



Poster Abstracts

(Backward) Steps to Mitigate Fall-Risk Post-Stroke

Authors:

Dorian, Rose, PT, PhD, University of Florida

Joanna deLacy, PT, DPT, NCS, Brooks Rehabilitation

Gina Brunetti, PT, DPT, Brooks Rehabilitation

Brooke Hoisington, PT, DPT, Brooks Rehabilitation

Dolores Miller-Sellers, PT, DPT, LSVT, AIB-R Malcom Randall VAMC

Abstract:

Purpose/Hypothesis: Falls post-stroke often occur when a backward step is required to sit down or to turn or transfer. Backward Walking Training (BWT), with its postural and lower extremity motor control requirements may facilitate this important gait sub-task and improve gait and dynamic balance. This study tested the hypothesis that backward step length, gait speed and dynamic balance would increase following BWT.

Participants: Twenty-three adults (16 male; 13 left hemisphere lesion; 2.8 ± 0.8 months post-stroke; age: 59.6 ± 9.7 years)

Methods: Participants engaged in eighteen BWT sessions on a treadmill and over-ground. The Ten Meter Walk Test (10MWT), Four-Square Step Test (FSST), 3-meter Backward Walk Test (3MBWT), Functional Gait Assessment (FGA) and step length during backward walking were assessed and paired t-tests compared pre- to post-intervention values (Bonferroni correction $p < 0.01$).

Results: Both forward (0.41 ± 0.06 to 0.50 ± 0.06 m/s) and backward (0.22 ± 0.00 to 0.32 ± 0.04 m/s) gait speed increased. Backward step length increased 18.1 ± 2.5 to 27.9 ± 3.6 cm (paretic limb) and 20.3 ± 2.4 to 27.3 ± 2.8 cm (non-paretic limb). Dynamic balance also improved, assessed by FSST (decreased completion time from 58.5 ± 10.0 to 42.5 ± 7.2 seconds) and FGA (7.6 ± 1.4 to 11.7 ± 1.5). Gains were statistically significant ($p < 0.01$).

Conclusions: This novel intervention resulted in improvements not only in gait speed and dynamic balance, but specifically step length during backward walking, potentially leading to a larger base of support, an important factor in mitigating falls.

Clinical Relevance: BWT provides a novel gait and balance intervention tool for therapists to employ to improve dynamic balance and gait to decrease post-stroke falls.

A Comparison of Quantitative Pupillometry and VOMS in Division 1 Female Soccer Players

Authors:

John Heick, PT, PhD, DPT, OCS, NCS, SCS

Northern Arizona University

Department of Athletic Training and Physical Therapy, Flagstaff, Arizona

John.Heick@nau.edu

Lauren Entsler, SPT

Northern Arizona University

Department of Athletic Training and Physical Therapy, Flagstaff, Arizona

lre35@nau.edu

Abstract:

Purpose: A potential biomarker for concussion is quantitative pupillometry (QP). A Neurological Pupil index (NPi) score < 3.0 has been observed in severe traumatic brain injuries. The Vestibular Ocular Motor Screening (VOMS) is a valid tool for assessing concussion. Female soccer players have an increased risk for concussion. This study evaluated QP in female soccer athletes compared to VOMS scores.

Participants: Twenty-seven female soccer athletes (20.46 ± 2.36 years).

Methods: Athletes completed the QP and VOMS at baseline. The NeuroOptic® NPi-200 provided (NPi, pupil size, minimum pupil size [MPS], constriction percentage [CH], constriction velocity, maximum constriction velocity, latency, and dilation velocity). NPi were categorized as low, medium, or high.

Results: Three athletes (11.5%) had significant findings. Mean NPi score was 3.9 ± 0.4 and 4.0 ± 0.4 . A significant difference was observed for CH ($\chi^2(2) = 17.843$, $p = 0.05$).

Conclusion: Athletes with an NPi < 3.8 had significantly less CH and larger MPS compared to those with higher NPi. Clinical Relevance: The lack of relationship between QP and VOMS suggest these are evaluating different constructs. Clinicians should not rely on NPi but should consider individual QP measures.

A data visualization method to improve standardized outcome collection, functional outcome improvement, and measure knowledge translation strategies in inpatient rehabilitation

Author:

Amber Walter, PT, DPT, NCS, Sheltering Arms Institute, Jessi Vaught, PT, DPT, NCS, Matt Wilks, PT, NCS

Abstract:

Purpose: Over a decade ago, Dianne Jette and colleagues (2009) described the need to continue to increase the frequency of outcome measure use despite a previous decade of work in developing measures in physical therapy. A large number of published works, resources, and presentations are now available demonstrating the importance of measurement and supporting clinical practice change. We sought to use these resources to guide us in achieving 90% completion of outcome collection by physical therapists after opening a new 114-bed inpatient rehabilitation facility. The present work will describe how we merged this fundamental practice of measurement with new trends in data science and visualization.

Description: While utilizing a knowledge to action approach with implementation, we supplemented audit and feedback interventions with a data dashboard. Due to the variety of measures used amongst four diagnosis-specific clinical units, the interactive and customizable dashboard became a powerful tool to understand our data. Clinicians can easily see completion rates and compare patient outcomes across clinician, unit, and diagnosis, driving decisions in intervention selection.

Summary of Use: The dashboard is one of many strategies utilized to improve outcome measure use. Data is made more accessible, thus providing an additional facilitator to implementation. In addition, we are able to utilize the dashboard to track success of various implementation strategies over time. Importance to Neurologic Physical Therapy: Combining data visualization techniques with implementation of outcome measures for neurologic populations provides increased accessibility and understanding leading to improved adoption and more focus on achieving improved patient outcomes.

A Guessing Game: Physical Therapy Management of Autonomic Dysfunction in a Patient with Spinal Cord Injury and Covid-19

Author:

Caitlyn Anderson, PT, DPT, NCS, GCS, University of Wisconsin-Milwaukee

Abstract:

Background/Purpose: The purpose of this case study is to highlight the unpredictable nature of Covid-19 in those with spinal cord (SCI) and possibly other neurologic injuries. More specifically, those with autonomic dysfunction (AD) may be at higher risk for morbidity and mortality when infected with Covid-19 and warrant skilled physical therapy (PT) management and interdisciplinary (ID) coordination.

Case Description: A 68 year old male pt 3 months status post C6 complete traumatic SCI presented from inpatient rehabilitation (IR) to the intensive care unit (ICU) with respiratory failure from Covid-19. Additional complications included tracheostomy, stage 4 sacral ulcer, and diabetes mellitus. He received PT services in the ICU over the next 3 months in the height of the pandemic, where newly emerged and severe AD created barriers and setbacks.

Outcomes: Early mobilization, ID coordination for timing and medication, and the use of equipment allowed this pt to participate in daily PT and return to IR despite a highly complex presentation. These strategies were able to be implemented in other neurologic populations with Covid-19 within an urban hospital setting.

Discussion: Despite no identifiable noxious stimuli or previously diagnosed AD, pts with SCI may suffer from severe symptoms due to cytokine storming, psychologic stress, and hyper-inflammatory state of Covid-19.

Clinical Relevance: AD may cause more severe and prolonged symptoms with dangerous scenarios in those with SCI and Covid-19. It is imperative the PT screens for AD in these populations across the continuum of care for successful pt outcomes.

A Knowledge Translation Case Study Focusing on Outcome Measure Utilization Within Inpatient Rehabilitation

Author:

Matthew Babunovic, DPT, NCS, Johns Hopkins Bayview Medical Center

Abstract:

Background/purpose: To conduct a knowledge translation(KT) case study within an inpatient rehabilitation facility(IRF) focusing on increasing outcome measure(OM) utilization of the “core set of outcome measures (Core set)” clinical practice guideline (CPG) in the adult neurologic population (1).

Description: Over two years, our facility tracked outcome measure usage by physical therapists while an outcome measure team(OMT) used the Ottawa Model of Research Use, to guide KT of the academy of neurological physical therapy’s(ANPT) CPG. The OMT established baseline data then completed four cycles consisting of various interventions, which were all followed by a retrospective chart reviews to track effectiveness.

Outcomes: The IRF increased OM completion during evaluations from 38% to 100%, retesting before discharge from 16% to 90%, and established a departmental protocol of preferred OMs.

Discussion: Various rehabilitation organizations have determined that OM use in neurologic populations is "essential for monitoring changes over time, quantifying observations and patient-reported function, enhancing communication, and increasing the efficiency of patient care"(3). Data on OM utilization in varying settings are hard to come by and results vary widely. A recent acute care study reported baseline OM usage of 16% (2). KT can be an arduous process but our results show its benefits for improving standards of care.

