squared off heel rocker, which confounded the results. However, it still outperformed the unmodified boot on the toe in/out parameters. DISCUSSION: The primary limitation of this study was the faulty prototype for the modified CAM boot, but the overall design and number of subjects were adequate to give researchers an idea of how a CAM boot affects gait. In future studies, it would be useful to observe joint and shank kinematics in order to identify specific compensations or use a force plate inside the boot to see if the modified rocker orientation improved ground reaction forces. CONCLUSIONS: Gait is affected by CAM boot rocker shape and orientation as well as leg length inequality. Disruptions to normal gait can be mitigated by rocker modifications or an Even-Up device. This warrants further study.
INTRODUCTION/ CLINICAL RELEVANCE: Functional performance measures are commonly used by clinicians to assess mobility in individuals with below knee amputation. The Time Up and Go (TUG), L-test and 2 minute walk tests (TMWT) are valid and reliable measures used in the lower limb amputee population. However, limited evidence exists on the association between each of these 3 outcomes measures, as well as their relationship with physical activity in individuals with below knee amputation. Therefore, the primary aim of this study was to examine the correlation between the TUG, the L-Test and the TMWT in subjects with below knee amputations. The secondary aim was to examine the correlation between the 3 tests mentioned above and recorded physical activity as well as with the Amputee Mobility Predictor (AMP) scale.

METHODS: Twenty subjects (age = 59.6±10.8 years, time since amputation= 6.1±7.2 years) with a unilateral below knee amputation were recruited from out-patient prosthetic fitting clinics. The subjects performed the L-Test, TMWT, TUG, and AMP. The order of tests was randomized. The subject’s physical activity was monitored continuously 24 hours/day over a 7 day period using an ActivPAL (Pal Technologies, Glasgow, UK) body worn sensor. The ActivPAL sensors recorded the subject’s steps/day as well as the duration they had been sitting/ lying, standing and walking. Both descriptive statistics and correlation analyses using Spearman’s rank were performed with significance set at p<0.05.

RESULTS: All subjects completed the study. Data from one of the subjects was excluded from the analysis because the ActivPAL’s data recording was incomplete. The correlation analysis revealed a strong and negative correlation between the TMWT and TUG (r= -0.922, p<0.001), TMWT and L-Test (r= -0.963, p<0.001) and a strong and positive correlation between the L-Test and the TUG (r= 0.955, p<0.000). There was no correlation between functional tests and physical activity except for a positive and moderate correlation between TMWT and steps/day (r= 0.404, p= 0.043), and negative and moderate correlation between TUG and steps/day (r= -0.442, p= 0.029). The AMP had a moderate and positive correlation with TMWT (r=0.552, p= 0.007) and a moderate and negative correlation with TUG (r= -0.527 p= 0.010) and L-Test (r= -0.553 p= 0.007).

DISCUSSION: This study found a strong correlation between the L-Tests, TUG and TMWT in below knee amputees. Therefore, the clinician may wish to choose either the L-Test, TUG or TMWT to assess mobility in below knee amputees. The individuals who performed better on the TUG and TMWT registered more steps per day. A higher functional ability may have allowed some participants to perform more steps per day. Conversely, greater steps/day could have perhaps contributed to better performance on the L-Test, TUG or TMWT, which are all related to walking ability. The performance on the TUG, L-Test and TMWT was not associated with time spent in lying/sitting, standing or walking. This lack of correlation illustrates that perhaps factors other than functional ability contribute to physical activity (e.g. endurance, balance, age, and motivation).

CONCLUSIONS: TUG, L-Test and TMWT were highly correlated and may be used to assess mobility and functional performance in individuals with below knee amputation. A good performance on the TUG, L-Test and TMWT does not necessarily translate to higher levels of physical activity in this population.

GETTING A GRIP ON DEMENTIA: HANDGRIP STRENGTH AS A MEANS OF MONITORING THE PROGRESSION OF ALZHEIMER’S DISEASE AND RELATED DEMENTIAS
**Introduction/Clinical Relevance:** Handgrip strength is essential for many functional tasks, and is recognized as an indicator of global muscle strength, as it is associated with measures of physical and functional performance in older adults. Reductions in handgrip strength have also been linked to lower cognitive performance in non-demented older adults. Recent studies show that non-cognitive features may predict the onset of clinical dementia. The purpose of this study is to examine the predictive capacity of handgrip strength as a biomarker for future cognitive impairment or onset of dementia.

**Methods:** For this systematic review, the Cochrane database of systematic reviews, CINAHL complete, PsychINFO, Scopus, PubMed Central, and the Web of Science databases were searched. Eligibility criteria were longitudinal, prospective cohort studies that included measures of handgrip strength and cognition in adults 60 years or older, who were either healthy or at risk of cognitive decline at the start of the study. Handgrip strength was assessed with dynamometry and cognition was assessed with the Mini Mental State Exam (MMSE). Two independent raters examined 140 studies, and 12 studies met inclusion criteria. Statistical modeling to examine the predictive capacity of grip strength on future cognition accounted for confounding variables of age, gender, education, and chronic health conditions.

**Results:** The mean(SD) number of subjects across studies was 1,245.23 (1109.02), with an average(SD) age of 76.8(5.2) years. Follow-up for these longitudinal studies ranged from 1-7 years. Results show that lower baseline handgrip strength is significantly associated with reduced MMSE performance over time (p≤0.01) and that higher handgrip strength was protective against cognitive decline over a 7-year period (β=−0.061; p<0.0001). Importantly, for each 1 pound decrease in handgrip strength, there was a greater likelihood of developing dementia (HR=0.87; p<0.05) or Alzheimer’s disease (HR=0.986; 95% CI=0.973-0.998).

**Discussion:** Better handgrip strength at baseline was associated with a lower risk of dementia and a lower risk of developing Alzheimer’s disease. Handgrip strength may be a useful biomarker of future cognitive impairment and should be regularly monitored.

**Conclusions:** Handgrip strength is an efficient, inexpensive and non-invasive measure that provides important information about the change in cognition over time. Monitoring handgrip strength of individuals with cognitive impairment could provide health care professionals with valuable information about their patient’s present and future physical and cognitive health.
METHODS: In this cross-sectional study, data from cohorts 9-14 (year 2006-2013) of the Surveillance, Epidemiology and End Results (SEER) national cancer registry and Medicare Health Outcomes Survey (MHOS) linkage were used to examine the prevalence of falls and walking or balance deficits in older (age 65+) prostate cancer survivors (first or primary cancer diagnosis) who completed MHOS surveys 12-48 months post cancer diagnosis. Based on responses to 2 survey questions: (1) falls in the past 12 months, (2) problems with balance or walking in the past 12 months, forward stepwise logistic regression analyses were completed to assess the contribution of independent variables to primary outcomes. Independent variables were demographics (age, gender, race, education, marital status, household income), health-related (comorbidity, body mass index (BMI)), and cancer-related (cancer staging, surgery, radiation, surgery-radiation sequence, time since cancer diagnosis).

RESULTS: The sample comprised of 1582 cases (98.9% male and 76.5% white); age at cancer diagnosis = 72.8±5.65 years; time since cancer diagnosis = 29.1±9.83 months; comorbid conditions = 3.4±2.52; cancer staging: 71.2% stage 2, 26.4% stage 3, and 2.3% stage 4; cancer treatment: 28% with surgery and 44.6% with radiation. Nineteen percent reported having fallen in the past 12 months and 27% had difficulties with balance or walking in the past 12 months. Final logistic regression model for falls was significant (p<0.001). Higher comorbidity was associated with significantly increased likelihood of falls. The model explained 10% (Nagelkerke R²) of the variance in the outcome of falls and correctly classified 83.6% of cases. Final logistic regression model for balance/walking problems was significant (p<0.01). Age at diagnosis and higher comorbidity were significantly associated with increased likelihood of difficulties with balance or walking. The model explained 29% (Nagelkerke R²) of the variance and correctly classified 82.1% of cases.

DISCUSSION/CONCLUSIONS: In older prostate cancer survivors, higher comorbidity was significantly associated with limitations in balance and walking as well as falls incidence, regardless of the cancer stage or type of treatment. Future research needs to delineate the impact of age-related comorbidity and cancer-specific factors on limitations in functional mobility, quality of life, and independence with activities of daily living in older prostate cancer survivors.

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CLINICAL DECISION MAKING ABILITIES OF PHYSICAL THERAPISTS IN MICHIGAN TO DETERMINE THE NEED FOR MEDICAL REFERRAL.
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INTRODUCTION: Physical therapist practice has changed in the last fifty years, including a higher level of education, increased autonomy of practice, and legislative changes that allow direct access to physical therapy services. Despite these changes, there remains variability in state laws and reimbursement policies that restrict access to physical therapy based on an assumption that physical therapists do not have the education and training to correctly identify patients who may require medical referral. In order to address these concerns and to determine the impact of the Doctor of Physical Therapy (DPT) degree, the authors investigated the clinical decision making (CDM) abilities of physical therapists in the state of Michigan to determine if medical consultation is warranted in hypothetical patient case vignettes. In addition, the study explored whether factors such as DPT education, clinical experience, clinical specialization, clinical practice setting, and
confidence influenced the CDM accuracy of physical therapists. **METHODS:** A survey instrument of 15 clinical vignettes was distributed via a snowball method to licensed physical therapists in Michigan across practice settings. The participants were asked to provide demographic and practice information. The survey also required participants to rate self-perceived competence in CDM abilities. In each vignette, the participants used key information to make a decision on the need for medical referral and the urgency of the referral. The participants then rated their level of confidence in making the referral decision. Chi-square analyses/Fisher’s Exact Tests, and independent t-tests were performed to determine the relationship between accuracy, confidence and demographic information. **RESULTS:** 205 participants completed the survey. The average total years of experience was 6.9 years, and 44.9% of participants held a DPT degree. Overall, the average accuracy in determining whether or not medical consultation was warranted was 85.3%. Participants that held a DPT degree had a 2.7% greater mean accuracy score (p=.03) compared to those with other degrees. No statistically significant difference was found between overall accuracy and years of experience. Accuracy of participants to recognize urgent medical referral when immediate action was required was an average of 78.3%. Mean accuracy of these urgent referrals was greater in those participants that held a DPT degree (p=.02). Participants with less than 10 years of experience had a 7.2% greater mean accuracy score (p=.01) on these urgent vignettes than participants with 10 years of experience or greater. Those who self-rated as confident in overall CDM were more accurate (p=.05) and on 5 of the 15 vignettes higher confidence was associated with accuracy. Clinical specialization and clinical practice setting were not associated with overall CDM accuracy. **DISCUSSION:** Overall, the average accuracy is consistent with previous studies, however, the current study highlights the accuracy of physical therapists’ CDM abilities across practice settings, levels of experience and levels of education. These factors have not been identified in previous studies. DPT degree positively impacts accuracy, while greater years of experience does not. **CONCLUSION:** Licensed physical therapists in Michigan across all practice settings were overall considered accurate in their ability to determine whether or not a hypothetical patient may require medical consultation in clinical case vignettes that represented a variety of medical conditions. Results support that the transition to the DPT degree has prepared physical therapists to accurately determine the need for medical referral in absence of extensive clinical experience.

**THERAPISTS’ PERCEPTIONS AND PROFESSIONAL INTEGRATION AFTER IMPLEMENTATION OF A PROFESSIONAL ADVANCEMENT PROGRAM: A RETROSPECTIVE PRETEST-POSTTEST DESIGN.**

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**INTRODUCTION/CLINICAL RELEVANCE:** Professional advancement programs (PAP) have been implemented within numerous health care systems throughout the U.S. and across a variety of professions. These programs are aimed at increasing the retention rate of skilled employees, recognizing dedicated clinicians for their contributions to the organization, and promoting professional development. These factors, in turn, are associated with the high quality, efficient health care all hospitals strive to deliver. This study aims to examine survey results of therapists’ perceptions and professional integration before and after implementation of a PAP. **METHODS:** Retrospective pretest-posttest design of survey data after the implementation of a PAP. Subjects: Inclusion Criteria: All PTs, PTAs, OTs, and COTAs practicing in any setting within Beaumont Health System in 2012 and 2013 were invited to complete the surveys. Exclusion
criteria: All other professions who submitted a survey were removed from statistical analysis as they were not eligible to participate in the PAP. Methods/Procedures: Prior to PAP implementation, therapists were invited to complete an internally-developed survey regarding professional development regardless of their intent to participate in the PAP. A second survey was made available 1-year post-implementation. The survey consisted of five demographic questions and 43 questions regarding professional development including current board certifications, continuing education hours, professional association membership, and other professional developmental interests. Statistical analysis: Independent group pre/post survey data was analyzed using SAS 9.0. Various statistical measures were utilized based on number of answers and type of data analyzed (Chi-Square, Fisher’s Exact, Cochran-Armitage Trend Test). RESULTS: A total of 248 pre- and post-surveys were completed. Statistically significant improvements were noted in the following items: current board certification, involvement in staff mentoring, and professional association membership (95% confidence interval, p < 0.05). Although other items did not demonstrate statistically significant differences, trends were noted that exhibited improvement. DISCUSSION: This study aims to examine survey results of therapists’ perceptions and professional integration before and after implementation of a PAP. The results demonstrated that, regardless of participation in PAP, participants cited an improvement in professional development. Regardless of the participation in the PAP, the awareness of the program and survey may have increased cognizance of qualities and standards a professional must uphold. Recognizing the expected standards of health care may facilitate clinicians to pursue personal growth, excel in providing evidence-based care, promote their profession, and optimize patient satisfaction. Furthermore, distinguishing employee efforts in achieving these goals may positively affect recruitment and retention rates. Study limitations included only only 36 participants who completed both a pre- and post-survey, resulting in use of independent group data. CONCLUSIONS: A PAP implementation may facilitate professional growth for clinicians regardless of program participation by increasing awareness of professional expectations. ACKNOWLEDGEMENTS: The authors wish to thank the Oakland University PT Program, Beth Black, PT, DSc for faculty sponsorship for Oakland University’s IRB, Charity Chen for biostatistical analysis, and all program collaborators.

STUDENT AND FACULTY PERCEPTIONS OF AN ORTHOPAEDIC PHYSICAL THERAPY STUDENT SPECIAL INTEREST GROUP IN AN ENTRY LEVEL DOCTOR OF PHYSICAL THERAPY PROGRAM
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INTRODUCTION: Special interest groups (“SIGs”) are common across health professions both at the clinician and student level; however, there is little evidence that examines faculty and student perceptions of such groups. The University of Michigan-Flint Physical Therapy program created an Orthopaedic Student Special Interest Group (“Ortho SIG”) as a way to foster the professional development of entry-level physical therapy students, residents, and faculty through a collaborative, student-driven and faculty supported community of practice. The goal of the Ortho SIG is to advance clinical reasoning and orthopaedic practice skills in an open and welcoming environment outside of normal class time. The purpose of this study was to explore perceptions of the Ortho SIG and its perceived value to both students and faculty who attend and do not attend. METHODS: Participants were invited to complete an anonymous and voluntary survey through
an e-mail invitation. Subjects: 104 entry-level doctor of physical therapy students from 3 consecutive cohorts and 13 faculty members participated in the study. Methods/Procedures: Survey construction and collection was completed using Qualtrics online survey software. Data analysis was performed using IBM SPSS version 20. Statistical Analysis: Frequencies were recorded to determine attendance, year in school, perceptions related to the events, and professional memberships. Kruskal-Wallis One-Way ANOVA was used to compare perceptions between those that attend and do not attend along with comparison of student and faculty perceptions. The alpha level of significance was set to $p = 0.05$. Bonferroni corrections were utilized when making more than one comparison. RESULTS: Statistical analysis indicated that the majority (95%) of students who attended the Ortho SIG found it a valuable and worthwhile experience outside of the classroom. Seventy percent of students reported increased confidence in clinical decision making and 95% believe it will help them become a better physical therapist. Although there were no statistical differences between faculty and students, the vast majority (93.2%) believe that other professions would benefit from attending Ortho SIG events. DISCUSSION: A student orthopaedic special interest group within a physical therapy program may be a valuable extracurricular activity that fosters advanced clinical reasoning while enhancing hands-on skills. In addition, a student special interest group may be an opportunity for interprofessional collaboration. CONCLUSIONS: The results of this study highlight the value of an Ortho SIG for entry-level doctor of physical therapy students and faculty and support its contribution to building a community of practice. The Ortho SIG established at the University of Michigan-Flint provides a successful model that can be used by other physical therapy programs.