Relevance: There are multiple studies published outlining KT in various institutions (3,4,5), however, there continue to be immense difficulties and prolonged delays. This case study provides another example of both the benefits and potentials challenges within a KT initiative.

A SURVEY OF PHYSICAL THERAPISTS' MEASURING INTENSITY OF EXERCISE FOR NEUROLOGICALLY-DIAGNOSED PATIENTS

Authors:

Macy, Miller, SPT, Franciscan Missionaries of Our Lady University

Kelly, Rodriguez, PT, DPT, NCS, Assistant Professor, Doctor of Physical Therapy Program at Franciscan Missionaries of Our Lady university

Kelly, Hodges, PT, DPT, NCS, Physical Therapist at Ochsner Lafayette General Medical Center

Abstract:

Purpose: The purpose was to investigate if and how physical therapists (PTs) are dosing the intensity of neurological rehabilitation. **Participants:** Practicing PTs treating neurologically-diagnosed patients were recruited.

Methods: The research consisted of an observational cross-sectional survey. Recruitment occurred by word of mouth, social media advertisement, posting on the Academy of Neurologic Physical Therapy (ANPT) list-serve as well as on the 'Neurocollaborative Professionals' Facebook page, and email. Clinicians agreed to anonymously complete an 18-question survey on SurveyMonkey.

Results: The overall response rate was 4%; 201 surveys were analyzed. Therapists tended to measure heart rate (HR) (71%) rather than a rating of perceived exertion (RPE) (49%). The most-used tool to measure intensity was a HR monitor (64%). Most therapists (68%) were monitoring intensity periodically for an individual patient within one session.

Conclusions: Walking function and independence are highly sought-after following neurologic injury. Clinicians should follow neurologic clinical practice guidelines (CPGs) for exercise intensity to train fundamentally. Based on the results of this survey, PTs are not consistently dosing moderate to high-intensity exercise for neurologic patients. Further research is needed to validate more accessible devices for use in monitoring intensity and observational data to determine what patients are doing versus what therapists think they do.

Clinical Relevance: Neurologic disorders are the leading cause of disability. Therapeutic exercise prescription should target cardiovascular efficiency for neuroplastic changes. Locomotor training for neurologic PTs have GPGs that recommend using appropriate intensity, set at moderate to high (60%-80% heart rate reserve or 70%-85% heart rate maximum).

Aerobic Exercise versus LSVT-BIG® in Addressing Fatigue and Motor Impairments in Parkinson's Disease

Author:

Taylor Pell, PT, DPT

Abstract:

Background/Purpose: Recent research has shown the neuroprotective benefits of aerobic exercise(1,2,3,6,7) in conditions such as Parkinson's disease. This case report evaluates the effectiveness of aerobic exercise, followed by LSVT-BIG®, in addressing fatigue and motor impairments in a patient with Parkinson's symptoms, who could not complete LSVT-BIG® previously due to fatigue.

Case Description: The patient is a 65-year-old male with severe bradykinesia and rigidity. The initial treatment consisted of aerobic activity for 15 minutes, 5 days a week for 4 weeks. LSVT-BIG® treatment consisted of 1-hour sessions, 4 times a week for 6 weeks.

Outcomes: The outcomes used included: the PDQ-39, PFS-16, supinesit, 5TSTS, and TUG. The subjective measures showed no significant change. The supinesit improved by 23.35 seconds (Supine>Sit) and 31.00 seconds (Sit>Supine) after completion of LSVT-BIG®. The 5TSTS showed a positive MCID(4) during both treatments (Aerobic: 1 minute, 3 seconds; LSVT-BIG®: 34.62 seconds). The TUG scores reached a positive MDC(5) for the LSVT-BIG® treatment only (19 seconds).

Discussion: The LSVT-BIG® treatment overall achieved the greatest improvements. Between the aerobic and LSVT-BIG® protocols Carbidopa-Levodopa was initiated, which possibly affected the improvements seen during the LSVT-BIG® portion of the program.

Clinical Relevance: Significant improvements in motor function were made with both treatment programs, but neither treatment created a significant effect on self-reported fatigue. The aerobic activity yielded beneficial effects and potentially contributed to the success of the following LSVT-BIG® treatment. The introduction of the new medication also enhanced the gains made with the LSVT-BIG® treatment.

Augmented Balance Training in Persons with Multiple Sclerosis: A Case Series

Authors:

Emily Myers

Deb A Kegelmeyer, DPT, GCS

Anne D Kloos, PhD, PT, NCS

Nora E Fritz, PhD, PT, DPT, NCS

Abstract:

Background/Purpose: Multiple sclerosis (MS) impacts balance and walking ability. Augmented balance training can enhance functional gains in persons with neurologic disorders, but the extent to which these gains are realized in persons with higher and lower disability is unknown.

Case Description: This is a sub-analysis of data from a randomized controlled trial of physically inactive individuals with relapsing-remitting MS randomized to either a wait-list control group or a video-game (multi-directional stepping to music using visual cues) intervention group 3x/week for 8 weeks. Eight participants were part of this case series, n=4 total per group with n=2 with Expanded Disability Status Score (EDSS) >3, and n=2 with EDSS ≤ 3 in each group.

Outcomes: Individuals in the intervention group demonstrated greater gains in gait, balance, and dual-task performance than those in the control group. Specifically, individuals with EDSS>3 (i.e., greater disability) demonstrated the largest gains in forward walking velocity (35.2% and 6.7% increase), dual-task walking velocity (17.7% and 8.1% increase), and Berg Balance Scale (39.6% and 3.9% increase). Further, individuals with EDSS>3 met or exceeded established MDCs for the Berg Balance Scale and 6 Minute Walk Test following training.

Discussion: Augmented balance training that combines motor training with increased cognitive demand may result in benefits in walking speed, walking endurance, dual-task ability and balance for persons with MS. In this case series, those with greater disability demonstrated the largest gains.

Clinical Relevance: Intensive balance training is feasible in persons with MS-related disability and may confer greater benefits than in those with lower disability.

Barriers and Facilitators to Implementing the Core Set Clinical Practice Guideline in Stroke Rehabilitation

Authors:

Matthew Annessi PT, DPT, NCS. Siskin Hospital for Physical Rehabilitation
Katherine Gibson PT, DPT. Siskin Hospital for Physical Rehabilitation.

Abstract:

Purpose: The Core Set of Outcome Measures for Neurologic Conditions recommends measures for use with patients undergoing neurologic rehabilitation. Multi-component implementation strategies that target barriers may increase success of implementation efforts. The purpose of this study was to identify barriers, facilitators, and current practice related to physical therapists use of the core set in inpatient rehabilitation..

Participants: Three physical therapists, three physical therapist assistants, and three supervisors participated.

Methods: A modified version of a measurement barrier survey and the Organizational Readiness for Change survey were administered. A focus group was convened to discuss results and explore barriers.

Results: Eight completed surveys were returned. 80% of clinicians reported using outcome measures (OMs) in 2/10 patients. Barriers identified included clinicians' belief that OMs were not integral to treatment interventions (66% agreement). Regarding the organization, 0% agreed that OMs are routinely used by colleagues and 66% reported lack of measurement standards led to decreased use. When asked if patients support the use of outcome measures, 83% responded "neutral". Facilitators included familiarity with 4/6 core set measures (100% agreement) and the belief that the organization could successfully implement the guideline (83% agreement). Focus group discussions identified barriers including inaccessible OM documentation, lack of organizational testing standards, education, and testing time/environments.

Conclusion: This study identified barriers and facilitators unique to clinicians, the organization, and patients.

Clinical Relevance: Barriers and facilitators to implementing standardized measures vary. Surveys and focus groups allow clinicians to identify their barriers and inform selected strategies to implement evidence successfully.

Barriers and Facilitators to Using Digital Health Technology in an Outpatient Clinic

Authors:

Jillian MacDonald, PT, DPT, Shirley Ryan AbilityLab

Bridget Fowler, PT, DPT, Shirley Ryan AbilityLab

Laura Stoff, MPH, Shirley Ryan AbilityLab

Ella Nettnin, BS, Shirley Ryan AbilityLab

Miriam Rafferty, PT, DPT, PhD, Shirley Ryan AbilityLab, Northwestern University

Abstract:

Purpose/Hypothesis: The purpose of this abstract is to describe the barriers and facilitators to the use of digital health technology to facilitate exercise behavior change from the perspective people with Parkinson's disease (PwP), physical therapists, and technology stakeholders.

Participants: A purposeful sample of stakeholders included PwP in the early stages of the disease (n=13), outpatient physical therapists (n=12) who work with PwP, and individuals involved in research and development of technology in healthcare (n=13).