INTERNATIONAL SERVICE LEARNING IN HONDURAS: IMPACT ON THE COMMUNITY SERVED
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INTRODUCTION/CLINICAL RELEVANCE: While there is a general assumption of mutual benefit and ethical engagement when academic institutions participate in International Service Learning (ISL) that allow participants to bring needed care to underserved countries, there is little research devoted to assessing the impact on the international community partners being served. Although unintentional, ISL visiting teams can cause the host community to endure hardships imposed by the visiting group, including reinforcement of negative attitudes, disruption of community relations and dynamics, interactions with culturally insensitive visitors, and poor quality care. The purpose of this study was to determine the impact that a two week ISL trip to Roatán, Honduras had from the perspectives of local community members. MATERIALS/METHODS: During the two-week trip, individual interviews were completed with 12 community individuals identified for their leadership and local ties to the community. The constant comparative method was used to generate themes. RESULTS: Four areas of impact on the community were identified: 1) Change in cultural views of chronic disability, 2) increased awareness of the role of physical therapy, 3) appreciation of authenticity and cultural humility, and 4) desire for sustainability of the program. DISCUSSION: Overall, the host community was satisfied with the partnership and found the interactions with the visiting team valuable which are consistent with prior findings in the literature. To ensure long-term positive benefits to host communities, local community leaders must be actively involved with the academic program to identify needs, set goals, assess the community’s perception the program’s effect on the community and create a plan for sustaining the partnership over time. CONCLUSION: All academic institutions, including physical therapist educational programs, involved in any international service learning ventures have the ethical and moral obligations to ensure host communities are benefiting equally as those from the visiting countries. Several recommendations for academic institutions considering embedding ISL into curriculum or those who are currently participating...
in ISL in physical therapist education were identified or reinforced from this study. Our profession promotes service to others, domestically and internationally. When done with intention and empowerment of the host community, these experiences can benefit all involved.

References:
1. FALL RISKS AND BALANCE/WALKING PROBLEMS IN OLDER SURVIVORS OF BREAST CANCER: RESULTS FROM SURVEILLANCE, EPIDEMIOLOGY, AND END RESULTS-MEDICARE HEALTH OUTCOME SURVEY

Huang M, Blackwood J, Godoshian M, Pfalzer L; University of Michigan-Flint. Flint, MI

INTRODUCTION/CLINICAL RELEVANCE: Cancer is a chronic condition of older adults. Cancer and its treatment cause sequelae affecting multiple body systems, leading to functional impairments, difficulty in balance and walking, and increased risks of falling. Complications associated with cancer are diverse and emerge over time after the diagnosis. Functional deficits after cancer diagnosis, however, may be heterogeneous and vary by the cancer status. Currently there is lack of research on balance problems and fall risks for survivors of breast cancer along the trajectory of survivorship. This study was to examine demographic, cancer- and health-related factors contributing to falls and balance/walking problems in older survivors of breast cancer.

METHODS: This study was a cross-sectional design. We analyzed data from Surveillance, Epidemiology and End Results (SEER) national cancer registry and Medicare Health Outcomes Survey (MHOS) linkage. SEER collects information on all newly diagnosed cancer cases, including cancer diagnostic staging and treatment information. SEER does not maintain data on chemotherapy. MHOS is administered annually to randomly Medicare Advantage beneficiaries. Data from cohorts 9-14 (year 2006-2013) were included. Participants were aged 65+ with first primary and only cancer, completed MHOS surveys 12-48 months post cancer diagnosis. Two primary outcomes were based on responses to 2 survey questions: (1) falls in the past 12 months, (2) problems with balance or walking in the past 12 months. Log-binomial forward stepwise regression assessed the contribution of variables to primary outcomes. Independent variables were demographics (age, gender, race, education, marital status, household income), health-related (comorbidity, body mass index (BMI)), and cancer-related (cancer staging, surgery, radiation, surgery-radiation sequence, time since cancer diagnosis). Significance was p<0.05.

RESULTS: The sample comprised of 1582 cases (98.9% female and 76.5% white); age at cancer diagnosis = 73.9±6.30 years; time since cancer diagnosis = 27.5±9.84 months; comorbid conditions = 3.9±2.50; cancer staging: 71.2% stage 2, 26.4% stage 3, and 2.3% stage 4; cancer treatment: 96.7% with surgery and 51.1% with radiation. Twenty-five percent reported having fallen in the past 12 months and 37% had difficulties with balance or walking in the past 12 months. Final logistic regression model for falls was significant (p<0.001). Race being white or black, older age at diagnosis, and higher comorbidity were associated with significantly increased likelihood of falls. The model explained 13% (Nagelkerke R²) of the variance and correctly classified 75.6% of cases. Final logistic regression model for balance/walking problems was significant (p<0.01). BMI, age at diagnosis, larger tumor size, and higher comorbidity were significantly associated with increased likelihood of difficulties with balance or walking. The model explained 31% (Nagelkerke R²) of the variance and correctly classified 73.3% of cases.

DISCUSSION/CONCLUSIONS: In older survivors of breast cancer, age at the diagnosis and the burden of chronic conditions was highly associated with falls and balance/walking problems, regardless of the cancer staging and treatment. Future research needs to delineate the impact of cancer-specific, in addition to tumor size, on functional problems in breast cancer survivors.
ACKNOWLEDGMENTS: Office of Research and Sponsored Programs at UM-Flint funded the study.

2. IDENTIFICATION OF BALANCE/WALKING PROBLEMS AND FALLS RISK IN OLDER LUNG CANCER SURVIVORS: RESULTS FROM SURVEILLANCE, EPIDEMIOLOGY, AND END RESULTS-MEDICARE HEALTH OUTCOME SURVEY

Blackwood J, Huang M, Godoshian M, Pfanzer L; University of Michigan-Flint. Flint, MI

INTRODUCTION/CLINICAL RELEVANCE: Cancer and its treatment affect multiple body systems, leading to functional limitations in areas such as balance and walking, which contributes to an increased falls risk. In older adults, cancer and its associated sequelae may contribute to a higher incidence of functional limitations and falls than the identified age associated falls risk factors. Many different complications of cancer present after diagnosis and treatment including functional limitations which vary by cancer type and status. For older adult survivors of lung cancer, there is a paucity of research describing limitations in balance and falls risk along the trajectory of survivorship. Therefore, the purpose of this study was to examine demographic, cancer- and health-related factors contributing to falls and balance/walking problems in older survivors of lung cancer.

METHODS: In this cross-sectional study, data from cohorts 9-14 (year 2006-2013) of the Surveillance, Epidemiology and End Results (SEER) national cancer registry and Medicare Health Outcomes Survey (MHOS) linkage were used to examine the prevalence of falls and balance or walking deficits in older (age 65+) lung cancer survivors (first or primary cancer diagnosis). Surveys were completed 12-48 months post cancer diagnosis. Forward stepwise logistic regression analyses were completed to assess the contribution of independent variables to (1) falls in the past 12 months, and (2) problems with balance or walking in the past 12 months. Independent variables were demographics (age, gender, race, education, marital status, household income), health-related (comorbidity, body mass index), and cancer-related (cancer staging and treatment, time since cancer diagnosis).

RESULTS: The sample comprised of 616 cases (53.2% female and 79.2% white); age at cancer diagnosis = 73.8±5.83 years; time since cancer diagnosis = 25.5±9.44 months; comorbid conditions = 5.0±2.69; cancer staging: 43.5% stage 2, 37.3% stage 3, and 19.2% stage 4; cancer treatment: 57.1% with surgery and 29.7% with radiation. Twenty-four percent reported having fallen in the past 12 months and 44% had difficulty with balance or walking in the past 12 months. Final logistic regression model for falls was significant \( p<0.05 \). Older age at diagnosis and higher comorbidity were significantly associated with increased falls likelihood. The model explained 19% (Nagelkerke \( R^2 \)) of the variance in the outcome of falls and correctly classified 67.5% of cases. Final logistic regression model for balance/walking problems was significant \( p<0.05 \). Race (being non-white) and higher comorbidity were significantly associated with increased likelihood of difficulties with balance or walking. The model explained 8% (Nagelkerke \( R^2 \)) of the variance and correctly classified 72.9% of cases.

DISCUSSION/CONCLUSIONS: Higher comorbidity was significantly associated with limitations in balance and walking as well as falls incidence, regardless of the cancer stage or type of treatment. In lung cancer survivors, older age at diagnoses contributes to an increased falls risk. Combined, these findings indicate falls risk and balance/walking impairments are key areas of assessment that physical therapists should assess in all older lung cancer survivors.
3. PEDIATRIC POWER MOBILITY TRAINING METHODS: A SYSTEMATIC REVIEW

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INTRODUCTION: Children with severe mobility limitations often lack independent mobility and must rely on others to help them explore their environment. Power mobility is increasingly used to reduce the impact of restrictions in independent mobility. The purpose of this systematic review was to summarize and critically appraise the quantitative research evidence related to power mobility training methods used with children 21 years of age and younger. METHODS: This systematic review was conducted in accordance with the Assessing the Quality and Applicability of Systematic Reviews (AQASR) guidelines. Subjects: The combined sample from included studies totaled 211 children, ages 5 months to 21 years. Methods/Procedures: A research librarian-assisted electronic literature search of 17 databases was conducted in June 2015 and again in January 2016. A manual search was also performed. Only primary source, peer-reviewed quantitative studies were included in the review. Mixed-method studies were included if the quantitative methods and data could be isolated. Inclusion criteria were: at least 1 subject ≤21 years of age, use of repeatable power mobility training methods, outcomes related to power mobility training or use, and published in English. Exclusion criteria were: power mobility outcomes indistinguishable from other technologies, outcomes not specifically attributed to children, and a focus on the development of technology or measurement tools. Screening, eligibility, and inclusion of studies were conducted in a triplicate process with disagreements resolved through consensus with a fourth reviewer. Data extraction was performed using the McMaster's Critical Review Form for Quantitative Studies. The Oxford Centre for Evidence-Based Medicine (OCEBM) 2011 Levels of Evidence or the Levels of Evidence for Single-Subject Research Designs (SSRDs) were used to determine levels of evidence. The scientific rigor was evaluated using a 10-criteria scale described by Medlicott & Harris. RESULTS: A total of 15,337 unique citations were identified in the searches. Of these, 27 met the inclusion/exclusion criteria for this review. Scientific rigor scores ranged from 2-7.8 with a mean of 3.97 and a median of 3.75. OCEBM Levels of Evidence ranged from II to IV with a total of 20 studies at a Level IV. Two SSRDs were rated at Level V. Commonly occurring concepts in power mobility training methods were identified and included incorporation of play, natural environment use, a responsive partner approach, Driving to Learn®, skills-focused training, virtual reality, and SMART wheelchair use. Identified outcomes of power mobility training or use included improvements in specific power mobility skills as well as improvements in personal-social skills, communication, mobility, and other developmental skills. DISCUSSION: A wide variety of power mobility training methods were utilized in the included studies. Frequency of training ranged from daily to less than once a week while the duration of training sessions ranged from 10 to 60 minutes. CONCLUSION: Evidence related to power mobility training techniques is in its infancy. Despite a lack of consensus on power mobility training methods, however, the individual studies included in this review reported that power mobility training or use may result in a range of positive outcomes without any known negative consequences or outcomes. ACKNOWLEDGMENTS: None

4. POWER MOBILITY TRAINING METHODS FOR CHILDREN: A SYSTEMATIC REVIEW OF QUALITATIVE METHODOLOGIES
INTRODUCTION/CLINICAL RELEVANCE: Children with neurodevelopmental conditions are often limited in their abilities to use self-generated locomotor skills to explore and learn from their environment. Power mobility devices are increasingly suggested as a way to ameliorate the impact of restrictions in self-generated locomotion. The purpose of this systematic review was to critically appraise evidence from published studies that employed qualitative research methodologies to explore power mobility training methods or techniques in children age 21 years or younger. METHODS: This systematic review was conducted in accordance with the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines. Subjects: A total of 18 subjects were included in the identified studies. Methods/Procedures: A research librarian-assisted computerized search of 19 databases was performed in June of 2015 and again in January of 2016. Only primary source studies were included in the review. Mixed-method studies were included if the qualitative methods and data could be isolated. Additional inclusion criteria were as follows: the study included at least 1 subject 21 years of age or younger and provided a description of the methods used related to learning to operate a power mobility device. Exclusion criteria included: (1) not being published in English; (2) non-peer-reviewed; (3) not reporting qualitative data; and (4) a focus on the development of technology or measurement tools. Screening, eligibility, and inclusion of studies were conducted in a triplicate process with disagreements resolved through consensus with a fourth reviewer. Included studies were appraised using the Critical Appraisal Skills Programme (CASP), a 10-question tool designed to evaluate criteria pertaining to the trustworthiness of qualitative research studies. RESULTS: A total of 14,300 unique citations were identified in the searches. Four studies were found to meet the inclusion and exclusion criteria. The research designs of the included studies were as follows: 2 case reports, 1 grounded theory research study, and 1 multiple case study design using mixed methods. Data extraction was performed using the McMaster's Critical Review Form for Qualitative Studies. One of the case reports achieved 5 of the 10 CASP criteria while the other case report achieved 9 of the 10 criteria. Both the multiple case study and the grounded theory study achieved all 10 CASP criteria. The dearth of raw qualitative data presented in the studies precluded a formal inter-study thematic synthesis of data. However, commonalities amongst the power mobility training methods used in the 4 studies were identified. DISCUSSION: Qualitative studies related to power mobility training methods for children are few in number but may still provide valuable and clinically relevant insights for therapists seeking evidence for practice. While reviewing studies to assess the inclusion and exclusion criteria for the review, a surprisingly large portion of qualitative data gathered in studies was “down-coded” and transposed into quantitative outcomes. Using qualitative methodologies to gain insights from families and children and reporting data in truly qualitative means could greatly enhance the literature and evidence related to power mobility training techniques. CONCLUSIONS: Incorporating qualitative methodologies into studies exploring power mobility training methods used with children could better conceptualize the “how” and “why” of power mobility implementation within the pediatric population. Including both qualitative and quantitative aspects encourages clinicians to look at the whole child and not merely the child’s numerical representation. ACKNOWLEDGMENTS: None

5. EFFECTIVENESS OF THE WII AT IMPROVING BALANCE IN OLDER ADULTS: A SYSTEMATIC REVIEW.
INTRODUCTION/CLINICAL RELEVANCE: The incidence of falls in the elderly, as well as fall-related nonfatal and fatal injuries, is rapidly growing in the United States. Traditional balance interventions have generally been the common treatment protocol for individuals with impaired postural control. Wii therapy may be able to provide an alternative balance intervention. The purpose of this systematic review was to evaluate the effectiveness of the Wii at improving balance in older adults without documented neurologic or orthopedic deficits. METHODS: A thorough investigation of the CINAHL Plus with Full Text, ProQuest Medical Library, and SPORTDiscus with Full Text databases was completed. The search terms utilized while analyzing the databases were “Wii” AND “randomized” AND “balance” OR “postural control” AND “elderly” OR “older adults”. In this systematic review, the inclusion criteria were: (1) individuals who were at least 60 years old and who did not have a documented neurologic or orthopedic condition; (2) an intervention group that was treated with Wii balance training; (3) a comparison group that was treated with traditional balance training or no intervention; (4) outcome measures specifically designed to objectively assess postural control; and (5) randomized controlled trials. The evidence level of each included study was assessed using the Oxford 2011 Centre for Evidence-Based Medicine Levels of Evidence. The methodological rigor of each included study was assessed using the PEDro Scale. RESULTS: A database search was performed, and a total of 440 articles were identified. Three additional articles were found via other sources. Based upon the inclusion criteria, eight studies were ultimately included in the systematic review. All eight studies compared a Wii therapy group to a control group in which no intervention was provided, and the Wii therapy group generally demonstrated a statistically significant improvement in postural control compared to the control group. DISCUSSION: Four of the eight studies compared a Wii therapy group to a conventional therapy group. Although these studies generally demonstrated no significant differences in postural control between the two groups, the Wii participants expressed greater enjoyment, interest, and motivation while performing their exercise program. Therefore, older adults who are instructed in a Wii home program may display better compliance on a long-term basis than those who are instructed in a conventional home program. CONCLUSIONS: Wii balance therapy tends to be more effective at improving postural control in older adults than no intervention. Although Wii balance therapy tends to be equally as effective at improving postural control as conventional balance therapy, long-term compliance may be better for those older adults who are instructed in a Wii home exercise program.

6. SEMONT MANEUVER VERSUS EPLEY MANEUVER FOR CANALOLITHIASIS OF THE POSTERIOR SEMICIRCULAR CANAL: A SYSTEMATIC REVIEW.

INTRODUCTION/CLINICAL RELEVANCE: The Epley maneuver is generally considered to be the preferred initial treatment for canalolithiasis of the posterior semicircular canal. Although the Semont maneuver was originally developed to treat patients with posterior canal cupulolithisis, several studies have demonstrated successful outcomes when the Semont maneuver is used to treat patients with posterior canal canalolithiasis. The purpose of this systematic review was to evaluate the effectiveness of the Semont maneuver to treat canalolithiasis of the posterior semicircular canal as compared to that of the Epley maneuver. METHODS: Applicable research articles were
obtained through a literature search of the Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, ProQuest Medical Library, and PubMed databases using the search terms “Semont” AND “Epley” AND “randomized” AND “positional vertigo” OR “positioning vertigo” OR “positional nystagmus” OR “positioning nystagmus”. The inclusion criteria for this systematic review were: (1) individuals diagnosed with canalolithiasis of the posterior semicircular canal, (2) the Semont or modified Semont maneuver as the intervention, (3) the Epley or modified Epley maneuver as the comparative intervention, (4) cessation of nystagmus as the outcome measure, and (5) randomized controlled trials. The Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence was used to assess the evidence level for all of the included studies, and the PEDro Scale was used to assess the methodological rigor for all of the included studies. RESULTS: A total of 82 articles were identified through a search of the three electronic databases, and three additional articles were identified through other sources. Based upon the inclusion criteria, six studies were ultimately included in the systematic review. In four of these studies, no statistically significant difference was identified between the Semont maneuver and the Epley maneuver. In other words, the Semont maneuver was equally as effective at treating posterior canal canalolithiasis as the Epley maneuver was. DISCUSSION: The first step of the Epley maneuver is the Dix-Hallpike position which requires both rotation and extension of the patient’s cervical region. Patients with cervical pain may experience difficulties assuming the required position. In fact, it may be unsafe to perform the Epley maneuver if a patient has a medical history of certain cervical pathologies such as joint instability, disc herniation, previous surgery, recent trauma, or rheumatoid arthritis. Patients with lumbar pain, severe cardiac problems, or severe respiratory problems may also be unable to tolerate the first step of the Epley maneuver. Therefore, the Semont maneuver may be a safer treatment option for specific patients with posterior canal canalolithiasis. CONCLUSIONS: In most cases, the Semont maneuver was equally as effective as the Epley maneuver at treating posterior canal canalolithiasis. In addition, the Semont maneuver should be considered as an alternative treatment option for patients with certain types of cervical, lumbar, cardiac, or respiratory pathologies.

7. THE EFFECTS OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION COMPARED TO TRADITIONAL REHABILITATION PROGRAM ON PAIN AND FUNCTION ON PATIENTS WITH PLANTAR FASCIITIS: A RANDOMIZED CONTROLLED TRIAL.

INTRODUCTION/CLINICAL RELEVANCE: Plantar fasciitis is a painful degenerative process of the foot, which has been treated with minimal success by physical therapists using a variety of modalities and exercises. These treatments are often not effective in relieving symptoms, however. Evidence is pointing towards manual techniques to relieve pain and decreased function associated with chronic plantar fasciitis. The purpose of this experimental research study is to determine the effectiveness of Instrument Assisted Soft Tissue Mobilization (IASTM) on the treatment of chronic plantar fasciitis as it relates to decreasing pain and increasing function. METHODS: Each healthy volunteer subject received 6 treatment sessions and was seen twice per week for 3 weeks. Subjects were assigned to either the control or experimental group depending on order of enrollment. Pre, mid, and post treatment measurements of pain level, ROM, and function were taken, using a VAS scale, goniometer, and FAAM, respectively. Statistical Analysis utilizing SPSS 24 were run and included the Wilcoxin, Mann-Whitney U, 2-way Repeated
Measures ANOVA, and Post-HOC tests, and the P value was set at <0.05. **RESULTS:** Fourteen subjects were diagnosed with plantar fasciitis and enrolled in the study. Six subjects were assigned to the control group and received only stretching and strengthening exercises for plantar fasciitis, and 8 subjects received the same treatment with IASTM performed before the exercises. The results show a significant decrease in pain on visual analog scale between the control and the experimental groups (P=.013). There was also an increase in function in the experimental group over the control group measured with the FAAM (P=.029). **DISCUSSION:** The purpose of this research was to study the effects of IASTM combined with stretching and strengthening, and compare the results to these exercises alone in the treatment of plantar fasciitis. There was no difference between groups in improvement of pain or function during treatments 1 to 3, but significant improvement was demonstrated between treatments 1 to 6 and treatments 3-6. This may suggest that IASTM is effective with a delayed response after 2-3 weeks of treatment. **CONCLUSION:** IASTM has become a popular treatment for many musculo-skeletal disorders. Many feel there is significant anecdotal evidence demonstrating its potential for being included as part of an efficacious treatment for plantar fasciitis. Our research has shown agreement with this evidence as well as meager peer reviewed evidence. Further it reveals a continued need for further research with correctly established parameters to ensure significantly positive outcomes. **ACKNOLEDGEMENTS:** We would like to thank Andrews University for the use of facilities, Dr. Sozina Katuli PhD for her guidance with the research process and statistical analysis, and all the individuals who volunteered and gave their time for this project.

8. **EVALUATING INSTRUCTION SHOWN TO REDUCE COGNITIVE LOAD USING TASK AND PERFORMANCE INCENTIVES.**

Pociask, F.D.1, Adamo, D.E.1,2, and DiZazzo-Miller, R.1; 1Department of Healthcare Sciences and 2Institute of Gerontology, Wayne State University, Detroit, Michigan.

**INTRODUCTION:** Human working memory (WM) becomes increasingly prone to errors as learning tasks become more complex. If instruction exceeds the capabilities of WM, some or all information will be lost and learning will be hampered or ineffective. Cognitive load theory (CLT) is a field of research used to improve the learning of complex cognitive tasks by matching instruction to the strengths and limitations of working and long-term memory. Similarly, motivational processes drive the allocation of mental effort toward learning. The purpose of this study was to test the effectiveness of instruction shown to significantly reduce cognitive load (CL) and improve learning in teaching introductory gait using task incentives (TI) or performance incentives (PI); in order to assess the relationship between involvement (i.e., motivation) and task performance. We hypothesized that delayed-posttest scores, posttest completion times, and ratings of CL would be significantly greater under the PI condition; as compared to the TI condition. A research question asked how much time participants would devote to exam preparation.

**METHOD:** Twenty-eight Physical Therapy (PT) and 25 Occupational Therapy (OT) students were randomly assigned to the PI group (mean age = 23.3 years; range = 20-29 years), or the TI group (mean age = 23.16 years; range = 20-30 years). Participants completed introductory gait instruction adopted from previous studies. Task (i.e., topic importance) and performance (i.e., grade) incentive conditions were compared. Significance was set at p<0.05. **RESULTS:** MANOVA yielded an overall significant main effect between the TI and PI group (Pillai’s Trace: $F_{[4, 47]} = 81.56, P < .000, \eta^2 = + 0.87$; no consequential violations of normality and homogeneity of variance were observed. Post hoc ANOVA revealed a significant main effects for subjective ratings of CL measured immediately after instruction ($F_{[1,50]} = 10.932, P < .002, \eta^2 = + 0.18$);
for posttest completion times ($F_{[1,50]} = 153.734, \ P < .000, \ \beta = + 0.76$); and for posttest scores ($F_{[1,50]} = 151.206, \ P < .000, \ \beta = + 0.75$). No significant differences were found for posttest ratings of CL. Post hoc ANOVA of total time devoted to exam preparation revealed a significant main effect for group ($F_{[1,50]} = 48.960, \ P < .000, \ \beta = + 0.49$) with the PI group devoting significantly more study time to exam preparation than the TI group. **DISCUSSION:** Cognitive load theory has mainly focused on improving learning by manipulating instructional conditions. However, individual motivational processes (e.g., goals and incentives) drive the allocation of mental effort toward learning. Accordingly, instruction designed to reduce CL and foster learning will have little effect unless learners are motivated to invest suitable mental effort to processing the instruction. In this study, topic relevance and importance to PT and OT clinical practice were insufficient motivators; as compared to PIs, which may be explained by goal orientation. These findings suggest study participants may be classified as Performance–Goal-Oriented learners (i.e., direct attention to performing well on learning indicators such as grades) as opposed to Learning–Goal-Oriented learners (i.e., dedicated to increasing competence). **CONCLUSIONS:** It is essential to compare the efficiency of instruction, as well as learner motivation under different instructional conditions, as the benefits of effective instruction may only be known when combined with learner motivation to achieve desired outcomes. **ACKNOWLEDGMENTS:** Wayne State University College of Pharmacy and Health Sciences Faculty Research Award Program.

9. AN INVESTIGATION OF THE CLINICAL REASONING PATTERNS OF PHYSICAL THERAPISTS FOR A CERVICAL SPINE CASE PRESENTATION.
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**INTRODUCTION:** The clinical reasoning process is a multifaceted and complex component of a patient examination. Physical therapists (PTs) come from varied professional and educational backgrounds, which results in numerous clinical reasoning strategies used to determine a physical therapy diagnosis. The purpose of this study was to quantitatively measure the clinical reasoning patterns of PTs by examining which components of the clinical examination were valued for a patient case consistent with a C6 cervical radiculopathy. **METHODS:** The design of this study was a randomized survey of a patient examination case of a C6 cervical radiculopathy diagnosis. The survey was made available through Survey Monkey’s online customizable website. Twenty-four American Physical Therapy Association accredited post-professional fellowship programs were contacted via email and asked to forward a link to their graduates that would allow them access to the survey. A total of 31 fellowship trained PTs from 14 different programs participated in the study. Participants were asked to rank on a 5-point Likert scale (from strongly disagree to strongly agree) the importance of each component of the physical examination in establishing a diagnosis of C6 cervical radiculopathy. The mean values were calculated for each question. Responses with a mean $\geq 4.00$ or $\leq 2.00$ were deemed as valuable and selected for statistical analysis. Wilcoxon-Signed Rank tests were used to compare examination component means, with a $p$-value of 0.003. **RESULTS:** Questions were grouped into eight different categories (history, observation, range of motion, special tests, joint motion assessment, myotome, dermatome, and neurological findings) in addition to being analyzed individually. The lowest overall mean occurred in the history section (mean = 3.2078) and the highest overall mean in dermatome testing (mean = 4.4194). Fellowship trained PTs valued the test item cluster for cervical radiculopathy (cervical distraction, cervical rotation $< 60^\circ$, upper limb tension test: general, and Spurling’s test) with an overall mean of 4.6589, as well as high emphasis on symptom provocative active range of
motion (AROM) exam components. **DISCUSSION:** Given a diagnosis of C6 radiculopathy, fellowship trained PTs placed emphasis on the neurological, dermatomal, and deep tendon reflex findings at the corresponding C6 level as part of their clinical reasoning model. Additionally, they valued provocative AROM findings as well as the test item cluster when ruling in or ruling out cervical radiculopathy as a diagnosis. **CONCLUSION:** The clinical reasoning processes utilized by fellowship trained PTs when examining a cervical radiculopathy case presentation included value of neurological findings as well as symptom provocative tests. This suggests that fellowship trained PTs utilized clinical reasoning decisions to select physical exam tests that were the most likely to stress irritated tissues or identify signs or symptoms that are commonly found with a radiculopathy. Future studies should be completed with a larger sample of therapists and comparisons made between fellowship-trained, residency-trained, PTs with advanced certifications, and general practitioners when examining a patient with the same case.

**ACKNOWLEDGEMENTS:** Paul Stephenson and Sango Otieno from the Statistical Consulting Center at Grand Valley State University for their statistical expertise. Additionally, Dan Vaughn, the Grand Valley State University Physical Therapy Department Chair for his expertise in manual therapy.

**STUDENT RESEARCH REPORTS**

**10. VALIDITY AND RELIABILITY OF ACCELEROMETERS IN COPD: A SYSTEMATIC REVIEW**

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**BACKGROUND AND PURPOSE:** Reduced physical activity is associated with poor prognosis in COPD. Accelerometers have greatly improved quantification of physical activity by providing information on step counts, body positions, energy expenditure and magnitude of force. The purpose of this systematic review was to compare the validity and reliability of accelerometers in COPD.

**METHODS:** An electronic database search of Medline and CINAHL was performed to examine psychometric properties of accelerometers in COPD. Study quality was assessed with the Strengthening the reporting of observational studies in epidemiology (STROBE) checklist while methodological quality was assessed with the modified Quality Appraisal tool for Reliability studies (QAREL).

**OUTCOMES:** The search yielded 5,392 studies of which 26 studies met the inclusion and exclusion criteria. The SenseWear Pro Armband reported high criterion validity under controlled conditions ($r = 0.75 – 0.93$) and high reliability (ICC 0.84 - 0.86) for step counts. The DynaPort MiniMod demonstrated highest concurrent validity for step count both with video and manual methods.

**DISCUSSION:** Validity of Sensewear Pro varied between studies especially in free living conditions, slower walking speeds and with addition of weights during gait. A high degree of variability was found in the outcomes used and statistical analyses performed between studies indicating a need for further studies to measure reliability and validity of accelerometers in COPD.