Methods: Semi-structured interviews were used to better understand barriers and facilitators with use of technology to facilitate behavior change in the clinic. Interviews were coded with deductive coding to the Consolidated Framework for Implementation Research (CFIR) to better understand implementation determinants.

Results: Key implementation determinants were similar across participant groups. Intervention characteristics that are important to consider, include design quality and packaging, adaptability, complexity, and cost. Characteristics of the physical therapists and PwP that influence implementation include knowledge, beliefs, and self-efficacy related to digital health technology use. Organizational determinants in the inner setting include available resources and access to knowledge and information. Additional constructs under the process domain were shared by technology stakeholders.

Conclusion: Multi-stakeholder input into the determinants of implementation can improve tailoring of interventions to implement digital health technology in physical therapy.

Clinical Relevance: Successful implementation of digital health technology in physical therapy will require addressing barriers related to the technology itself, the physical therapist, the patients, the organization, and processes.

Case Study: Motor Retraining to Maximize Outcomes in an Individual with Functional Neurologic Disorder

Authors:

Jodi Krause, PT, DPT, NCS, UPMC Centers for Rehab Services

Lindsay Lewis, PT, DPT, NCS, UPMC Centers for Rehab Services

Abstract:

Background/Purpose: FNDs consist of symptoms including weakness, tremor, dystonia, gait dysfunction; caused by a problem with functioning of the nervous system, not damage. FNDs are common and associated with poor prognosis. Little research exists to guide the PT management. Purpose of this case study is to discuss the use of existing motor learning models/2014 PT consensus statement in individual with FND.

Case Description: 25 year-old female, Intermittent curling of left toes, progressed to spasm of entire left leg, characterized by rapid alternating extensor/flexor synergy pattern; triggered by certain shoes. Evaluated by podiatry, ortho-surgeon, neurosurgeon. Normal brain/spine MRI. Diagnosed FND by Movement Disorders Specialist.

Interventions: CBT to identify abnormal movement triggers, demonstration that normal movement can occur, promoting autonomy/enhancing expectations, retraining movement through diverted attention (cognitive/motor distractions), graded-activity.

Outcomes: Initial Evaluation: gait speed=0.9m/s, 1.8m/s fast(no spasm); 6MWT=515ft(>10 spasms); FGA=26/30(no spasm). Walked 10minutes. Avoided community ambulation. Only wore flip flops. Discharge: gait speed=1.2m/s, 1.8m/s fast(no spasm); 6MWT=1430ft(no spasm); FGA=30/30; Walked 30 minutes. Walked in grocery store, walked her dog. Wore all of her shoes.

Discussion: There is little evidence to guide the treatment of individuals with FND. The variable nature of FNDs makes them difficult to study. There is no "one-size-fits-all" therapy available, thus individualized therapy is required. In this case study, existing models of motor learning were integrated to create a unique approach to manage this individual's movement disorder.

Clinical Relevance: FNDs are one of the most common diagnoses seen in neurology. PTs have a pivotal role in their management.

Clinical Delivery of Robotic Exoskeleton Gait Training during Inpatient Rehabilitation: A Retrospective Study

Authors:

Austin Wong, BSA, Chad Swank, PT, PhD, Monica Bennett, PhD, Librada Callender, MPH, Jaclyn Miller, PT, DPT

Baylor Scott & White Institute for Rehabilitation – Dallas, TX

Abstract:

Purpose: Technological advancements enable overground robotic exoskeleton gait training (RGT) in patients with neurologic injury. Yet, no guidelines inform the progression of RGT sessions. Our purpose was to describe RGT utilization with neurologic patients during inpatient rehabilitation (IP).

Participants: Patients with spinal cord injury (SCI), stroke, and traumatic brain injury (TBI) who completed at least one RGT session during IP.

Methods: Retrospective review of medical records over four years. RGT session data included frequency, dose, and device assistance details.

Results: Patients (stroke n=88; SCI n=60; TBI n=18) completed 6.1 ± 4.2 (SCI), 5.8 ± 4.3 (stroke), and 8.7 ± 6.1 (TBI) RGT sessions averaging one session every 7 (SCI), 6 (stroke), and 4 (TBI) days during IP. For SCI, up time (16.3 to 24.4 minutes), walk time (9.3 to 20.9 minutes), steps (268.3 to 729.4) increased and exoskeleton assistance (left: 92.6 to 73.7, right: 93 to 77.5) decreased. For stroke, up time (13.8 to 20.1 minutes), walk time (5.8 to 14.6 minutes), steps (143.8 to 308.9) increased and exoskeleton assistance (left: 89.5 to 71.2, right: 90.2 to 74.4) decreased. For TBI, up time (12.3 to 15.8 minutes), walk time (5.43 to 13.1 minutes), steps (146.4 to 438.2) increased and exoskeleton assistance (left: 86.6 to 62.2, right: 89.4 to 70.8) decreased.

Conclusion: Patients with SCI, stroke, and TBI demonstrated progressive tolerance and reduced device assistance across multiple sessions during IP.

Clinical Relevance: Robotic exoskeletons may be a useful tool for progressing walking ability during IP. Future studies should explore the association of RGT progression with mobility outcomes.

Community-based exercise class participation for people with Parkinson's disease and their instructors during COVID-19

Authors:

Mark M. Mañago, PT, DPT, PhD, NCS, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO, United States; VA Eastern Colorado Geriatric Research, Education, and Clinical Center, Rocky Mountain Regional VA Medical Center, Aurora, CO, United States

Laura A. Swink, PhD, OTR, VA Eastern Colorado Geriatric Research Education and Clinical Center, Rocky Mountain Regional VA Medical Center, Aurora, CO, United States

Emily R. Hager, MS, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO, United States; VA Eastern Colorado Geriatric Research, Education, and Clinical Center, Rocky Mountain Regional VA Medical Center, Aurora, CO, United States

Robyn Gisbert, DPT, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO, United States

Gammon M. Earhart, PhD, PT, FAPTA, Washington University in St. Louis School of Medicine, Program in Physical Therapy, St. Louis, MO, United States

Cory L Christiansen, PhD, PT, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO, United States; VA Eastern Colorado Geriatric Research, Education, and Clinical Center, Rocky Mountain Regional VA Medical Center, Aurora, CO, United States

Margaret Schenkman, PhD, PT, FAPTA, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO, United States

Abstract:

Purpose/Hypothesis: The study purpose was to determine community-based exercise class changes and related barriers for people with Parkinson's disease (PD) and their instructors during the COVID-19 pandemic. We hypothesized an in-person exercise participation decline due to exposure concerns and virtual participation increase with technological barriers identified.

Participants: Eighty-four people with PD who regularly participated in exercise class before March 2020 (70±7 years old) and 43 class instructors (51±12 years old) from 20 US states completed surveys between 10/2020-02/2021.

Methods: Electronic surveys included custom-designed questions, and for the PD group, the Godin Leisure-Time Questionnaire (GLTQ) and Schwab and England Activities of Daily Living Scale (S&E).

Results: Mean S&E score was 84±16. While 77% of the PD group scored "active" on the GLTQ, >50% reported decreased exercise quantity and intensity compared to pre-COVID. Less than half of respondents still attended or taught in-person classes, and virtual class participation in the PD group increased by 46%. The top in-person class participation barrier for the PD (63%) and instructor (51%) groups was fear of participant COVID-19 exposure. The top virtual class participation barrier was lack of socialization (20% of PD group) and technology problems (74% of instructor group).

Conclusion: Class participants largely remained active, but the overall exercise quantity and intensity decline suggests virtual classes may not fully meet the needs of people with PD, possibly because of technology and socialization barriers.

Clinical Relevance: As virtual classes become more common for people with PD, these results may help instructors address barriers to exercise participation.

Consider Barefoot vs. Socks in Postural Control Assessment

Authors:

Madison A. Pessel, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Brittani Morris, PT, DPT, PhD student, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Susan R. Lunardi, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Sarah Mischianti, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Andrew Medlin, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Maura Cosetti, MD, Department of Otolaryngology-Head and Neck Surgery, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Jennifer Kelly, PT, DPT, NCS, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Anat V. Lubetzky, PT, PhD, CSCS, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Abstract:

Purpose. Head mounted displays carry great promise as a clinical assessment of postural control[1,2] due to the ability to modify sensory load in diverse environments, and to accurately quantify head kinematics.[3,4] Wearing socks during testing could potentially affect proprioceptive feedback and is often not accounted for.[5] We aimed to test whether head kinematics change in response to sensory perturbations when healthy young adults are wearing socks as compared to standing barefoot.

Participants. Ten healthy young adults (5 females) , mean age 30.2, SD=5.16 years.

Methods. This protocol was part of a larger study looking at the interaction of visuals (2 levels) and sounds (2 levels) for postural control. Participants wore the HTC Vive Pro Eye and stood hip-width apart with and without socks. The data were quantified via head path and acceleration in the medio-lateral (ML) and anterior-posterior (AP) directions.

Results. A small significant increase in all parameters was observed with socks (Mean difference Path ML -2.102 & AP -3.749; P= 0.001, Acceleration: ML -1.01, P= 0.011; AP -2.377, P= 0.044). Acceleration in both directions increased significantly with visual perturbation with and without socks. No significant changes were observed with sound perturbations.

Conclusions. The data demonstrated a consistent significant increase in head path and acceleration with socks which did not change responses to sensory perturbations.

Clinical Relevance. As wearing socks showed significant differences in movement for healthy young adults, it could potentially lead to larger differences for individuals with balance impairment and should be considered when assessing balance performance.

Continuum of Therapist Confidence and Knowledge in Treating Patients with Parkinson's Disease Across Practice Settings

Authors:

Jennifer Penn, PT, DPT, NCS, University of the Incarnate Word (San Antonio, Texas)

Patti Berg-Poppe, PT, MPT, Ph.D., University of South Dakota (Vermillion, South Dakota)

Mona Bains, Ph.D., University of the Incarnate Word (San Antonio, Texas)

Miriam R. Rafferty, DPT, Ph.D., Shirley Ryan AbilityLab (Chicago, Illinois), Northwestern University (Chicago, Illinois)

Abstract:

Purpose/Hypothesis: To evaluate knowledge as well as perceived importance, mastery, and preparedness among physical therapists (PTs) who treat people with Parkinson's disease (PWP) in settings across the care continuum.

Participant(s): PTs licensed to practice and residing in Texas were invited to participate; 350 responses were retained for analysis.

Methods: A 37-item survey collected information about demographics, clinical practice setting, knowledge of Parkinson's disease, and respondent-rated perceived levels of mastery and preparedness when treating PWP. Respondents also reported the perceived importance for preparedness items.

Results: Participants reported an average of 17.8 years of practice experience, and 17.7% reported board specialist certification, with advanced Orthopedic specialization most frequently reported, followed by Neurologic and Geriatric. 36% reported advanced training for working with PWP. The percent of correct knowledge question responses was lower among acute care PTs (41.3%), home health PTs (40.2%), and other/unspecified PTs (35.4%) compared to outpatient neurologic PTs (61.9%). Overall knowledge scores were correlated with perceived preparedness ($r=0.134$, $p=0.013$), but not perceived mastery ($r=0.084$, $p=0.122$) or perceived importance ($r=0.041$, $p=0.454$) scores.

Conclusions: We identified a knowledge gap between PTs in outpatient neurologic settings when compared to other settings. PTs with less knowledge also felt less prepared to work with this population.

Clinical Relevance: Because PD is a chronic progressive disorder, PWP are likely to be treated by PTs across the continuum of care. Tailoring education materials for each setting to improve knowledge across the continuum of care may improve the preparation of PTs to treat this complex population.

Do Subjective and Objective Measures of Perceived Walking Challenge predict Community Ambulation Post-stroke?

Authors:

Kanika Bansal, PT, MPT^{1,2}; David J Clark, ScD^{1,3}; Michael Monaldi, MS^{1,3}; Emily J Fox, PT, DPT, PhD^{1,2}; Dorian K Rose, PT, PhD^{1, 2, 3}

¹University of Florida, Gainesville, FL; ²Brooks Rehabilitation, Jacksonville, FL; ³Malcom Randall VAMC, Gainesville, FL

Abstract:

Purpose/Hypothesis: To test the hypothesis that post-stroke sympathetic nervous system (SNS) activity while walking in indoor and outdoor environments will explain higher variance in daily community steps than one's self-efficacy.

Participants: Twenty-two independent ambulators, 5.7±3.5 years post-stroke (11 females, age: 62.4±7.3 years, gait speed: 0.75±0.35 m/s)

Methods: Participants walked both indoors and outdoors encountering challenges such as crowded hallways, and uneven terrain. SNS activity was measured from the palmar surface of each hand. Percent change in skin conductance level (Δ SCL) between baseline resting and walking phases was analyzed separately for indoor and outdoor environments. Self-efficacy was assessed with the Activities-Specific Balance Confidence (ABC) Scale. To quantify number and location of steps in the home and community, participants wore an Activity Monitor and a Global Positioning System (GPS) device for seven consecutive days. Using GPS coordinates total steps were differentiated into two geographical zones: home and community. Stepwise multiple regression tested our hypothesis.

Results: Stroke survivors took significantly more steps at home (3038±1791 steps/day) than in their community (1538±1103 steps/day; p=0.001). Neither ABC score (r=0.18; p=0.42) nor indoor and outdoor Δ SCL (r=0.31; p=0.53) explained significant variance in community steps/day.

Conclusions: Subjective (ABC Score) and objective (SNS activity) measures of perceived challenge of walking in indoor and outdoor environments did not predict daily community walking activity in our post-stroke cohort.

Clinical Relevance: Rehabilitation professionals should consider factors other than solely perceived challenge, such as other personal, social and environmental that may impact one's community ambulation post-stroke.

Does early cervical management impact incidence of delayed recovery in adolescents with acute concussion?

Authors:

McPherson, Jacob I., PT, DPT, NCS, Department of Rehabilitation Sciences, School of Public Health and Health Professions, State University of New York at Buffalo, Buffalo, NY

Sparks, Patrick D., ATC, UBMD Orthopaedics and Sports Medicine

Haider, M Nadir, MD, UBMD Department of Orthopaedics and Sports Medicine, Jacobs School of Medicine and Biomedical Sciences, State University of New York at Buffalo, Buffalo, NY

Willer, Barry, PhD, Department of Psychiatry, Jacobs School of Medicine and Biomedical Sciences, State University of New York at Buffalo, Buffalo, NY

Leddy, John J., MD, UBMD Department of Orthopaedics and Sports Medicine, Jacobs School of Medicine and Biomedical Sciences, State University of New York at Buffalo, Buffalo, NY

Abstract:

Purpose/Hypothesis: Cervical impairments associated with concussion are historically associated with longer recovery times[1-4]. We hypothesized that adolescents who were provided early cervical intervention, when indicated, would demonstrate recovery time and incidence of persistent symptoms (recovery ≥ 30 days) comparable to those without cervical findings.

Participants: Adolescents with acute concussion presenting with (n=132, 14.99 \pm 1.9 years, 58% male, 81% sport-related, 5.70 \pm 3.3 days since injury) and without (n=138, 14.85 \pm 1.8 years, 65% male, 85% sport-related, 6.13 \pm 3.4 days since injury) cervical findings on physical exam.

Methods: Patients were assessed with the Buffalo Concussion Physical Exam (BCPE), Neck Disability Index (NDI) and Post-Concussion Symptom Scale (PCSS) instruments[5]. Groups were separated based on positive or negative cervical exam findings on the BCPE. Cervical impairments were addressed by physicians specializing in concussion management using a clinical algorithm. Mild impairments were managed conservatively (over-the-counter analgesics, warm/cold compresses, and/or neck stretching exercises). Patients with moderate or greater impairments were assessed by a physical therapist at the initial clinic encounter who provided specific cervical interventions.

Results: Physician-observed cervical findings had moderate agreement with self-reported function on the NDI ($\kappa=0.414$, $p < 0.001$). Patients with cervical findings presented with higher initial symptom severity on PCSS (37.9 \pm 22.1 vs 30.8 \pm 20.2, $p=0.011$); however, there was no significant difference in recovery time (34.44 \pm 33.2 vs 34.81 \pm 39.0, $p=0.933$) or incidence of persistent symptoms (39% vs 35%, $p=0.511$).

Conclusions: In this retrospective case controlled study, cervical impairments managed early after concussion were not associated with prolonged recovery.

Clinical Relevance: Early management of cervical impairments may reduce the development of persistent concussion-related symptoms.

Effect of Cervical and Vestibular Exercises on a Post-Concussion Disorder Patient: A Case Study

Author:

Maureen Clancy PT, DPT, OCS

Abstract:

Background: The CDC in 2014 estimated 2.5 million TBI related ED visits occurred in the US with most classified as mild brain injury or concussion. 70-90 of patients will recover in 1-2 weeks, with those that don't being classified as having post-concussion syndrome (PCS). While concussion is defined as a brain injury, there is agreement that persistent PCS symptoms also arise from other structures, including the upper cervical spine. An abundance of similarities exist between post concussion symptoms and whiplash associated disorder (WAD).

Purpose: Identify symptoms, impairments and functional limitations in a PCS patient. Establish any risk factors or poor prognostic indicators for a protracted recovery, or poor outcome. Utilize concussion clinical trajectories to guide clinical management.