**CONCLUSION:** The SenseWear Arm Band is the most commonly used accelerometer in COPD, but measurement properties are limited with gait speed variability and assistive device use. DynaPort MiniMod, Stepwatch and Actigraph GT3X accelerometers demonstrate high validity in slow and fast walking conditions but lack reliability data.
11. DESCRIPTION AND CORRELATION OF PULL-UP FREQUENCY TO AGE AND BODY MASS INDEX AMONG ADOLESCENT BOY SCOUTS

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INTRODUCTION/CLINICAL RELEVANCE: Health behaviors, inclusive of physical activity, established during adolescence determine a young person’s health status and future risk of developing chronic diseases in adulthood. The Boy Scouts of America (BSA) is a national organization supporting positive health choices among adolescent males. The Personal Fitness Merit Badge is one BSA tool encompassing fitness and health measures, specifically pull-up and body mass index (BMI) assessment. Therefore, the purpose of this study was to describe and compare the frequency of a pull-ups performed in Boy Scouts by age and BMI. METHODS: Boy Scouts age 11-17 were recruited using a sample of convenience from the Great Lakes BSA Council. Medical clearance and age were obtained from each scout prior to performing exercise testing or measures during a Personal Fitness Merit Badge Event conducted as a service learning experience within the physical therapy health promotion and wellness coursework. Weight, height and number of pull-ups performed in 60 seconds were obtained using established methodology. Body mass index was computed \[ \text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2} \] and categorized as underweight, normal, overweight, or obese using the Centers for Disease Control and Prevention standards. Descriptive statistics reported age, BMI, and average number of pull-ups. Additionally, the nonparametric Spearman version of the correlation coefficient determined correlations between number of pull-ups to both age and BMI and the two sample Wilcoxon Tests reported relationships between pull-ups and BMI category with statistical significance set at \( p \geq 0.05 \). RESULTS: 66 Boy Scouts, mean age 12.2 (SD= 1.28) years with an 11-17 age range, performed a mean of 1.74 (SD=2.71) pull-ups (range 0-10). The mean BMI was 20.89 (SD=5.53) with a range of 10-42.7. Prevalence of scouts in each of the four BMI categories were as follows: underweight (9.1%), normal (56.1%), overweight (12.1%), and obese (22.7%). A statistically significant negative correlation \( (r= -0.32, p=0.009) \) was identified between the frequency of pull-ups and a higher BMI category, but not by age. Additionally, significantly higher frequencies of pull-ups were performed by normal weight scouts when compared to those meeting the overweight or obese criterion \( (p=0.021, p=0.002 \) respectively). DISCUSSION/CONCLUSION: This study describes the frequency of pull-ups performed by Boy Scouts completing the Personal Fitness Merit Badge requirements. As a negative correlation between pull-up frequency and an increased BMI was identified, the modified pull-up test could be considered for Boy Scouts identified as overweight or obese; thus, providing a more sensitive outcome measures for design and implementation of future exercise programming. ACKNOWLEDGEMENTS: The authors acknowledge The Oakland University School of Health Sciences and Physical Therapy Program, The Prevention Research Center Research Competitive Award, The Undergraduate Physical Therapy Research Educational Experience (UPTREE), Ed Peterson, PhD; Henry Ford Health System Senior Statistician and the Oakland University Third Professional Year DPT Students for their efforts and contributions to this research effort.

12. PHYSICAL ACTIVITY AND BALANCE PERFORMANCE AND CONFIDENCE MEASURES IN INDIVIDUALS WITH BELOW KNEE AMPUTATIONS

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INTRODUCTION: Pedometers or accelerometers are used to track steps/day and allow for comparison between actual and recommended levels of physical activity. While there are no physical activity guidelines set specifically for amputees, emerging evidence seems to indicate that amputees may be less active than healthy adults. The factors that underpin this decrease in daily physical activity has not been extensively studied. Therefore, the aim of this study was to assess physical activity in transtibial amputees to examine the association between physical activity and balance performance/confidence measures.

METHODS: Twenty subjects (Age = 59.6+/− 10.8 years, time since amputation = 6.1+/− 7.2 years) with a unilateral below knee amputation were recruited from outpatient prosthetic fitting clinics. The subjects completed the Activity-specific Balance Confidence (ABC) scale, the Amputee Mobility Predictor (AMP) and instrumented balance assessments using the NeuroCom Balance Master. The order of tests was randomized. The subject’s physical activity was monitored continuously 24 hours/day over 7 days using an ActivPAL body worn sensor. The ActivPAL sensors recorded the subject’s steps/day as well as the duration in sitting/lying, standing and walking. Both descriptive statistics and correlation analyses using Spearman’s rank were performed with significance set at p<0.05.

RESULTS: Twenty subjects completed the study. Data from one subject was excluded from the analysis due to lack of recording from the ActivPAL. Descriptive analysis indicated that the participants spent on average 19.7±0.5 hours per day laying/sitting, 3.5±0.4 hours standing, 0.77±0.07 hours stepping, and walked an average of 3145±378 steps/day. The correlation analysis revealed significant but moderate associations between the AMP and time spent sitting/lying (-0.430, p<0.05), stepping (0.476, p<0.05) and the average steps/day (0.535, p<0.01). The ABC was correlated with time spent sitting/lying (-0.528, p<0.05), standing (0.493, p<0.05) and average steps/day (0.412, p<0.05). Movement velocity towards the amputated side, measured by the Balance Master, was moderately correlated with time spent stepping (R: 0.579, p<0.05; L: 0.810, p<0.01) and average steps/day (R: 0.597, p<0.05; L: 0.833, p<0.01).

DISCUSSION: A previous study reported that healthy US adults typically take about 5,100 steps/day, which is significantly less than the 10,000 steps recommended. The transtibial amputees in this study took an average of 3145±378 steps/day, placing them in the sedentary category and well below the national average. In individuals with transtibial amputations, a lesser balance performance/ confidence could hinder participation in physical activity. Conversely, lesser engagement in physical activity could perhaps lead to a decline in balance performance/confidence. The moderate correlation illustrates that additional factors other than balance confidence/ performance such as physical endurance, age, and motivation may also contribute to the lack of physical activity.

CONCLUSION: Our preliminary study using objective physical activity measures has shown that most below knee amputees were sedentary. Those with lower physical activity had lower balance performance and balance confidence, and these could perhaps be targets of interventions to improve physical activity in this population.

13. PHYSICAL ACTIVITY, BALANCE PERFORMANCE AND K-LEVELS IN INDIVIDUALS WITH BELOW KNEE AMPUTATIONS
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INTRODUCTION: Individuals with above or below knee amputations often get assigned a Medicare Functional Classification Level (MFCL), also called K-level, which is a “five-level
classification system used by clinicians (e.g., physicians and prosthetists) to describe the functional level of persons with amputations”. The K-Level is used by Medicare and other payers to determine which type of prosthesis will be covered for the individual. Most commonly, the physician assigns K-levels based on the patient’s self-reported physical activity, co-morbidities and patient goals. Recently, objective measures such as the Mobility Predictor (AMP) have been designed to help in assigning K-levels more objectively and possibly improve prosthesis prescription. However, the association between K-level and objective measures of physical activity, balance and balance confidence have not been studied extensively. Therefore the aim of this study was study the association between K-levels, balance performance/confidence and physical activity.

METHODS: Twenty subjects (age = 59.6±10.8 years, time since amputation = 6.1±7.2 years) with a unilateral below knee amputation were recruited from outpatient prosthetic fitting clinics. The subjects completed the Activity-specific Balance Confidence (ABC) scale, the Amputee Mobility Predictor (AMP) and instrumented balance assessments using the NeuroCom Balance Master. The order of tests was randomized. The K-level and type of prosthesis used by each patient was provided by the prosthetists. The subject’s physical activity was monitored continuously 24 hours/day over 7 days using an ActivPAL body worn sensor. The ActivPAL sensors recorded the subject’s steps/day as well as the duration in sitting/lying, standing and walking. Both descriptive statistics and correlation analyses using Spearman’s rank were performed with significance set at p<0.05.

RESULTS: Twenty subjects completed the study. Data from one subject was excluded from the analysis due to lack of recording from the ActivPAL. Five subjects were assigned a K-level of 2 and the remaining fourteen subjects were assigned a K-level of either 3 or 4. The correlation analysis revealed a positive and strong association between the K-levels and AMP score (r=0.758 p<0.001). However, no significant associations were observed between K-levels and physical activity measures. Moreover, no significant associations were observed between K-levels and balance performance/confidence measures.

DISCUSSION: Our preliminary study investigated the associations between K-levels and physical activity measures as recorded objectively by body worn sensors. The authors did not find any significant differences in physical activity levels between K2 and K3/4 groups indicating that individuals with higher K-levels are not necessarily more physically active than those with lower K-levels. A strong and significant correlation between the AMP and K-levels perhaps indicates that larger AMP scores are associated with higher K-levels (K3/4).

CONCLUSION: The assigned K-levels had no significant correlation with physical activity measures in this study’s participants.

14. COMPARISON OF GRIP AND PINCH STRENGTH AMONG PHYSICAL THERAPISTS PRACTICING IN TWO PHYSICAL THERAPY SETTINGS: AN EXPLORATORY STUDY.

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INTRODUCTION/CLINICAL RELEVANCE: Grip and pinch strength normative values can be used to assess injury predisposition. Currently, no data exists for physical therapist (PT) grip and pinch strength normative values. PTs use their hands frequently in work, with the wrist and hand being the second most commonly injured body part among practicing PTs. The purpose of this pilot study proposes a model for determining grip and pinch strength normative values among
PTs working in neurological and acute care settings as compared to orthopedic PTs and their age matched peers to predict injury risks. **METHODS:** 21 PTs working in neurological/acute care settings and 21 PTs working in orthopedics were conveniently sampled from several physical therapy locations. PTs were included in this study if they practiced in an acute care / neurological setting or performed manual techniques in an orthopedic setting. PTs who sustained a hand, wrist, elbow, or neurological injury that could impact grip and pinch strength testing within the past six months were excluded from the study. Following institutional review board approval, the subjects performed hand grip, lateral pinch, 3 jaw chuck, and tip pinch strength tests. Forearm circumference, hand dominance, current pain level on the visual analog scale, and history of injury to the upper limb within the past 6 months were also noted. **RESULTS:** Grip strength of acute care/neurological and orthopedic PTs were not significantly different from their age matched peers in most age categories. The only significant difference was found in neurological PTs in the 25-29 age group. Significant differences were found in pinch strength between acute/neurological and orthopedic PTs as compared to their age matched peers. Neurological/acute care and orthopedic PTs in all age groups demonstrated significantly weaker strength on all pinch tests except in the 50-64 age group. **DISCUSSION:** This study explored the differences in grip and pinch strength measurements between neurological/acute care and orthopedic PTs and their age matched peers. It was found that orthopedic PTs worked on average 2 times more hours per week than neurological PTs, which could attribute to higher grip strength values in this setting. In both settings, common interventions often involve large muscle groups such as grip and leg strength. PTs are trained to protect small joints and may avoid using small muscles of hands and fingers. Fine motor skills used during typing and manipulation of small objects are used less frequently during physical therapy interventions. Limitations included the fact that PTs were chosen using a convenience sample at Oakland University and at the Detroit Medical Center. Only four males were recruited for this study and their data was not included. Therefore, this study has low generalizability across genders as males were excluded from this study. Only uninjured PTs were included in our study. PTs who are injured may have different, even weaker strength measurements. **CONCLUSIONS:** PTs working in the neurological/acute care settings and orthopedics had significantly weaker pinch strengths as compared to their age matched peers. **ACKNOWLEDGEMENTS:** The authors wish to thank the physical therapy program at Oakland University and the participants in this study.

15. EFFECTS OF NUSTEP SEAT POSITION AND CADENCE ON MUSCLE ACTIVATION IN HEALTHY INDIVIDUALS

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**Introduction/Clinical Relevance:** The NuStep total body recumbent stepper provides a coupled reciprocal leg extension movement against graded loads while the subject is seated. The NuStep is used in a variety of clinical settings as an exercise modality. To date there are no investigations to our knowledge that have studied if the position of the seat, while exercising using a NuStep under two distinct cadence settings has an effect on lower extremity muscle activation. The purpose of this study was to investigate changes in electromyographic (EMG) activation in lower extremity muscles while exercising at two different seat positions (and at two stepping cadences) in healthy subjects.
**Methods:** Twenty-four participants (14 female, mean age 23.3 ± 1.8 years) were recruited as part of this study. Participants were positioned on the NuStep for the standard (far) position (10-15 degrees of knee flexion at maximum pedal extension) and the near position (30-35 degrees of knee flexion). A 10 minute trial of stepping was performed to determine the self-selected speed (SS). EMG surface electrodes were then applied to the rectus femoris, vastus medialis, semitendinosus, soleus, medial gastrocnemius, and tibialis anterior muscles bilaterally as per Surface ElectroMyoGraphy for the Non-Invasive Assessment of Muscles (SENIAM) recommendations. The force and EMG output during maximal voluntary contraction (MVC) of each muscle were measured simultaneously using surface EMG and a hand-held dynamometer. The participants then performed 4 bouts of 5 minutes of stepping with a 5 minute rest in between each experimental condition (SS speed near seat, SS speed far seat, 80 steps/min near seat, and 80 steps/min far seat). EMG data were recorded at 10 second intervals during the 2nd, 3rd and 4th minutes of each experimental condition and were normalized to MVC. A descriptive analysis was performed followed by a repeated measures ANOVA to examine differences in muscle activation between experimental conditions, hemiparetic side, and muscle groups.

**Results:** The repeated measures ANOVA revealed that there were significant differences in muscle activation between the four experimental conditions in the right lower extremity (p=0.001), however no such effects were observed in the left lower extremity (p=0.297). A post-hoc analysis of muscle activation in the right lower extremity showed that the tibialis anterior (TA) muscle had significantly greater activation during SS far seat position compared SS near seat position (p=0.036), and a similar difference was also observed in the semitendinosus muscle (p=0.053). The SS cadence had greater muscle activation compared to 80 steps/minute in both seat positions for both of these muscle groups (p<0.05). The other muscle groups tested mostly showed that SS cadence with seat far position produced more muscle activation compared to 80 steps/min and near seat positions.

**Discussion:** Muscle activation in the lower extremity while stepping on a NuStep seems to be affected by both seat position and stepping cadence. This effect was more pronounced in the right lower extremity of each participant compared to their left lower extremity. The clinical implication of significant increases in muscle activation in both TA and semitendinosus muscle group with faster cadence and far seat position is important. Both these muscle groups play a significant role in positioning of the foot (tibialis anterior) and clearance and stability of the lower extremity (semitendinosus) during walking.

**Conclusions:** This study has demonstrated that exercising at a self-selected cadence at a far seat position can facilitate greater muscle activation of both TA and semitendinosus muscles.

16. **ACUTE LOW-DOSE CAFFEINE SUPPLEMENTATION INCREASERS EMG FATIGUE THRESHOLD IN HEALTHY MEN**

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**Introduction:** Natural products such as coffee beans and tea leaves contain caffeine which are found in various beverages as well as in over-the-counter medications. Moreover, studies indicate that caffeine consumption increases tolerance for various modes of exercise such as endurance and/or strength. The purpose of this study was to determine whether consumption of a single low dose (200mg) caffeine drink will delay the onset of neuromuscular fatigue in the superficial quadriceps femoris muscles. We hypothesized that the EMG fatigue threshold ($\text{EMG}_{\text{FT}}$) values for the caffeine condition will be significantly higher than the $\text{EMG}_{\text{FT}}$ values for the placebo condition.
**Methods:** Ten healthy college-aged men [mean ± SEM, age 23.0 ± 0.4 yrs; weight = 80.6 ± 3.5 kg] were recruited from the university student population. Each participant visited the laboratory on three separate occasions during a three week period. The initial visit included consent and orientation to the single-leg knee-extensor ergometry, whereas the two other visits were the testing sessions which required the participant to consume either the placebo or caffeine in a random order. The participants were asked to refrain from exercise and caffeine consumption 24 h prior to the testing. Furthermore, the testing sessions for each participant were performed at relatively the same time (±1 h) for each session. The single-leg knee-extensor ergometry has been used previously in our laboratory and exclusively focuses the exercise demand on the quadriceps femoris muscles. For both placebo and caffeine conditions, the EMG amplitude (microvolts root mean square, µVrms) was calculated from 10 second epochs in 20 second intervals for each two-minute stage and then plotted versus time. The EMG$_{FT}$ was determined for each participant for both testing conditions.

**Results:** The mean maximal power output achieved for the single-leg knee-extensor was 15.8% greater when caffeine was consumed than placebo which was statistically significant (p=0.002). Moreover, the mean EMG$_{FT}$ was significantly (45%) greater during the caffeine condition compared to placebo. When the EMG$_{FT}$ for the caffeine condition was normalized to the maximal power output for the placebo condition there was a significant increase (51.0 ± 4.1% vs. 75.9 ± 4.2%; p < 0.001).

**Discussion:** The main and unique finding of the present study was that a single low dose of caffeine, consumed 1 hour prior to exercise, increased EMG$_{FT}$ compared to placebo. Moreover, we found that participants were able to achieve a higher maximal power output in the caffeine condition than the placebo condition. To our knowledge, this is the first study to show that the EMG$_{FT}$ may be influenced by caffeine supplementation. The reduction of fatigue via caffeine consumption may be, in part, due to the its lipophilic properties, therefore, allowing it to cross the blood-brain barrier and influence adenosine receptors in the brain. Moreover, studies have suggested that caffeine consumption increase dopamine signaling by blocking the A$_{2A}$ receptor, but also through an unblocked dopamine receptor.

**Conclusion:** Our findings suggest that an acute low dose of caffeine 1 h prior to the workout may have ergogenic effects for exercises using continuous muscle action.

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17. PHYSICAL FITNESS IN PERSONS WITH EARLY TO MODERATE STAGE DEMENTIA.

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**Introduction:** Physical fitness is associated with reducing the risk for several diseases and health conditions and improving overall quality of life. Poor physical fitness has been linked to poor cognitive performance in healthy older adults. However, the relationship between physical fitness and global cognitive decline is not clearly understood in individuals with early stage dementia. The purpose of this study was to investigate the relationship between physical markers of functional fitness, using the Senior Fitness Test (SFT), and the Mini Mental State Exam (MMSE) score, which serves as a global marker of cognitive function in people with and without dementia.
Early stage dementia. Further, this study examined the predictive capacity of SFT measures as biomarkers for monitoring progression of cognitive loss. **METHOD:** Ten people with dementia (age mean ± standard deviation = 75.7 ± 8.8 years) and 10 individuals without dementia (age mean ± standard deviation = 75.0 ± 5.6 years) participated in the study. Stage of dementia was determined from the Clinical Dementia Rating Scale. Physical fitness was measured using the SFT. The six tasks of the SFT include; lower and upper body strength; lower and upper body flexibility; agility/dynamic balance and aerobic endurance. Cognitive function was measured with the MMSE and is the most widely used short cognitive screen test in clinical practice and research. Descriptive analyses of the demographic characteristics are expressed as mean ± standard deviation. The Kolmogorov-Smirnov test was performed to examine normality of data (p > 0.05). Pearson’s correlation coefficients between SFT tasks and MMSE tests were determined. Multiple regression was used to predict MMSE score from SFT measures and to control for potential confounders. Statistical significance was set at p < 0.05. **RESULTS:** For SFT tasks, significant group differences were found for agility / dynamic balance (p < 0.05) and aerobic endurance (p < 0.05). MMSE scores were negatively associated with agility/dynamic balance (r = -.624, p < .001). Higher cognitive performance was associated with less time taken to stand from a seated position, walk 8 feet, turn around and return to a seated position which is the task used to measure agility/dynamic balance. MMSE scores were positively associated with aerobic endurance (r = .429, p < .05). Higher cognitive performance was associated with longer distance walked in 6 minutes, which is the task that measures aerobic endurance. Higher cognitive performance was also associated with greater lower body flexibility (r = .431, p < .05). However, the final regression model only showed that agility / dynamic balance (β = -.519, p < .05) was a significant predictor for MMSE-based cognitive function. **DISCUSSION & CONCLUSIONS:** Individuals with and without early stage dementia showed similar scores for lower and upper body flexibility and strength tasks. However, those with early stage dementia had delays when compared to healthy controls for agility / dynamic ability, and walked shorter distances for the aerobic endurance task. Findings suggest that physical markers of cognitive decline are specific to tasks requiring motor processing time. **ACKNOWLEDGMENTS:** We would like to thank the Alzheimer’s Association Greater Michigan Chapter for their assistance with recruitment and providing us space for data collection.

**18. CENTER OF PRESSURE VARIABLES IN DYNAMIC FUNCTIONAL TASKS THAT ARE RELATED TO A HISTORY OF FALLS IN COMMUNITY DWELLING OLDER ADULT**

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**INTRODUCTION/CLINICAL RELEVANCE:** Age-related changes in postural control are major risk factors for falls. Many studies have investigated stabilometric variables of center of pressure (COP) in static standing. However, research on the measures of postural stability during dynamic movements to detect fall risks is limited. This study investigated whether COP parameters during a functional, dynamic movement task could identify older adults with a history of falls (fallers) and to examine the effect of trial on COP.

**METHODS:** Twenty-one community-dwelling older adults volunteered; 11 were non-fallers and 10 were fallers based on self-reported history of falls in the past 12 months. All could walk >50 ft without another person’s assistance and a history of neurologic conditions.
Participants reached forward to grasp a water bottle (weight 100 g) placed at 30 cm in front of the feet on the floor using the right arm, and returned to an upright posture while holding it. They were instructed to perform the task as fast as possible. Participants performed 3 trials. A force platform (AMTI OR6-5. Watertown, MA) and a motion analysis system (VICON Motion Systems Ltd. Centennial, CO) recorded ground reaction forces and body kinematics, respectively. COP variables included the displacement during and the duration of anticipatory postural adjustments (APA), maximum forward displacement, peak velocity, and trajectory smoothness measured by normalized integrated jerk (NIJ). Linear Mixed Model analyzed variables with group as between subject factor and trial as within subject factor. Tukey’s LSD was used for post-hoc comparisons. Significance level was p<0.05.

RESULTS: Arm reaching movements were significantly faster in non-fallers than fallers during reaching but not returning movements (p<0.05). APA amplitudes were significantly smaller (p<0.05) and APA durations were significantly longer (p<0.05) in fallers (9.8 mm, 189 ms) than non-fallers (14.3 mm, 150 ms). COP trajectory smoothness was significantly reduced in fallers (NIJ=633) compared to non-fallers (NIJ=403) during the reach portion of the task (p<0.05), but not the return. In contrast, all groups achieved maximum COP forward displacement at comparable timings and had similar COP peak velocities. Neither the effect of trial or group by trial was significant.

DISCUSSION: During a dynamic reaching task, APA amplitudes and durations and the control of COP trajectory smoothness during movements are altered with a history of falls in older adults. However, velocities of COP are not altered with a history of falls in older adults. COP variables remained consistent across trials (no trial effect). Further research needs to investigate the kinematic strategies with relation to the control of COP during reaching tasks in fallers and non-fallers.

CONCLUSIONS: COP variables may be sensitive and precise parameters in identifying risk of falls in an older adult population.

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19. TRADITIONAL VERSUS NONTRADITIONAL ANATOMY INSTRUCTION AMONG PHYSICAL THERAPY STUDENTS: A COMPARATIVE STUDY

INTRODUCTION: The format of anatomy courses has been changing over the past decade. Schools have started replacing traditional cadaveric dissection with alternative teaching tools. One of the primary reasons for changing delivery in anatomy teaching is the financial burden placed upon teaching institutions: high cadaver cost plus additional funds required for equipment to house the cadaver, transportation to and from the teaching facility, waste removal, and maintenance of a laboratory that meets Occupational Safety and Health Administration standards. The purpose of this study was to assess the effectiveness of both traditional and nontraditional anatomy teaching models on student learning outcomes, student perceptions of learning, and student retention of knowledge. It was hypothesized that
learning anatomy using a wider variety of teaching methods would help students utilize different learning approaches, would enhance their perceptions of anatomy class, and would result in longer term retention of anatomical content.

**METHODS:** This study utilized a comparative design with samples of convenience from two mid-Western universities. Seventy, first year Doctor of Physical Therapy students were recruited on a voluntary basis. Students taught with traditional anatomy instruction served as the control group, while the experimental group participated in non-traditional anatomy instruction (prosected cadavers, computer software programs, and anatomical models). Three instruments were used for this study; a demographics survey, the Revised Study Process Questionnaire (R-SPQ-2F) and a learning perception survey. Student knowledge and retention was assessed using an anatomy quiz pre-instruction, immediately at the end of the anatomy class and six months after the anatomy class ended. Data were analyzed using SPSS 23.0. Independent t-tests compared quiz scores and student perceptions of learning. Mann-Whitney U tests were used to analyze approaches to learning. **RESULTS:** The groups were homogenous in age and gender. The control group (taught with cadavers) had significantly higher quiz scores at pre-test and at the conclusion of the anatomy class. However, six months after the class ended there was no statistical difference on scores between the groups. The experimental group utilized deeper learning strategies significantly more than those taught with cadavers both prior to anatomy, and at the conclusion of the class. Finally, although total anatomy study time was not statistically different between the groups, the groups spent their time differently. The control group spent more time in lecture and using models, while the group taught with cadavers spent more time in supplemental labs, using the textbook and interacting with cadavers. **DISCUSSION AND CONCLUSION:** Using non-traditional approaches to teaching anatomy may allow students to develop deeper learning approaches which may help with long-term retention of knowledge. The findings support the use of non-traditional anatomy instruction in a Doctor of Physical Therapy program. **ACKNOWLEDGEMENTS:** We would like to acknowledge the anatomy students and instructors of Wayne State University and Oakland University, Dr. Fredrick Pociask, as well as the WSU Master’s Innovation and Development Fund Grant.

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**20. PATIENT-REPORTED OUTCOME IN MOBILITY: DOES COGNITION PLAY A ROLE?**

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**INTRODUCTION/CLINICAL RELEVANCE:** Mobility is defined as the ability of a person to move around, walk safely and independently at home and in the community. Mobility is central to independence in activities of daily living, participation in societal roles, and health-related quality of life. Life-Space Assessment (LSA) is a self-reported measure of mobility that reflects the values,
preferences, needs, and outcomes that are most important to patients and/or caregivers. It is designed to determine a person’s average pattern of mobility in the month prior to the assessment. Declines in cognition have been linked to increased risky engagement of mobility activities during daily life in community-dwelling older adults. The relationship of cognition to patient-reported mobility remains to be investigated.

**METHODS:** Forty adults residing independently in the community aged 50 years and over participated in the study (44% female). The inclusion criteria were: able to follow instructions in English, medically stable and without acute illness, without neurologic conditions, and without severe pain affecting standing or walking. Primary outcomes were LSA total score and sectional scores. The LSA assesses one’s life-space at 5 levels: (1) home, (2) outside of house, (3) neighborhood, (4) town, and (5) outside of town and unlimited. Independent variables were cognitive assessment measures including Montreal Cognitive Assessment (MoCA), Trail Making Test A (TMT-A) and B (TMT-B). Covariates were age, functional comorbidity index (FCI), and 10-meter gait speed. Forward stepwise linear regression was applied to determine the contribution of cognition to LSA. The significant level was p<0.05.

**RESULTS:** Descriptive statistics (mean±SD) are as followed: age=66.4±9.29 years; FCI=4.9±2.94, gait speed=1.17±0.911 m/s, MoCA=21.3±4.90, TMT-A=54.9±39.65 s, TMT-B=127.3±68.77 s, LSA Total=56.8±23.05, LSA Section-Home=7.5±0.97, LSA Section-Outside of House=12.9±3.49, LSA Section-Neighborhood=13.4±7.01, LSA Section-Town=15.6±8.70, and LSA Section-Outside of Town=7.5±8.68. Regression analyses showed that: (1) Faster gait speed, lower comorbidity measured by FCI, and higher cognitive function measured by MoCA were significantly associated with higher LSA Total scores (p<0.001), indicating better overall mobility. These variables together explained 65% of variance in LSA Total scores, (2) FCI significantly contributed to scores of LSA Section-Home (p<0.05) and LSA Section-Outside of House (p<0.05), (3) FCI and gait speed significantly contributed to scores of LSA Section-Neighborhood (p<0.001) and LSA Section-Town (p<0.001), (4) Gait speed and MoCA significantly contributed to LSA Section-Outside of Town (p<0.01).

**DISCUSSION/CONCLUSIONS:** Among community-living adults aged 50 years and older, cognition was an important factor determining overall self-reported mobility, particularly for unlimited life space that requires mobility in places outside one’s town. Multiple chronic conditions influenced one’s mobility within the smallest life space, i.e. bedroom and home. Together with comorbidity, gait speed influenced one’s mobility beyond the life space of home. Mobility may be multifaceted in its construct. Various attributes of a person’s function may contribute to different levels of mobility in terms of life space.

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### 21. PATIENT-REPORTED OUTCOME IN MOBILITY: DOES BALANCE OR BALANCE CONFIDENCE MATTER?

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**INTRODUCTION/CLINICAL RELEVANCE:** Mobility refers to the ability of a person to move around, walk safely and independently at home and in the community. Mobility is central to independence in activities of daily living, participation in societal roles, and health-related quality of life. Life-Space Assessment (LSA) is a self-reported measure of mobility that reflects the values, preferences, needs, and outcomes that are most important to patients and/or caregivers. It is designed to determine a person’s average pattern of mobility in the month prior to the assessment.
Difficulties with balance have been linked to poor mobility as measured by performance-based clinical measures. The relationship of balance performance or self-reported balance confidence to patient-reported mobility remains to be investigated.

**METHODS:** Forty adults residing independently in the community aged 50 years and over participated in the study (44% female). The inclusion criteria were: able to follow instructions in English, medically stable and without acute illness, without neurologic conditions, and without severe pain affecting standing or walking. Primary outcomes were LSA total score and sectional scores. The LSA assesses one’s life-space at 5 levels: (1) home, (2) outside of house, (3) neighborhood, (4) town, and (5) outside of town and unlimited. Independent variables were balance performance measured by Brief-BEST, and balance confidence measured by the Short version of Activity-specific Balance Scale (ABC-6). Covariate were age and functional comorbidity index (FCI). Forward stepwise linear regression was applied to determine the contribution of cognition to LSA. The significant level was p<0.05.