Case Description: 21 year old male with h/o 14 concussion/concussion type of events over 7 years. Current episode began 3 month earlier while playing Frisbee. Symptoms included difficulty concentrating, photophobia, phonophobia, headaches, lightheadedness, dizziness, and neck pain.

Objective: Decreased cervical ROM, decreased scapular strength, decreased deep neck flexor endurance, impaired cervical proprioception and VOR and DHI 36/100. Treatment: stretching, F/B gaze stabilization/proprioception/isometric strengthening, F/B habituation/isotonic strengthening.

Outcomes/Discussion/Clinical Relevance: Deep neck flexor endurance (41s) normal, improved ROM/strength, VOR improved and DHI 16/100. Functionally able to return to baseline. It is important to address cervical impairments in patients with PCS who present with dizziness, neck pain and headaches. Relationship between PCS and whiplash associated disorders suggests a link between these etiologies. Further research should be conducted to determine best treatment approach in PCS patients.

Effects of a Novel Audio Biofeedback Device on Gait Parameters in Persons with Parkinson's Disease

Authors:

Lisa Inglis, PT, DPT, Board-Certified Clinical Specialist in Neurologic Physical Therapy, Department of Physical Therapy, Daemen College

Erin Egan, SPT, Daemen College

Nick Frappa, SPT, Daemen College

Allyson Royce, SPT, Daemen College

Brian Castonguay, SPT, Daemen College

Michael Ross, PT,PT, DHSc, Board-Certified Clinical Specialist in Orthopaedic Physical Therapy, Department of Physical Therapy, Daemen College

Abstract:

Purpose/Hypothesis: To examine the effects of a novel audio biofeedback device on gait parameters in subjects with Parkinson's disease (PD).

Participants: Six subjects diagnosed with PD [mean age: 68 ± 10.5 years; mean time since diagnosis of PD: 11.5 ± 8.4 years; Hoehn and Yahr scale: stage I, n=1; stage II, n=2; stage III, n=3].

Methods: Subjects completed 3 trials of the 10 Meter Walk Test (10MWT) to establish a baseline and then randomly under three conditions: audio biofeedback only, music only, and audio biofeedback with music. Audio biofeedback was provided through Electroskip™ technology, which is a wireless, wearable device that sends a discrete real-time generative audio biofeedback signal when the user steps on either the heel or toe force sensors positioned on their shoes. The amount of time/steps required to complete the 10MWT, the number of freezing episodes during the 10MWT, and quality of gait using the Modified Gait Abnormality Rating Scale were assessed. Data for the different conditions were compared with Friedman's tests.

Results: There were no statistical or clinically significant differences under any of the conditions for any of the parameters assessed for the 10MWT when compared to the control trials ($p > 0.05$).

Conclusions: A novel audio biofeedback device did not immediately influence 10MWT performance in subjects with PD. Further study with larger samples and longer training protocols are warranted.

Clinical Relevance: While auditory biofeedback may provide some benefit to individuals with PD, this technology does not have a consistent immediate impact on gait characteristics.

Effects of Hip Joint Mobilization and Stretching on ROM and Spasticity in Persons with SCI

Authors:

Brian J. Maloney, PT, DPT, Shepherd Center, Emory University Division of Physical Therapy

Ryan Koter, PT, DPT, Shepherd Center

Edelle Field-Fote, PT, PhD, FAPTA, Shepherd Center, Emory University Division of Physical Therapy

Abstract:

Purpose/Hypothesis: Lower extremity range of motion (ROM) limitations may be detrimental to function in persons with spinal cord injury (SCI). Limited interventions have been researched or shown improvements in ROM. This study will describe the effects of stretching and joint mobilization on ROM improvements, pain, and change of spasticity as well as its feasibility and safety.

Case description: 4 male subjects who were in the subacute phase following SCI participated in a repeated measures design with 1 week wash out period. Measures of subjective spasticity, objective spasticity, ROM, global rating of change, and pain were measured immediate post interventions and at 4 hour delayed post intervention. Interventions were lower extremity stretching, hip joint mobilization, or a combination of these two stretches.

Outcomes: All subjects had improvements in ROM. All subjects had improvement in either subjective or objective measures of spasticity. Pain was minimally effected. No adverse instances.

Conclusions: All interventions were safe and feasible. Improvements in ROM measures were intervention specific. Stretching and joint mobilization may provide a small change to spasticity, and there does not appear to be any cumulative changes when performing both interventions.

Clinical Relevance: Joint mobilization may be an additional treatment to address ROM impairments for pwSCI in the subacute stage of recovery

Effects of modeling on motor control and sway during sit to stand in Parkinson disease

Authors:

Rebecca Martin, PT, DPT, PhD, NCS, Hanover College, Nova Southeastern University

George Fulk, PT, PhD, FAPTA, SUNY Upstate

Lee Dibble, PT, PhD, ATC, University of Utah

Ali Boolani, PhD, Clarkson University

Jennifer Canbek, PT, PhD, NCS, Nova Southeastern University

Abstract:

Purpose/Hypothesis: Sit to stand (STS) transfers often present challenges for people with Parkinson disease (PwP). Cues promoting an external attentional focus to improve transfers in this population are supported by current evidence. However, current evidence utilizes cues that cannot be easily applied in home and clinical settings. The purpose of this study is to determine the effect of a concurrent modeling cue during the STS transfer of PwP.

Participants: Thirteen PwP, 13 healthy controls (HC)

Methods: Both groups completed 3 trials of uncued STS transfers. The PwP also completed 3 trials with a modeling cue. Body worn inertial measurement units collected data on postural sway and motor control characteristics during each trial. Data of the two groups were compared using unpaired t-tests. Data between conditions of the PwP group were compared using paired t-tests.

Results: Concurrent modeling resulted in a significant decrease ($p \leq 0.01$) in duration of transfer. In the uncued condition, the PwP were significantly slower than the HC group. When the modeling cue was provided, the duration of STS of PD and HC groups were similar ($p \leq 0.01$). Modeling resulted in significantly less coronal plane sway ($p \leq 0.01$) than the uncued condition for PwP.

Conclusions: Our results suggest that concurrent modeling may be a viable option for caregivers and clinicians wanting to improve the motor control and postural stability of individuals with PD during a STS transfer.

Clinical Relevance: Cues improving motor control and postural sway of PwP during STS may increase independence and reduce caregiver burden.

Effects of Sitting as an Early Intervention for Patients Displaying Pusher Behavior in Acute Care

Author:

Patricia Newcomb, PhD, RN, CPNPret, Texas Health Resources

Abstract:

Purpose: The purpose of this study is to assess the relationship between the length of time spent in correct, upright, sitting postures and changes in Pusher Behavior (PB) after a stroke in the acute care hospital setting.

Participants: A convenience sample of 108 patients admitted to an acute care comprehensive stroke hospital with a diagnosis of acute hemorrhagic or ischemic stroke displaying PB.

Methods: In this prospective cohort study, multivariable regression was used to test the hypothesis that time spent in correct sitting posture influenced PB using the Burke Lateropulsion Scale (BLS) and Postural Assessment of Stroke Scale (PASS). Non-parametric analysis was used to test the hypothesis that sitting correctly at least 200 minutes per day improved BLS and PASS scores. Other covariates included skilled therapy time, admitting stroke severity, and age were also analyzed for effect.

Results: Only average sitting time was statistically, significantly associated with improvement in BLS and PASS scores ($p = 0.001$ and 0.009 respectively). Sitting correctly ≥ 200 minutes/day was significantly related to improvements in BLS and PASS score improvements.

Conclusion: This study confirmed the clinical hypothesis of proper sitting to have a positive effect on the waning of PB. Correct sitting should be encouraged throughout a patient's acute care stay for improved postural and functional outcomes of patients displaying PB after an acute stroke.

Clinical Relevance: Time outside of acute therapy interventions/treatments can utilize corrective sitting postures to enforce midline reorientation and diminish the effects of PB.

Engage-PD: Which Patients Benefit Most from a Telehealth Physical Activity Coaching Program for Parkinson's Disease?

Authors:

Hai-Jung Steffi Shih, PT, PhD¹, Jamie Rieger^{1,2}, Ashrita Satchidanand, BS¹, Chelsea Macpherson, PT, DPT, NCS¹, Miriam King, BA¹, Geraldine Yu PT, DPT, OCS³, Julie Fineman, PT, EdD^{1,4}, Hiral G. Shah, MD⁵, Roy N. Alcalay, MD, MS⁵, Lori Quinn, PT, EdD^{1,6}

1. Department of Biobehavioral Sciences, Teachers College Columbia University, New York, NY
2. Department of Neuroscience & Behavior, Barnard College, New York, NY
3. Department of Physical Therapy, New York Presbyterian Hospital, New York, NY
4. Doctor of Physical Therapy Program, Marist College, Poughkeepsie, NY
5. Department of Neurology, Columbia University Irving Medical Center, New York, NY
6. Department of Rehabilitation and Regenerative Medicine (Physical Therapy), Columbia University Irving Medical Center, New York, NY

Abstract:

Purpose: We explored patient characteristics affecting intervention outcomes for Engage-PD, a telehealth physical activity (PA) coaching program for persons with Parkinson's disease (PwP).

Hypothesis: PwP with younger age, earlier disease stage, lower baseline PA, and lower baseline self-efficacy will experience greater intervention efficacy following the Engage-PD program.

Participant(s): Thirty-nine PwP (sex: M=25, F=14; age: 64.8±9.0 years; Hoehn & Yahr (H&Y): I=26%#37;, II=49%, III=26%) participated in the study; White=85%, 10% Non-White=10%, declined response=5%.

Methods: PwP participated in up to 5 Engage-PD sessions with a physical therapist. Engage-PD was grounded in self-determination theory to facilitate long-term behavior change with an emphasis on higher intensity aerobic exercise. Brunel Lifestyle Physical Activity Questionnaire (BLI) and Norman Exercise Self-efficacy (ESE) Scale were administered pre- and post-intervention. Relationships between patient characteristics and intervention outcomes were analyzed using Pearson's correlation, Mann-Whitney U test, independent t-tests, and Kendall rank correlations where appropriate.

Results: Younger age and lower baseline planned PA (BLI) were associated with greater improvements in planned PA post-intervention ($r=-0.42$, $p=0.004$; $r=-0.79$, $p < 0.001$). Lower baseline ESE was associated with greater improvements in self-efficacy ($r=-0.63$, $p < 0.001$). Non-White participants improved more than White participants on planned PA post-intervention ($p=0.009$). Sex and H&Y were not associated with intervention outcomes.

Conclusions: PwP who were younger, had lower baseline PA and ESE, and who were non-White received more benefits from a PA coaching program than their counterparts.

Clinical Relevance: Findings facilitate individualized rehabilitation and demonstrate how telehealth PA coaching could increase PA and bridge the gap in health disparities in PwP.

Environment has an impact on Stroke Survivor Gait Speed and Endurance Outcome Measures

Authors:

Kari Dunning, PT, PhD, University of Cincinnati
Valerie Hill, OTR/L, PhD, University of Cincinnati
Pierce Boyne, PT, PhD, University of Cincinnati

Abstract:

Purpose/Hypothesis: To examine the influence of the home environment of stroke survivors on standardized gait tests. We hypothesized that the walking environment (home versus laboratory) would influence stroke survivor gait speed and distance.

Participants: Individuals (n=18) \geq six months post stroke with minority or lower socioeconomic status were participants in a larger NIMHD-funded pilot study investigating a lifestyle intervention. Mean comfortable gait speed (CGS) during lab 10 meter walk test (10mWT) was 0.61m/s

Methods: Paired tests compared gait measures between the laboratory and the participant's home including the 10mWT, 5 meter walk test (5mWT), 2 minute walk test (2MWT), and 6 minute walk test (6MWT). Fast gait speed (FGS) and CGS were measured.

Results: Several gait speed measures were significantly different ($p < 0.05$), indicating slower walking at home versus laboratory. Mean difference (laboratory versus home) and p-values were as follows: 10mWT CGS 0.05m/s ($p=0.04$), 10mWT FGS 0.04m/s ($p=0.04$), 5mWT CGS 0.04m/s ($p=0.12$), 5mWT FGS 0.10m/s ($p=0.02$), 2MWT 3.73 ($p=0.16$), 6MWT 8.67m ($p=0.10$).

Conclusions: Environment seems to have an impact on gait speed testing. Further study to determine the impact of possible reasons (e.g. number of turns, surface changes) is needed.

Clinical Relevance: Clinicians and researchers should be aware of the impact of environment on gait tests.

Epidural Stimulation Facilitates Volitional Lower Extremity Movement in Patients With Spinal Cord Injury: Systematic Review

Authors:

Becky Schoeneberg, PT, DPT Southwest Baptist University Bolivar, MO

Kevin Hodgson, SPT Southwest Baptist University Bolivar, MO

Kristin Richardson, SPT Southwest Baptist University Bolivar, MO

Keith Smith, SPT Southwest Baptist University Bolivar, MO

Abstract:

Purpose/Hypothesis: Spinal cord epidural stimulation (scES) is an emerging area of research in people with spinal cord injury (PWSCI). The purpose of this systematic review was to examine the evidence and evaluate the effectiveness of scES on lower extremity function in patients with motor complete (ASIA A and ASIA B) SCI.

Participant(s): Ten subjects, six with ASIA A and four with ASIA B SCI were included. Both thoracic and cervical level lesions were represented. All had chronic SCI ranging from 2.2 years to 4.2 years post injury.

Methods: Relevant databases were systematically searched, with 1,280 articles screened. Nine met inclusion criteria and were analyzed using the AACPDm methodology.

Results: The included studies were level IV case series (1-4) or level V case studies (5-9). Four main outcomes were reported: standing (3-6), voluntary lower extremity movement (1,7), stepping/walking (2,8), and exoskeleton assisted walking (EAW) (9). In all nine studies, subjects progressed from no lower extremity volitional control or function to volitional movements and/or function with the use of scES.

Conclusions/Clinical Relevance: This review suggests that scES, when combined with PT, is a promising intervention that may help restore movement and function for PWSCI. Improvements below the level of lesion are possible using scES. This intervention is currently only approved by the FDA for clinical trials. Therefore, it is critical that PTs stay abreast of advances in this area of research. PTs are in a prime position to redefine SCI rehabilitation by incorporating this revolutionary intervention into clinical practice in the future.

Feasibility of Incorporating Heart Rate Sensors During Online Exercise for People with Parkinson Disease

Authors:

Amy Yorke, PT, PhD; Board Certified in Neurologic Physical Therapy. University of Michigan-Flint, Flint, MI.

Leslie Smith, PT, DPT; Board Certified in Cardiopulmonary Physical Therapy. University of Michigan-Flint, Flint, MI.

Kimberly Krakosky, BS, SPT. University of Michigan-Flint, Flint, MI.

Elizabeth Glasco, BS, SPT. University of Michigan-Flint, Flint, MI.

Miriam Rafferty, PT, DPT, PhD. Shirley Ryan AbilityLab and Northwestern University. Chicago, IL.

Abstract:

Purpose/Hypothesis: Exercise is essential for successful disease management in people with Parkinson disease (PwPD). In the research setting, high intensity aerobic exercise has been shown to improve motor function in PwPD, while being safe and feasible. Intensity of aerobic exercise can be measured through wearable technologies such as a heart rate sensor (HRS). A gap exists in describing if PwPD can successfully learn to utilize a HRS to monitor their cardiovascular response in an online exercise class.

Objectives: Characterize the feasibility of incorporating HRS in PwPD who participate in a weekly high intensity online exercise class.

Participants: Convenience sample of 10 PwPD (6 males, 4 females; average age 65.7 years)

Methods: All visits, including testing and intervention, were completed remotely using a video conference system. Pre/posttest measurements of physical performance, activity level, and usability of HRS pre and post intervention have/will be completed. Primary outcome measures include attendance and use of HRS. An educational session followed by eight, one hour online exercise sessions were scheduled.

Results: Average 5TSTS pretest was 9.7 secs. At time of submission, 7/8 exercise sessions have been completed with > 90% attendance and successful use of HRS.

Conclusions: Preliminary results demonstrate that PwPD can successfully utilize HRS during an online exercise class to monitor intensity. Suggested adaptation to improve success of HRS include pre-training sessions, peer mentoring, and troubleshooting guidelines.

Clinical Relevance: Wearable technologies may be implemented into an online group exercise class for PwPD in order to monitor intensity of exercise.

Feasibility of Therapeutic Yoga for Inpatient Stroke Participants

Authors:

Luke Johnson DPT, NCS, Johns Hopkins Specialty Hospital
Kristie Weinberger CTRS, RYT, Johns Hopkins Specialty Hospital
Rebecca Aclin CTRS, RYT, Johns Hopkins Specialty Hospital
Matthew Babunovic DPT, NCS, Johns Hopkins Specialty Hospital

Abstract:

Purpose: To conduct a quantitative, retrospective study on the feasibility of Therapeutic Yoga (TY) for patients with subacute stroke, in the inpatient setting (IRF). Participants: IRF, adult stroke survivors who were ambulatory at baseline. Participants referred to the program by their Physical/Occupational Therapist, with complete pre-post data recorded.