**RESULTS:** Descriptive statistics (mean±SD) are as followed: age=66.4±9.29 years; FCI=4.9±2.94, Brief-BEST=13.4±5.81, ABC-6=54±27.7%, LSA Total=56.8±23.05, LSA Section-Home=7.5±0.97, LSA Section-Outside of House=12.9±3.49, LSA Section-Neighborhood=13.4±7.01, LSA Section-Town=15.6±8.70, and LSA Section-Outside of Town=7.5±8.68. Regression analyses showed that: (1) Better balance measured by Brief-BEST and lower comorbitidy measured by FCI were significantly associated with higher LSA Total scores (p<0.001), indicating better overall mobility. These variables together explained 56% of variance in LSA Total scores, (2) Brief-BEST and FCI significantly contributed to scores of LSA Section-Home (p<0.01) and LSA Section-Outside of House (p<0.01), (3) Balance confidence measured by ABC-6 significantly contributed to scores of LSA Section-Neighborhood (p<0.01), (4) ABC-6 and FCI significantly contributed to LSA Section-Town (p<0.001), (5) Brief-BEST significantly contributed to LSA Section-Outside of Town (p<0.01).

**DISCUSSION/CONCLUSIONS:** Balance performance was an important factor determining overall self-reported mobility, particularly for mobility within one’s home, outside of house, and outside one’s town. Balance confidence influenced self-reported mobility in the neighborhood and community within one’s town. Mobility may be multifaceted in its construct. Balance performance and perceived competence in balance while carrying out daily activities may contribute to different levels of mobility in terms of life space. Clinicians need to assess balance using both self-reported and performance-based tools while addressing patient-reported limitations in mobility.

**ACKNOWLEDGEMENT:** The School of Health Professions and Studies, Physical Therapy Department, and Office of Graduate Studies of UM-Flint funded this study.

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22. FALL RISKS AND BALANCE/WALKING PROBLEMS IN OLDER SURVIVORS OF COLORECTAL CANCER: RESULTS FROM SURVEILLANCE, EPIDEMIOLOGY, AND END RESULTS-MEDICARE HEALTH OUTCOME SURVEY


**INTRODUCTION/CLINICAL RELEVANCE:** Cancer is a chronic condition of older adults. Cancer and its treatment cause sequelae affecting multiple body systems, leading to functional impairments, difficulty in balance and walking, and increased risks of falling. Complications associated with cancer are diverse and emerge over time after the cancer diagnosis. Functional deficits after cancer diagnosis, however, may be heterogeneous and vary by the cancer status.
Currently there is lack of research on fall risks and balance problems specifically for survivors of colorectal cancer along the trajectory of survivorship. This study was to examine factors contributing to balance or walking problems and falls in older survivors of colorectal cancer.

**METHODS:** This study was a cross-sectional design. We analyzed data from Surveillance, Epidemiology and End Results (SEER) national cancer registry and Medicare Health Outcomes Survey (MHOS) linkage. SEER collects information on all newly diagnosed cancer cases, including cancer staging and treatment. SEER does not maintain data for chemotherapy. MHOS is administered annually to randomly selected beneficiaries. Participants were from cohorts 9-14, aged 65+ with first primary and only cancer, completed MHOS surveys 12-48 months post cancer diagnosis. Primary outcomes were based on 2 survey questions: (1) problems with balance or walking and (2) falls in the past 12 months. Independent variables were demographics (age, gender, race, education, marital status, household income), health-related (comorbidity, body mass index), and cancer-related (cancer staging, surgery, radiation, surgery-radiation sequence, time since cancer diagnosis). Log-binomial forward stepwise regression assessed the contribution of variables to primary outcomes. Significance was $p<0.05$.

**RESULTS:** The sample comprised of 1136 cases (52.5% female and 73.7% white); age at cancer diagnosis = 74.1±6.77 years; time since cancer diagnosis = 27.5±9.80 months; comorbid conditions = 4.3±2.22; cancer staging: 54.8% stage 2, 40.1% stage 3, and 5.1% stage 4; 96.8% treated with surgery and 10.3% treated with radiation. Twenty-two percent reported having fallen and 35% had balance/walking problems in the past 12 months. Final logistic regression model for falls was significant ($p<0.05$). The model explained 12% (Nagelkerke $R^2$) of the variance in the outcome of falls and correctly classified 77.3% of cases. Higher BM, female gender, older age at diagnosis, stage 4 cancer, and higher comorbidity were associated with significantly increased likelihood of falls. Final logistic regression model for balance/walking problems was significant ($p<0.05$). The model explained 26% (Nagelkerke $R^2$) of the variance and correctly classified 72.3% of cases. Race being non-white, older age at diagnosis, and higher comorbidity were significantly associated with increased likelihood of difficulties with balance or walking. No other cancer-related variables were associated with falls and balance/walking problems.

**DISCUSSION/CONCLUSIONS:** Demographic and health-related risk factors for falls in older colorectal cancer survivors were consistent with those reported in older adults. Survivors at advanced stage of cancer were more likely to fall. Except for age at cancer diagnosis and comorbidity, different factors contributed to falls and balance/walking difficulties in older survivors of colorectal cancer.

**ACKNOWLEDGMENTS:** Office of Research and Sponsored Programs at UM-Flint funded the study.

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23. **INCORPORATING HEALTH AND WELLNESS STRATEGIES IN A PHYSICAL THERAPY PRO BONO CLINIC: A PILOT STUDY**

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**INTRODUCTION/CLINICAL RELEVANCE:** Health behaviors including physical activity, weight management, nutritional habits, and smoking contribute to an individual’s well being. The APTA advocates for physical therapists to address health and wellness strategies. Student-run pro bono clinics provide services to underserved populations. The purpose of this study it to determine if adding health and wellness strategies to an already established Physical Therapy (PT) plan of care improves health behaviors in patients attending a PT pro bono clinic. **METHODS:** A pilot prospective descriptive study was used. Subjects: A sample of convenience included 15 clients
referred to the SAY Detroit PT Clinic; 13 females and 2 males, with a mean age of 56.2 (±8.8) years and a range from 34-70 years; 93% were African American. Methods/Procedures: After obtaining informed consent, patients completed a Health Behavior Questionnaire (HBQ). Demographic information, weight, blood pressure (BP) and a 6 Minute Walk Test (6MWT) were obtained pre- and post-intervention. BP was categorized as normal or suboptimal. Patients completed weekly tracking logs including daily number of steps via pedometer, minutes spent exercising, daily servings of fruits and vegetables, and the number of cigarettes smoked each day. Following each PT treatment, education and coaching was tailored to patient needs based on patient responses of their HBQ. Patients attended PT appointments over a course of up to 6 visits. Statistical Analysis: Descriptive statistics were tabulated for all data using SPSS 23. RESULTS: 73.3% of participants were contemplating or preparing to change behaviors with their physical activity and 80% with consumption of fruits and vegetables; 66.7% with weight management. 80% of the participants were non-smokers with the remaining 20% intending or in the process of quitting. Suboptimal BPs were found in 80% of the participants. Preliminary results indicate positive trends for weight loss and intake of fruits and vegetables. No significant changes were identified with BP, BMI, minutes spent exercising or the 6MWT. DISCUSSION: The majority of patients in this sample were not practicing good health behaviors but most were contemplating change. Short-term education and coaching intervention did not make changes in BP or 6MWT but positive trends in weight and dietary changes suggest that physical therapists have the opportunity to educate, motivate and coach patients through health behavior changes. Limitations of this study included a small sample size, consistent patient attendance, pedometer challenges, and self-reported data. Changing lifetime habituated health behaviors is difficult in the course of 6 PT visits suggesting that length of time and intensity may be factors that need further research, in addition to a larger sample size. CONCLUSIONS: Lifestyle behavioral changes are difficult to change with short-term intervention. Adding health and wellness strategies to an already established PT plan of care did not improve health behaviors specific to physical activity, but trends towards improving weight management and consumption of fruits and vegetables was seen. Further research is needed to guide PTs with targeted interventions and educational strategies to promote health and wellness. ACKNOWLEDGEMENTS: Thanks to the MPTA Institute for Education and Research Small Grant Program for funding.

24. REFLUX AND TORTICOLLIS: IS THERE A RELATIONSHIP? A LITERATURE REVIEW
   MacIntosh, C, Brown, S.; Oakland University, Rochester MI

INTRODUCTION/CLINICAL RELEVANCE: Torticollis, primarily in infants, is characterized by lateral flexion and contralateral rotation of the neck. Often, infants presenting with this neck position have also been diagnosed with reflux, the regurgitation of stomach acid into the esophagus. Although there have been numerous studies on torticollis and reflux as their own individual entities, few studies have investigated a relationship between the two conditions. Therefore, the purpose of this literature review was to evaluate and determine if there is a documented relationship between the diagnosis of torticollis and reflux in infants. METHODS:
A search of CINHAL Plus with Full Text, PubMed and Google Scholar was conducted using the search terms “torticollis and reflux”, “torticollis and infants”, “reflux and infants”, and “vagus nerve and torticollis and reflux”. During the review, casual evidence of torticollis secondary to Sandifer’s syndrome became evident. Therefore, search terms of “Sandifer’s syndrome and torticollis and infants” were included in the review. Inclusion criteria for this literature review were as follows: (1) participants were infants or children; (2) diagnosis of torticollis, abnormal neck posturing, reflux or Sandifer’s syndrome; and (3) possible vagus nerve involvement with a diagnosis of torticollis or abnormal neck posturing and reflux. Any study without a relation to a diagnosis of torticollis or abnormal neck posturing was excluded. RESULTS: A total of 2,236 articles were identified through a database search. The initial search revealed a connection of torticollis to the diagnosis of Sandifer’s syndrome, described as spastic dystonic movements of the head and neck associated with gastro esophageal reflux disease. This led to the inclusion of the term Sandifer’s syndrome in this literature review. Six articles meeting the inclusion criteria were included in the literature review. Four articles identified torticollis or abnormal neck posturing secondary to a diagnosis of Sandifer’s syndrome. Three of these articles concluded that the successful treatment of reflux, whether by surgical or medical intervention, resulted in the resolution of the torticollis. Three articles concluded that pain of gastro esophageal reflux is thought to be a causal factor of the abnormal head and neck posturing of torticollis.

DISCUSSION: Many infants diagnosed with torticollis also exhibit symptoms of reflux. In order to treat these patients effectively, it is important to understand if there is a relationship. The pain of gastro esophageal reflux is thought to be a causal factor of the abnormal head and neck posturing of torticollis. Medical management of reflux, whether through medication, diet or surgical treatment, appeared to lead to the resolution of dynamic or episodic torticollis. CONCLUSION: This literature review found that there is a relationship between gastro esophageal reflux and dynamic or episodic torticollis. ACKNOWLEDGEMENTS: Thank you to Oakland University for this opportunity to learn and conduct research within the field of physical therapy.

25. Division I Female Cross Country Runners’ Perception on Eating Behaviors and Attitudes Toward Health: A Pilot Study. Thomas M, Morse L, Waggoner S, Stickler L; Grand Valley State University, Grand Rapids, MI.
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INTRODUCTION: The Female Athlete Triad (Triad), composed of low energy availability (EA), menstrual dysfunction, and low bone mineral density (BMD), is a complex condition that can affect an athlete both physically and psychologically. Low energy availability is thought to be at the cornerstone of the triad; however, the factors that may impact athletes’ eating behaviors are complex and not well understood. Thus, the purpose of this qualitative study was to explore the perspectives of female collegiate cross country runners from Division I schools on eating behaviors and attitudes toward health. METHODS: Phenomenologic qualitative research methods were used in this study. Six NCAA Division I female collegiate cross country runners, ages 18 to 20, all attending the same university participated in the interviews. All interviews were conducted individually and consisted of a semi-structured format with a flexible guide of open-ended questions. Each interview was recorded, and later transcribed. Three researchers individually
coded and developed themes/subthemes, and then collaborated as a team to negotiate a set of themes/subthemes. **RESULTS:** Three main themes and 11 sub-themes became apparent through analysis of the transcripts of the six participant interviews. The three themes were Nutritional Views, Identity as a Runner, and Psychological Factors. **DISCUSSION:** There were consistent interactions among the themes and subthemes, and each athlete’s identity as a runner clearly had an impact on her perception of health. Many of the runners expressed the need to eat a more balanced diet; however, they found restricted options within their campus cafeteria. Time constraints as well as availability of nutritional content, and the belief that the diet for a runner is different than a non-athlete, all played a role in the athletes making nutritional choices. Therefore, the ability for athletes to exercise control in what they consume may affect their possible awareness of caloric intake and allow for a larger focus on their performance. Overall, athletes tended to report not limiting their diets based on outside influences, but only limiting themselves when food was considered unhealthy and had the potential to lead to weight gain. Furthermore, the athletes expressed the need for balance between caloric intake and expenditure. The athletes also expressed uncertainty on how to attain nutritional balance, either due to an expressed lack of either reliable nutritional sources or nutritional knowledge. Individualized education and establishing trustworthiness are important areas for health care professionals to address. **CONCLUSION:** The interactions that occurred between the subthemes and themes in this study demonstrated that there were multiple factors beyond nutritional knowledge influencing the athletes’ nutritional behaviors. These findings give some insight into the nutritional decisions in female runners that may impact the female athlete triad, but clearly it is a complex issue.

**CASE REPORTS**

**26. PHYSICAL THERAPIST AND PHYSICAL THERAPIST ASSISTANT STUDENTS COLLABORATE TO PREPARE FOR CLINICAL PRACTICE AS TEAM MEMBERS.**

Thompson K, Mele R, Oakland University, School of Health Sciences, Physical Therapy Program, Rochester, Michigan. Macomb Community College, School of Health and Human Services, Physical Therapist Assistant Program, Clinton Township, Michigan.

**BACKGROUND AND PURPOSE:** The purpose of this case study is to describe a student led, innovative teaching and learning method to prepare students for clinical practice as team members. For the past 10 years the Doctor of Physical Therapy (DPT) Program at Oakland University in Rochester, Michigan and the Physical Therapist Assistant (PTA) Program at Macomb Community College in Clinton Township, Michigan have collaborated to offer a unique and interactive learning experience. This learning experience provides the students an opportunity to work and learn together about their education, roles, and responsibilities as team members. PT and PTA students and clinicians are expected to be able to effectively work together and fulfill their responsibilities and roles in patient care. **DESCRIPTION:** This student driven meeting and learning experience involves 3rd DPT students and 2nd year PTA students who are in their final, full academic semester. The meeting is part of the Professional Issues Seminar courses for both programs. Each program takes turns hosting approximately 60 students from both classes for the 3 hour meeting at their institution every other year. The overall learning objectives and methods are developed by the course instructors jointly. Four physical therapist and four physical therapist assistant students from each program work as a team to create and carry out the joint learning experience. The experience includes a needs assessment, learning activities, ice breakers, educational presentations and case studies. Needs assessments conducted by the students in the
past have identified that only two-third of the DPT students have worked with the PTAs while on their clinical experiences, all PTA students have worked with physical therapists (PT) on their clinical experiences, both PT and PTA students have identified pros and cons of working with each other, and all students have indicated that communication and teamwork are essential for quality patient care. Learning activities have included PowerPoint presentations by the students on curriculum, direction and supervision, roles and responsibilities. Ice breakers are focused on getting to know each other, communication and working effectively as a team. Case studies are on a variety of patient types, clinical settings and include a discussion on PT and PTA roles in patient management. Hot topic discussions have included joint mobilization, the possible move of PTA education to the baccalaureate degree, and roles and responsibilities with direct access.

OUTCOMES: The outcomes have been very positive, enhanced the understanding of roles and responsibilities and improved the lines of the communication between the PT and PTA students. Learning objectives related to education, roles, and responsibilities as team members have been met. DISCUSSION: The student-driven learning approach fosters creativity, creates student ownership of the learning and outcomes, and models effective collaboration between PTs and PTAs. This innovative learning experience evaluates student-readiness and prepares students to collaborate and work together as physical therapists and physical therapist assistants in clinical practice.