Methods: All stroke patients at our facility have the Berg Balance Scale (BBS) administered at admission/discharge, and TY participants are administered the Activities-specific Balance Confidence Scale (ABC-scale) by a Recreation Therapist (TR). (1) After referral, patients are assigned a TR certified in adaptive yoga. Sessions are 30 minutes and typically 5x/wk. Meaningful participation in TY was at least 3 sessions.

Results: Data collected so far (n=13) show that 76% of participants demonstrate measurable (>1 MDC) improvement in BBS or ABC-scale scores. We expect at least 45 total participants, completing data collection and analysis by 6/2021.

Conclusions: TY appears to be a feasible intervention to administer in a multi-disciplinary fashion in the inpatient rehabilitation environment for stroke survivors. The majority of participants demonstrate measurable and clinically significant improvements in chosen balance and balance-confidence measures.

Clinical Relevance: There are multiple pilot and feasibility studies exploring the use of TY in adults with neuromuscular conditions (1). Yoga as a balance or psychological intervention has been explored in brain injury (2), as well as TBI (3) and stroke (4,5). There continues to be insufficient evidence supporting this as an effective treatment across various community settings, and no quantitative literature exploring its use in the IRF setting.

Functional Intermuscular Reduction in Spasticity in Multiple Sclerosis (MS-FIRSt)

Authors:

BJ Miller DPT, NCS1, SA James PT, PhD1, and TH Kolobe PT, PhD, FAPTA1

1Department of Rehabilitation Sciences, University of Oklahoma Health Sciences

Abstract:

Background: Multiple Sclerosis (MS) is a debilitating progressive condition affecting young adults. Altered gait, resulting from spasticity, is the signature impairment impacting walking in 85% of people with MS.

Purpose/Hypothesis: IMES followed by TM+FES will decrease spasticity and improve strength, as demonstrated by increases in the number of toe taps and heel raises, increase gait speed and endurance.

Participants: Sixteen adults, ages 18-64 years, who were diagnosed with MS, exhibited spasticity of one lower extremity.

Methods: Using a pre-post experimental design, we implemented a combination of IMES, followed by TM+FES for 6 weeks. Spasticity was measured using the Modified Ashworth Scale (MAS), strength with the number of toe taps and heel raises. Functional outcome measures included the six-minute walk test (6MWT), the 25-foot walk test (25FWT), and the Modified Fatigue Impact Scale (MFIS).

Results: MAS scores decreased ($p=0.0011$). Toe taps ($p=0.0123$) and heel raises ($p=0.0067$) increased. The mean scores for the 6MWT increased 39.7 feet ($p < 0.0001$) and the 25FWT decreased 1.2 seconds ($p=0.001$). The MFIS mean score decreased, however it was not statistically significant ($p=0.1301$).

Discussion/ Conclusion: Results of this novel combination protocol may be a viable intervention to decrease spasticity, increase strength, and improve walking in individuals with MS. Although changes in fatigue were not statistically significant, the positive trend may suggest a latent response in fatigue due to changes in spasticity and strength.

Clinical Relevance: This study is the first to use a combination of IMES and FES to combat the elusive problem of spasticity in people with MS.

Geographic Disparities in Access to Outpatient Stroke Rehab Clinics in Southeast Rural Texas

Authors:

Susan Dixon Doherty DPTa, Dorothea Parker RNA, Kalyani Sonawane PhD^b, Joseph Wozny MPH^a, Trudy Krause, DrPH^c,

Cecilia Ganduglia-Cazban DrPH^c, Nicholas Hoang, Susan Varghese, Sean I Savitz MD^a

^a Department of Neurology and Institute for Stroke and Cerebrovascular Disease. The University of Texas Health Science Center at Houston

^b Clinical Analytics & Decision Science Lab. The University of Texas Health Science Center at Houston

^c School of Public Health. The University of Texas Health Science Center at Houston

Abstract:

Purpose: Outpatient stroke rehabilitation centers (OSRC) play a vital role in providing post-discharge care essential for stroke survivors' optimum recovery. However, with the ongoing pandemic, reduced access to OSRC has become a serious concern, particularly for stroke survivors residing in micropolitan and non-core rural counties in southeastern Texas.

Method: We identified OSRC in rural southeast Texas by performing an internet search. A telephonic survey was administered to collect data on OSRC. Estimated stroke incidence and discharge status were extracted from claims databases. Google maps determined travel distance and time. Descriptive statistics were used to examine and compare the characteristics of rural counties. Analyses were performed using SAS® 9.2.

Results: We surveyed 65 OSRC from a total of 42 rural (12 micropolitan and 30 non-core) southeast Texas counties (Figure 1). Over 50% non-core counties had no access to OSRC; number of centers per 1000 stroke patients was 4.7 (non-core) versus 11.0 (micropolitan) (P=0.01) (Table 1). Compared to micropolitan areas, fewer centers in non-core rural areas offered physical therapy, occupational therapy, speech-language therapy. Telerehabilitation is far less available in rural non-core counties than micropolitan counties. Survivors from non-core counties need to travel twice the distance to access OSRC. Stroke incidence, however, remains high in non-core vs micropolitan areas.

Conclusion: Non-core rural counties in southeast Texas have inferior access to OSRC despite a high need for post-stroke care. During the pandemic when patients remain at home, efforts such as telerehabilitation might improve access to these critical services to improve rural stroke survivor outcomes.

Head and Trunk instability in Patients Before and After Vestibular Schwannoma Resection

Authors:

Angela Weston, DPT, Department of Physical Therapy and Athletic Training, University of Utah, Salt Lake City, UT

Annie Fangman, DPT, Department of Physical Therapy and Athletic Training, University of Utah, Salt Lake City, UT

Carolyn Taylor, MS, Department of Biomedical Engineering, University of Utah, Salt Lake City, UT

Lindsey Agnew, Department of Physical Therapy and Athletic Training, University of Utah, Salt Lake City, UT

Mark Lester, PhD, Department of Physical Therapy, College of Health Professions, Texas State University, San Marcos, TX

Carrie Hoppes, PhD, U.S. Army Medical Center of Excellence, Army-Baylor University Doctoral Program in Physical Therapy, San Antonio, TX

Lee Dibble PhD, Department of Physical Therapy and Athletic Training, University of Utah, Salt Lake City, UT

Brian J Loyd, PhD, Department of Physical Therapy and Rehabilitation Sciences, University of Montana, Missoula, MT

Abstract:

Background and Purpose: People with vestibular dysfunction rely on visual compensation to maintain postural control. However, it is unknown if the ability for visual compensation to overcome vestibular deficits remains in the acute period following resection of eighth cranial nerve schwannoma. Therefore, we examined head and trunk control during dynamic gait in individuals prior to and following surgery.

Methods: 7 patients diagnosed with vestibular schwannoma (age=36.86+/-10.94) were assessed before and within 2 weeks following schwannoma resection. The primary outcome was the linear variability of head and trunk accelerations during self-selected walking over a 20-foot path while wearing inertial measurement units (IMUs) on the head and sternum. Variability was quantified by calculating the Root Mean Square of accelerometer signals from the head and trunk IMUs and was calculated in the anteroposterior, mediolateral, and craniocaudal directions and normalized to walking speed. Wilcoxon signed-rank tests were used to examine differences between assessments.

Results: RMS in the craniocaudal direction significantly increased from pre to post-op ($p=0.03$) at the head and trunk. RMS values increased in the mediolateral and anteroposterior direction at the head and trunk from pre to post-surgery, but were not significant.

Conclusions: Only craniocaudal head stability during walking demonstrated significant increases after surgery. The paucity of significant changes may be a result of pre-surgical deficits resulting in visual compensation that remains after surgery.

Clinical Relevance: Head and trunk control deficits may be present both before and following vestibular schwannoma resection, but future work must be done to further quantify these deficits.

Head stability during gait in people with Multiple Sclerosis

Authors:

Cielita, Lopez-Lennon, PT, DPT, Department of Physical Therapy and Athletic Training, University of Utah
Carolyn, Taylor, MS, Department of Biomechanical Engineering, University of Utah

Annie, Fangman, PT, DPT, Department of Physical Therapy and Athletic Training, University of Utah

Robison, Isabeau, SPT, Department of Physical Therapy and Athletic Training, University of Utah

Lindsey, Agnew, BS, Department of Physical Therapy and Athletic Training, University of Utah

Lee, Dibble, PT, PhD, ATC, FAPTA, Department of Physical Therapy and Athletic Training, University of Utah

Brian, Loyd PT, DPT, PhD, Department of Physical Therapy and Rehabilitation Sciences, University of Montana

Abstract:

Recent research suggests that MS-related demyelination can damage CNS vestibular centers and create gaze and postural (head/body) stability deficits. To examine the potential consequences of such deficits, the effects of visual input on head stability in people with MS during gait tasks were examined. We hypothesized that people with MS (PwMS) would be more reliant on visual input to control head linear accelerations compared to healthy controls.