27. POWER MOBILITY TRAINING FOR A CHILD WITH CEREBRAL PALSY AND AN AUTISM SPECTRUM DISORDER: A CASE REPORT

Kenyon LK, Humphreys J, Farris J; Grand Valley State University, Grand Rapids, Michigan.

BACKGROUND AND PURPOSE: The onset of independent locomotion is a powerful facilitator of development in typically developing children. Infants and young children with neurodevelopmental delays may not be able to use independent locomotion and are at risk for delays across multiple areas of development. Recent research further suggests that power mobility use is an effective and appropriate intervention for children 12 months of age and older who lack efficient, independent locomotion and that power mobility use may be especially beneficial for young children who lack independent locomotion only in early childhood. The purpose of this case report is to describe the use of a power mobility training intervention with a young boy dually diagnosed with cerebral palsy (CP) and an autism spectrum disorder (ASD).

CASE DESCRIPTION: The participant in this case was a 4 year, 2 month-old boy with triplegic CP (Gross Motor Function Classification System Level IV) and an ASD (with accompanying language disorder). Outcome measures included the Pediatric Evaluation of Disability Inventory – Computer Adaptive Test (PEDI-CAT), the Dimensions of Mastery Questionnaire (DMQ), the Strengths and Difficulties Questionnaire (SDQ), the Canadian Occupational Performance Measure (COPM), the Assessment of learning power mobility use (ALP). A qualitative maternal interview was also conducted pre and post-intervention. The power mobility training intervention was provided for 45-60 minutes per week for 16-weeks using our Play & Mobility Device (PMD). The PMD is a small, highly maneuverable motorized platform that is designed for children weighing less than 40 pounds. The control system on the PMD interfaces with either a joystick or switches and can be adapted to meet the needs of each child. An individualized, engaging environment designed to elicit specific beginning power mobility skills was created during each intervention session. Components of operant conditioning and behavioral modification were used to promote the participant’s engagement in sessions. OUTCOMES: The participant progressed from driving
the PMD using a single switch at an ALP Level 1 (Novice) and limited understanding of cause and effect and tool use to driving using a joystick at an emerging ALP Level 5 (Sophisticated Beginner) who was conscious of cause and effect and the ability to cause motion in different directions. Significant change was noted on all COPM goals and improvements were also noted in other measures. The maternal interview revealed the mother’s perceptions of improvements in the child’s understanding of mobility in that he began using a walker and walking with hand-held assist during the intervention period. **DISCUSSION:** The participant in the case appeared to make improvements in multiple areas during the intervention period. Power mobility training may offer an alternative means by which to improve cause and effect and tool use skills in young children who have ASDs. **ACKNOWLEDGEMENTS:** None.

28. **LOW BACK PAIN AND OSTEOPOROSIS POST-LUMBAR FUSION AND THORACIC VERTEBROPLASTIES: A CASE REPORT.**

Brinker KM, Peck J; Grand Valley State University, Grand Rapids, Michigan.

**BACKGROUND AND PURPOSE:** In 2012, 29% of adults in the U.S. reported low back pain, with highest prevalence between the ages of 40-64. Lumbar fusion is a common procedure performed to treat degenerative and instability issues in the spine. After a fusion, adjacent segments are more prone to increased intradiscal pressure and degeneration. Vertebroplasty is commonly used to treat osteoporotic vertebral fractures and may be followed by multiple complications. The purpose of this case report is to describe and provide rationale for the evaluation and treatment of an individual with low back pain and an extensive medical/surgical history. **CASE DESCRIPTION:** The patient was a 69-year-old Caucasian female with low back pain and occasional left lower extremity pain of two months duration. She was two years post-operative L4-5 transpedicular decompression, facetectomy, transforaminal lumbar interbody fusion (TLIF), and posterolateral fusion. She also had a history of vertebroplasties at T8, 9, and 11 for compression fracture treatment. Her medical history was significant for coronary artery disease (CAD), depression, arthritis, thyroid dysfunction, fibromyalgia, osteoporosis, Crohn’s disease, and previous hepatitis A. The patient’s symptoms worsened with bending, prolonged standing, and walking more than 20 minutes. Her symptoms improved with lying down, aquatic exercise, and a home TENS unit. Functional difficulties included lifting, carrying, hair washing, yard work, and sleeping. Upon initial physical therapy (PT) evaluation, she presented with major loss of lumbar extension and moderate loss of side gliding bilaterally. Lumbar extension caused increased bilateral low back pain, left side gliding caused increased left low back pain, and right side gliding did not cause increased pain. Her initial Roland-Morris Disability Questionnaire (RMDQ) score was 16/24. The patient did not present with a clear PT diagnosis and had multiple adjacent segment dysfunctions according to magnetic resonance imaging (MRI). Interventions were based on a neutral core stability program focusing on transverse abdominis contractions during a variety of activities. She was given an initial home exercise program (HEP) that was modified at each subsequent PT session. **OUTCOMES:** The patient was seen for 6 sessions over a period of 47 days. She continued to demonstrate decreased lumbar extension and side gliding range of motion with few pain changes. However, she did report no pain while on vacation during this timeframe. Her RMDQ score improved to 13/24. Although she was not discharged, the patient did not attend any more PT sessions after 6 visits and did not reply to a follow-up call. **DISCUSSION:** Transverse abdominis (TA) thickness was demonstrated as decreased in individuals with low back pain in a variety of postures compared to individuals without low back pain. Additionally, TA activation during upper extremity movement has been shown to decrease with age. Based on
evidence within the literature, core strengthening appears to be an important aspect in the treatment of low back pain in clinical practice and was the primary intervention in this case. The patient progressed slowly and was not pain-free upon cessation of PT. Treatment of chronic low back pain has been reported as difficult within the literature, and pain-free outcomes are not easily achieved. Future research may focus on internal and external oblique muscle activity via electromyography or ultrasound during postural changes, as well as further evidence on changes in low back symptoms after core stabilization and gluteal strengthening exercises.

ACKNOWLEDGEMENTS: Thank you to Carrie Malin, PT, DPT, OCS, CertMDT and staff at Mercy Health Hauenstein Neurosciences for assistance with this case.

29. PHYSICAL THERAPY INTERVENTION IN AN INPATIENT REHABILITATION SETTING FOR A 62 YEAR OLD FEMALE WITH EPIDURAL ABSCESS RESULTING IN SPINAL CORD INJURY
Beach, KS; Hall, LM Central Michigan University, Mount Pleasant, Michigan

Background and Purpose. Abscesses on the spinal cord can lead to a spinal cord injury. Spinal cord injuries are a serious injury that can lead to serious deficits in function. Physical therapy is an important part of the rehabilitation process to restore function to the patient. The purpose of this case report is to describe the effects of physical therapy in an inpatient rehabilitation setting on the recovery process for a patient who suffers from a SCI secondary to a spinal abscess.

Case Description. A 62 year old female was admitted to the emergency department after complaints of spreading pain in her neck and shoulders and an inability to urinate or defecate. After being diagnosed with a spinal abscess, the patient underwent an emergency surgery. She was admitted into an inpatient rehabilitation center sixteen days later. Over the next 8 weeks, the patient underwent a variety of physical therapy interventions to address her functional deficits. The functional independence measure (FIM) was used to measure her functional gains throughout her therapy stay.

Outcomes. The patient made significant functional gains during her inpatient rehabilitation stay. The interventions focused on wheelchair management, bed mobility, transfer training, balance, lower extremity and core strengthening, endurance, gait training, and stair management. She made significant functional improvements on the FIM in wheelchair propulsion, ambulation, and stair management that demonstrated her increase in independence.

Discussion. The outcomes for the patient in this case study suggest that physical therapy in an inpatient rehabilitation setting can be beneficial for a patient suffering from a SCI secondary to a spinal abscess. The patient did not have complete recovery to her premorbid status, but should continue to progress in outpatient physical therapy due to her still showing progress at her discharge.

Acknowledgements. Thank you to Linda Hall PT, MS, DPT for advising me on this case report.

30. COMPARISON OF VIRTUAL REALITY TO TRADITIONAL PHYSICAL THERAPY TRAINING OF GROSS MOTOR SKILLS IN TWO BOYS WITH AUTISM.
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INTRODUCTION: This case series aimed to compare virtual reality to traditional physical therapy training in development of gross motor skills in children with autism. Early physical therapy (PT) training of gross motor skills is important for children with autism. Commercially
available mainstream virtual reality (VR) devices (i.e. Xbox Kinect) have been found to be effective in training social skills, but studies have not assessed its use for training gross motor skills in this population. This case series seeks to determine whether children with autism can obtain similar benefits from gross motor skill training on the Xbox Kinect as compared to that same training delivered by a therapist. **METHODS:** Two boys ages 8 and 12 with mild to moderate autism were randomized into either virtual reality group or traditional PT group. Both participants had bi-weekly 45 minute sessions for 6 weeks. The virtual reality participant was treated using the Kinect Sports video game; while the second participant performed the same Kinect Sport activities but in a clinical environment with student physical therapists. Outcome measures included Test of Gross Motor Development-2 (TGMD-2), Sensory Organization Test (SOT), Social Responsiveness Scale-2 (SRS-2), and Activities Scale for Kids - Performance version (ASKp). Participants were evaluated by a masked assessor the week prior and the week following the 6 week treatment program. **RESULTS:** Both participants demonstrated improvements on the TGMD-2, ASKp, and the SRS-2. Conflicting findings were observed on the SOT. **CONCLUSIONS:** The results indicated that both interventions may lead to improvements in gross motor skills and reduced social impairment. Randomized controlled trials are necessary to determine the clinical applicability of these findings. **ACKNOWLEDGMENTS:** The authors would like to thank the participants and their parents for their involvement in this case series.

31. OUTPATIENT PHYSICAL THERAPY INTERVENTION FOR A 44-YEAR-OLD FEMALE WITH VESTIBULAR DYSFUNCTION DUE TO CORTICOSTEROID OVERDOSE

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**BACKGROUND AND PURPOSE:** Vestibular dysfunction affects 35% of adults in the United States aged 40 years and older. There is currently limited published literature on the effect of medication toxicity, specifically corticosteroid toxicity on vestibular system dysfunction. The purpose of this case report is to describe and examine the effectiveness of physical therapy interventions including vestibular rehabilitation in treating corticosteroid induced vestibular dysfunction in a 44-year-old female.

**CASE DESCRIPTION:** A 44-year-old Caucasian female presented to physical therapy with complaints of auditory and visual disturbances accompanied by vertigo and severe migraines. The patient experienced a sudden onset of symptoms after being prescribed corticosteroids and taking them in oral pill form, sub-dermal injection, and via inhalation within a 1 week time frame. The patient presented with decreased balance, impaired gaze stability and smooth pursuit, impaired gait, increased cervical muscle tension, and decreased cervical spine range of motion. Functionally, the patient was unable to work due to hypersensitivity to light and inability to look at a computer screen without an increase in symptoms. She also reported issues with performing activities of daily living requiring increased time to do so due to dizziness and unsteadiness with moving and changing positions. The patient was treated over 13 weeks and 18 treatment sessions with a combination of vestibular and manual therapy to address her vestibular and musculoskeletal issues. During weeks 7-10 the patient’s medical interventions did change.

**OUTCOMES:** After 13 weeks, the patient reported a decreased in headache symptoms (1/10 on the Numeric Pain Rating Scale), reduction in vertigo symptoms (24/100 on the Dizziness Handicap Inventory and 21/24 on Dynamic Gait Index). Improvements in balance were seen with the patient showing no impairments on the Sharpened Romberg and Modified Clinical Test of Sensory Integration on Balance Assessment. There were also improvements in all planes of cervical spine...
range of motion. Some degree of abnormal gaze stability and smooth pursuit remained at the end of therapy. Functionally, the patient reported no difficulty with activities of daily living and was able to return to work and driving part time.

**DISCUSSION:** Vestibular therapy in conjunction with manual therapy techniques were shown to be effective in treating vestibular dysfunction due to corticosteroid toxicity for the individual described in this case. The patient had a significant reduction in vertigo, migraine headache, and tinnitus symptoms with a significant improvement in balance, gait, and cervical spine range of motion. However, complicating factors involving alterations in medical treatment that the patient received during physical therapy services exist. Because of this, it is uncertain whether vestibular and manual therapy were solely responsible for the patient’s improvements illustrated in this case report.

32. **EFFECT OF LATERAL CERVICAL FLEXION RANGE OF MOTION RESTRICTION ON TREATMENT PROGNOSIS IN TWO INFANTS DIAGNOSED WITH CONGENITAL MUSCULAR TORTICOLLIS: A CASE REPORT**

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**BACKGROUND AND PURPOSE:** Congenital muscular torticollis (CMT) is a postural condition that involves unilateral tightness of the sternocleidomastoid (SCM) muscle. This condition is often accompanied by positional preference for head tilt toward and rotation away from the side of tightness. Secondary problems associated with CMT are craniofacial deformities, gross motor impairments, and range of motion deficits. The current standards outlined in the clinical practice guidelines for torticollis base severity and treatment prognosis off age at treatment onset and cervical rotation restrictions. There is little evidence linking cervical side-bending restriction to treatment duration and prognosis even though it is a major component of CMT diagnosis. **CASE DESCRIPTION:** Patient 1 is a 3-month-old female referred to physical therapy for torticollis with related plagiocephaly. Patient 2 is a 3-month-old male referred to physical therapy for torticollis. Both patients showed impairments in rotation and side-bending range of motion (ROM), deficits in gross motor development, and craniofacial asymmetries resulting from positional preferences. However, within these similarities there were found to be differences that made these patients good candidates for this case report. The significant findings included patient 1 having greater limitation in side-bending ROM while patient 2 demonstrated decreased head control and significantly higher cranial ratio measurements. Interventions consisted of myofascial stretching, weight shifting exercises, and neuro-development treatment techniques. **OUTCOMES:** Patient 2 demonstrated greater improvements in range of motion and head tilt resolution than patient 1 over a 9-week treatment period. Correlation between side-bending range of motion restriction and treatment duration could not be accurately determined due to a shortened treatment duration for patient 1 secondary to insurance complications. Both patients demonstrated poor improvement in craniofacial anthropometrics, with referral to an orthotist obtained for both patients at the conclusion of their treatment. **DISCUSSION:** Patient 2 demonstrated greater improvement in the majority of objective measures than patient 1 over the same 9-week treatment period. Since patient 2 presented initially with less limitation in side-bending range of motion, this case report suggests that cervical side-bending range of motion at the time of initial evaluation may be an important prognostic factor for treatment duration and symptom resolution.
33. REHABILITATION FOLLOWING A COMPLEX ACETABULAR LABRAL RECONSTRUCTION AND REVISION OSTEOPLASTY: A CASE REPORT
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BACKGROUND AND PURPOSE: Over the past decade, the treatment of hip pathologies in the younger, active population has evolved tremendously. Acetabular labral tears and femoroacetabular impingement (FAI) are two increasingly recognized sources of hip pain that can be successfully treated with surgical intervention aimed at preserving the integrity and function of the hip joint. In most individuals a labral repair is performed, however in some unique cases the labrum is unsalvageable due to several possible contributing factors including degeneration, fraying, prior surgical debridement, complex tearing, or natural size. In these cases, a labral reconstruction is required. The aim of the present case study is to describe the examination procedures and interventions applied in the successful rehabilitation of a patient after complex labral reconstruction and joint osteoplasty. CASE DESCRIPTION: The present case is a 36-year-old female who underwent a labral reconstruction using an allograft, in addition to significant revision osteoplasty. This was preceded by an arthroscopic procedure seven years prior, to repair a labral tear and FAI. During the procedure, the femoral head and neck were over-resected leading to rapid degenerative changes in the joint, including the labrum. Over the course of ten weeks in physical therapy, the patient progressed from toe-touch weight bearing using bilateral crutches to advanced functional strengthening and return to work. Intervention included the application of therapeutic exercise, manual therapy techniques, and neuromuscular electrical stimulation to facilitate gluteal activation. OUTCOMES: Progress measures including manual muscle testing (MMT), range of motion (ROM), the Lower Extremity Functional Scale (LEFS) and the Hip Outcome Score (HOS) which has been found valid and reliable specific to labral tears, femoroacetabular impingement, and hip arthroscopy were utilized. At discharge, the patient had obtained functional ROM and strength which enabled her to perform many high-level strengthening activities. Outcome measures indicated 20–40% disability, however much of this was related to recreational activities from which the physician advised the patient to abstain in order to best preserve the reconstructed joint. DISCUSSION: While there is a significant body of research on rehabilitation after hip arthroscopy and reconstruction, much variability remains in the recommendations of various researchers and physicians. From the present case, three main points about rehabilitation after complex labral reconstruction can be highlighted: the importance of limiting hip flexor tendonitis during rehabilitation; the frequent occurrence of gluteal dysfunction after hip surgery and how to address this; and the importance of high-quality clinical decision making in all post-surgical rehabilitation cases. Further research is needed to develop consistent, evidence-based recommendations for rehabilitation after labral reconstruction. This will take time, as labral reconstruction remains a relatively new approach in hip preservation and is used only in rare cases where arthroscopic labral repair is not effective.

34. A CASE REPORT DESCRIBING THE PHYSICAL THERAPY EXAMINATION FOR A PATIENT FOLLOWING RE-OPERATIVE HEART SURGERY FOR AORTIC VALVE REPLACEMENT IN AN ACUTE CARE HOSPITAL.
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Background and Purpose: Senile aortic stenosis commonly remains asymptomatic until sixth to seventh decade of life. Aortic valve replacement procedures and exercise have been associated
with improved outcomes for these patients. Physical therapists need to customize exercise intensity and the progression of exercise for each individual patient using appropriate objective and subjective measures to guide their decision making. The purpose of this case report is to describe how the physical therapy (PT) examination guided interventions and outcomes for a patient following re-operative cardiac surgery for aortic value replacement and tricuspid value repair during her inpatient acute care hospital stay.

Case description: The patient was a 69 year old female with past medical history of severe aortic stenosis, hypertension, severe tricuspid regurgitation and paroxysmal atrial fibrillation (AF). She underwent aortic value replacement and tricuspid value repair and remained in the intensive care unit for 6 days secondary to complications. PT examination was initiated on post-operative day (POD) 1. Outcome measure including the functional independence measure scores (FIM), 30 second chair rise (SCR), gait speed and fatigue severity scale (FSS) were completed during initial and follow up examinations to guide PT interventions.

Outcomes: Significant improvements were noted in the patient’s FIM, 30 SCR, gait speed and FSS from examination to discharge from PT.

Discussion: This case reports describes the usefulness of a focused evidence based PT examination on choosing appropriate interventions to improve overall outcomes. Further research on appropriate outcome measures for this population in the acute care setting would be beneficial.

35. PHYSICAL THERAPY INTERVENTION TO ACHIEVE MOTOR MILESTONES IN A PATIENT WITH CONGENITAL DISORDER OF GLYCOSYLATION TYPE 1A IN AN OUTPATIENT PEDIATRIC REHABILITATION CENTER
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BACKGROUND AND PURPOSE: Congenital Disorder of Glycosylation (CDG) is a rare heterogeneous group of autosomal recessive metabolic disorders. CDG Type 1A is the most common type and is caused by a disruption in the gene PPM2 on chromosome 16 leading to a disruption N linked glycosylation pathways creating multi system complications. The most common complication is prominent neurological involvement. Diagnosis requires a series of specialized tests. CDG varies in complexity and has variable prognosis. Treatment is designed around managing the patient’s symptoms and improving overall functional independence.

CASE DESCRIPTION: A 22 month old female with a recent diagnosis of CDG Type 1A presented to an outpatient pediatric rehabilitation center to address delays in her developmental milestones. The patient was referred for physical therapy, occupational therapy, and speech language therapy. Prior to this, the patient was previously seen at the same rehabilitation center for concerns with delay in her gross and fine motor skills. With other concerns, the patient was referred to various other health care disciplines leading to a diagnosis in CDG Type 1A.

OUTCOMES: After 8 months and 25 physical therapy visits, the patient made significant improvements in her gross motor skills allowing her to increase her ability to explore her environment. The patient was able to meet 9 out of the 11 long term goals created to improve balance, strength in the extremities and core, and functional mobility.

DISCUSSION: The patient demonstrated ability to make significant progress in achieving motor milestones, but still fell below the norm for her age. Participation in multiple therapy services in addition to good compliance with home exercise programs may have positively affected outcome of treatment. Physical therapy is a good way to address functional deficits, further research should be conducted to examine the appropriate dosage and best treatment methods for this condition.

ACKNOWLEDGMENTS: The author would like to thank the participant of this case study and their family.
36. EFFECTS OF A BALANCE SPECIFIC TREATMENT APPROACH ON GAIT IN A 59-YEAR-OLD FEMALE WITH A CVA: A CASE REPORT

BACKGROUND AND PURPOSE: Cerebral vascular accident (CVA) is the fifth leading cause of death in the United States and the leading cause of adult disability. Adults with a CVA have been found to rely heavily on their vision and have difficulty using an ankle strategy for postural balance reactions, which causes a decrease in balance and results in an increased fall risk. The purpose of this case study was to implement a balance specific treatment approach to improve gait and balance in a 59-year-old female post CVA. Since balance is essential to ambulate without falling, it is important to evaluate the effectiveness of a balance specific treatment approach on gait, in order to improve future interventions in patients following a CVA.

CASE DESCRIPTION: The patient was a 59-year-old female with a medical diagnosis of left sided hemiparesis secondary to a right sided CVA that she had 14 days prior to being treated in outpatient physical therapy (PT). The examination data indicated that the patient had left sided hemiparesis specifically in the left lower extremity (LLE), decreased balance, gait abnormalities and decreased ability to perform ADL’s, secondary to the CVA. PT intervention focused on a balance specific treatment approach, 2 times per week for 60 minutes for a total of 9 sessions.

OUTCOMES: The standardized outcome measures used included the Berg Balance Scale (BBS) with an improvement of 1 point (MDC=4.13) and the Functional Gait Assessment (FGA) with an improvement of 12 points (MDC=4.2). A functional goals and status sheet specific to the outpatient physical therapy clinic was used to track progress performing ADL’s and the patient showed improvement in all goal areas.

DISCUSSION: Balance training activities showed clinically relevant improvement in the Functional Gait Assessment while on the Berg Balance Scale the patient likely had a ceiling effect and did not demonstrate significant change. Future research should measure the effects of balance training on patients with a CVA ranging from mild to severe involvement, using outcome measures common in the clinical setting.

37. TASK SPECIFIC TRAINING IN AN INDIVIDUAL WITH INCLUSION BODY MYOSITIS: A CASE REPORT
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BACKGROUND AND PURPOSE: Myositis is a family of inflammatory diseases of skeletal muscle. Inclusion Body Myositis (IBM) is a rare form of myositis characterized by slowly progressive proximal and distal weakness. Physical therapists have been cautious in utilizing strengthening exercises with persons with myositis, citing concerns about exacerbating inflammation and weakness. Low-intensity traditional resistive strengthening has been found to be safe in individuals with polymyositis and dermatomyositis. There is a paucity of research on interventions for persons with IBM, specifically interventions other than traditional resistive training. Task-Specific Training (TST) is an individualized intervention focused on improving activities the individual has difficulty performing. The purpose of this case report is to describe the efficacy of TST to improve functional strength and fall risk in an individual with IBM. CASE DESCRIPTION: The patient is a 74 year-old African-American male who was referred to physical therapy (PT) with primary complaints of lower extremity weakness, impaired balance and
gait abnormalities. The patient reported a history of 2 falls in the past year, increasing difficulty with ambulation with a standard cane, descending stairs, and increased weakness since diagnosis. The patient’s goals for PT were 1) walk independently without an assistive device and 2) ascend a flight of stairs without fatigue. PT examination revealed atrophy of bilateral quadriceps and gluteal muscles; impaired LE strength (MMT: 4/5 Hip flexion, 4-5 Hip extension, knee flexion/extension); decreased functional mobility/strength/balance as measured by Five Times Sit to Stand (5TSTS=15.2s) and Timed Up and Go (TUG=10.7s); impaired dynamic balance (Dynamic Gait Index [DGI = 19/24]) specifically stepping over obstacles and stairs. TST activities focused on sit-to-stand, descending stairs/ramps and gait. Some TST exercises impacted more than one task. The patient exercised 7 days/week X 5 weeks: 9 sessions of TST and a HEP the other days.

OUTCOMES: The patient improved on all outcome measures. Hip flexion/extension and knee extension increased to 4+/5, 5TSTS decreased to 11.69s (decrease of 3.51s), TUG decreased to 8.97s (decrease of 1.73s), gait speed increased to 1.6 m/s (increase of 0.3 m/s) and DGI improved to 21/24. DISCUSSION: TST focused specifically on improving the patient’s performance in sit-to-stand, descending stairs, and ambulation without an assistive device by selecting tasks directly related to these activities rather than traditional resistive strengthening exercises. The patient did include weight lifting as part of the HEP. The patient improved on all outcome measures of strength, balance, endurance and strength while reducing fall risk. In addition, the patient reported that he was again able to participate in ballroom dancing and ambulate in the community without a cane. A PT plan of care has historically been conservative when given to individuals with myositis with little information specific to individuals with IBM. The patient in this case report exercised 7 days/week for 5 weeks with no observable increase in inflammation or weakness. The intensity of this program is higher than most reported in the literature. One potential concern is the unequal increase in strength comparing knee extension and flexion bilaterally, likely directly related to the selection of the tasks. Long term impact of this asymmetry resulting from the TST is unknown but the selection of tasks may need to be modified to promote symmetrical strength gains. Additionally, intervention type and dosage is not well understood in persons with IBM and future research is required to investigate best practices.

38. VESTIBULAR REHABILITATION FOLLOWING SURGICAL REPAIR FOR SUPERIOR CANAL DEHISCENCE SYNDROME
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BACKGROUND AND PURPOSE: Superior Canal Dehiscence Syndrome (SCDS) causes both auditory and vestibular symptoms. Following surgical repair of SCDS, patients often experience dizziness and imbalance. This case report describes the post-operative vestibular rehabilitation program and how it was modified for a patient with slow progress secondary to visual vertigo.

CASE DESCRIPTION: The patient was a 63 year old male with history of strabismus eye surgery, right hearing loss, aural fullness, and sensitivity to loud sounds who initially presented to vestibular PT for pre-operative education in SCDS vestibular exercises focusing on habituation head movements, gaze stabilization and walking. He subsequently underwent a right transmastoid approach for repair of superior semicircular canal dehiscence and removal of encephalocele with a right middle cranial fossa approach. He was seen post-operatively for a total of 6 physical therapy visits over 9 months with emphasis on a home exercise program consisting of VOR, habituation and balance exercise progressions, and dynamic walking activities. Additional
oculomotor exercises were recommended for this patient to address his symptoms of visual vertigo which may have been exacerbated by his underlying strabismus.

**OUTCOMES**: Outcome measures two-weeks post-operatively were as follows: Dizziness Handicap Inventory (DHI) = 38/100, Timed Up & Go (TUG) = 9.92 seconds, Dynamic Gait Index (DGI) = 16/24, and he demonstrated a 3 line difference in Dynamic Visual Acuity (DVA). Measurable improvements in outcome measures at discharge included: DHI = 18/100, TUG = 6.87 seconds, DGI = 23/24 and one line difference in DVA. Most importantly, he was able to return to work and all of his recreational activities.

**DISCUSSION**: Vestibular rehabilitation focusing on adaptation, habituation, balance, and walking exercises can be both functionally and symptomatically beneficial following surgical repair for SCDS and should be implemented into post-operative vestibular exercise programs.

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**39. A SCHOOL-BASED INTERVENTION TO IMPROVE FITNESS AND FUNCTION IN SEVERE CEREBRAL PALSY: A PILOT STUDY**
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**INTRODUCTION/CLINICAL RELEVANCE**: Children with severe cerebral palsy (CP) often have low levels of cardiorespiratory fitness. However, impairments associated with CP may interfere with the ability to exercise at levels sufficient to develop fitness. The purpose of this study was to investigate the impact of a school-based adapted bicycle-riding program to improve fitness and function in students with severe CP. **METHODS**: A multiple-baseline, single-subject A-B-A-B design with repeated measures was used. Every effort was made to conduct the study in a manner that was consistent with the actual practice of school-based physical therapy. To accommodate the school calendar, the duration of each phase of the study was as follows: initial baseline: 4 weeks, initial intervention: 8 weeks, second baseline: 7 weeks, and second intervention: 8 weeks. Subjects: Three subjects with severe CP ages 8 to 14 years, Gross Motor Function Classification System (GMFCS) Levels IV and V participated in the study. Methods/Procedures: The Energy Expenditure Index (EEI) was used weekly during all phases to measure cardiorespiratory fitness. At the initial baseline phase and at the end of each intervention phase, function was measured using the Gross Motor Function Measure-66 (GMFM-66) and the status of individualized goals as determined by Goal Attainment Scaling (GAS) on a scale of -2 to +2. Prior to the start of the initial baseline phase, subjects were fitted for adapted bicycles. During intervention phases, an adapted bicycle-riding program was carried out daily for up to 30 minutes as part of each subjects’ regular school activities. Analysis: EEI data was analyzed using the 2 standard deviation (SD) band method with significance assumed when at least two consecutive data points in the intervention phase were outside of the baseline 2 SD range. Findings from the GMFM-66 and the GAS were interpreted relative to values indicating true change. **RESULTS**: Actual subject completion of the adapted bicycle-riding program was high (75%, 83%, 97%). All 3 subjects appeared to enjoy the program and all school personnel were supportive and receptive to the program. One subject demonstrated significant change in cardiorespiratory fitness. Two of 3 subjects demonstrated true change in gross motor function as measured by the GMFM-66. All 3 subjects demonstrated better than expected change in individualized goals as determined by GAS. **DISCUSSION**: Students with CP in this age range at GMFCS Levels IV and V often have a poor
prognosis in regard to achieving measurable gross motor improvement and yet may still require school-based physical therapy services to optimize their educational outcomes. Programs such as this adapted bicycle-riding program may allow the opportunity to provide a meaningful service to older, severely involved students. **CONCLUSIONS:** The adapted bicycle-riding program allowed the subjects to participate in a school-based activity that may have resulted in improvements in their fitness and function. **ACKNOWLEDGMENTS:** The authors thank the students, families, teachers, and schools who agreed to participate in this research study, and Freedom Concepts, Inc. for the loan of bicycles used for the adapted bicycle-riding program. This research was supported by the Physical Therapy Department of the University of Michigan – Flint.