Participants: 25 PwMS (mean(SD):EDSS=3.67(.99), age=51(13.29); 28% female) and 10 controls (age=37.8(12.36); 50% female).

Methods: Participants walked forward at a self-selected pace along a level walkway in vision present and absent conditions. In both conditions, they wore wireless inertial measurement units on their forehead. Accelerometer data from the head sensor was processed using a custom MATLAB algorithm to produce root mean square (RMS) variability measures of linear accelerations in the cranio-caudal, medio-lateral and anterior-posterior directions for both visual conditions. These RMS values were then normalized to gait speed during the associated trial and separate linear mixed models were used to examine the effect of group, condition, group by condition ($p < 0.05$)

Results: Significant group by condition effects (PwMS:vision absent) were found in the cranio-caudal ($\beta=12.24; P < .001$) medio-lateral ($\beta=1.67; P < .001$) anterior-posterior ($\beta=2.46; P < .003$) directions.

Conclusion: PwMS appear more dependent on visual input for head stabilization during gait than healthy controls.

Clinical Relevance: Increased variability during vision absent conditions in PwMS suggests deficits in the integration of vestibular input for head stabilization. Rehabilitation targeted at vestibular sensory integration may improve head and body stability during gait.

Head-Mounted Display Training of Sensory Integration in a Functional Context for Patients with Vestibular Disorders

Authors:

Anat V. Lubetzky, PT, PhD, CSCS, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Jennifer Kelly, PT, DPT, NCS, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Zhu Wang, MS, Future Reality Lab, Department of Computer Science, Courant Institute of Mathematical Sciences, New York University, New York, NY, USA

Marta Gospodarek, MA, Department of Music and Performing Arts Professions, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Gene Fu, PT, DPT, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Santosh Krishnamoorthy, PT, DPT, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Laura Lei-Rivera, PT, DPT, GCS, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

John Sutera, PT, DPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA; Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Bryan D. Hujsak, PT, DPT, NCS, MBA, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Abstract: Purpose: Virtual reality (VR) interventions can simulate real-world environments.[1–3] The purpose of this study was to test the feasibility of a VR application developed for a Head Mounted Display (HMD) to target dizziness and sensory integration in a functional context for patients with vestibular disorders.

Participants: Clinicians at Mount Sinai Vestibular Rehabilitation enrolled 28 patients with central and peripheral vestibular disorders, 15 completed the study.

Methods: The application includes a virtual street, airport, subway and park.[4] The clinician controls the sensory load, e.g., direction, amount and speed of objects. We recorded the Visual Vertigo Analog Scale (VVAS)[5], Dizziness Handicap Inventory (DHI), Activities-Specific Balance Confidence Scale (ABC), 8-foot up and go (8FUG) and Four-Step Square Test (FSST) before and after the intervention.

Results: Twelve patients with peripheral hypofunction improved significantly on VVAS ($P=0.02$), DHI ($P=0.008$), and ABC ($P=0.02$), and a small significant improvement on the FSST (1.69 seconds on average, $P=0.015$) with no change in 8FUG. Two patients with mTBI improved on the VVAS. One patient improved on the DHI (by 20 points) and the ABC (by 30%) and the other did not change. The patient with vestibular migraine had worse VVAS (by 10 points), and similar DHI and ABC.

Conclusions: The application was found to be feasible, no adverse events were reported and self-reported improvement was noted in the majority of participants. Effectiveness needs to be tested in future randomized trials.

Clinical Relevance: HMD training within increasingly complex immersive environments appears to be a promising adjunct modality for vestibular rehabilitation.

High Intensity Gait Training in Client with Sub-Acute Paraplegia Following Aortic Dissection: A Case Study

Authors:

Carrie Rowlett, PT, DPT, NCS

Kristen Cezat, PT, DPT, NCS, ATP/SMS

Christina Voigtmann, PT, DPT, NCS

Abstract:

Background/purpose: Investigate feasibility/barriers of High Intensity Gait Training (HIGT) for a client with spinal cord injury resulting from aortic dissection.

Case Description: A 52 y/o male presented to physical therapy with Type 1 Aortic Dissection resulting in incomplete paraplegia from T5-L1 ischemia and post-operative AV block requiring pacemaker placement. Precautions included: sternal, pacemaker, and systolic blood pressure < 150mmHg.

Initial assessment: full-time wheelchair user, dependent mobility.
Seventeen HIGT sessions completed in conjunction with usual care from weeks 3 – 10 following onset.

Interventions: body weight support treadmill, robot assisted gait training, and variable stepping practice. Vitals, Borg Rating of Perceived Exertion Scale, and physical response were monitored throughout intervention. PTs and physicians collaborated to establish exercise parameters.

Outcomes: Results admission to discharge: 10MWT: 0 m/s to 0.23 m/s, 6MWT: 0m to 48m, WISCI II level: 0/20 to 6/20, and ASIA Impairment Scale classification of T8 AIS C to T8 AIS D. Discharge function: household ambulator with rolling walker, AFOs, and steadying assistance. Barriers to HIGT: fatigue, surgical precautions, orthostatic hypotension initially, and hypertension in later weeks. No adverse effects occurred.

Discussion: MDC/MCID was met for all outcomes. These results warrant further research and suggest that HIGT not be excluded based solely on cardiac co-morbidities in the sub-acute phase. Collaboration between the PTs and physicians afforded this client with a complex cardiac history to safely participate in HIGT.

Clinical Relevance: With proper consultation and vitals monitoring, HIGT may be feasible and safe in medically complex patients that may have previously been precluded.

High Intensity Gait Training in Sub-Acute Transverse Myelitis: A Case Study

Authors:

1. Kristen Cezat, PT, DPT, NCS, ATP/SMS, Orlando Health ORMC Institute for Advanced Rehabilitation
2. Christina Voigtmann, PT, DPT, NCS, Orlando Health ORMC Institute for Advanced Rehabilitation
3. Anna Dawson, PTA, CBIS, CLT-LANA Orlando Health ORMC Institute for Advanced Rehabilitation

Abstract:

Background/purpose: Investigate feasibility and barriers of High Intensity Gait Training (HIGT) for a client with spinal cord injury (SCI) resulting from Transverse Myelitis (TM).

Case Description: A 68 year-old-male presented to inpatient rehab facility following TM. MRI revealed spinal cord inflammation from T7-conus resulting in T6 AIS D SCI.

Function at admission: non-functional ambulator requiring full time wheelchair use. Fifteen HIGT sessions were completed in conjunction with usual care during 20-day length of stay. HIGT aimed to achieve up to 85% of heart rate max via treadmill training with and without body weight support, robotic-assisted gait training, and variable stepping practice. Intensity measured via vital signs, continuous heart rate monitoring, and Borg Rating of Perceived Exertion Scale. Assessed response to intervention daily. Ten Meter Walk Test (10MWT), Walking Index for Spinal Cord Injury II (WISCI II), and ASIA were used as pre and post outcome measures.

Outcomes: MCID doubled for 10MWT and tripled for WISCI II. Function at discharge: Improved to a limited community ambulator with rolling walker and AFOs. Barriers to HIGT: fatigue.

Discussion: TM is a rare disorder resulting in SCI with traditional PT interventions focused on function and energy conservation. Limited evidence is available regarding HIGT in TM.

Clinical Relevance: HIGT intervention was safely performed in this case of TM. No adverse effects were encountered. No functional declines were experienced. The authors found HIGT to be both feasible and beneficial. HIGT should not be excluded based solely on concerns of fatigue following TM.

High Intensity Gait Training Interventions for an Individual Who Is Non-Ambulatory After Acute Stroke

Author:

Elizabeth Marcy, PT, DPT, NCS, MossRehab

Abstract:

Background: The Locomotor Clinical Practice Guideline (CPG) recommends high intensity gait training (HIGT) to improve walking outcomes for ambulatory individuals with chronic stroke. The purpose of this case study was to determine if HIGT could be achieved using body weight support treadmill training (BWSTT) and a robotic exoskeleton (EKSO) for an individual who was non-ambulatory after acute stroke.

Case Description: A 63-year-old woman who was non-ambulatory after stroke presented to acute inpatient rehab. The BERG, Six Minute Walk Test (6 MWT), and 10 Meter Walk Test (10 MWT) outcome measures were recorded. A HIGT program was implemented to achieve 65-85% of her heart rate maximum and a BORG Rate of Perceived Exertion (RPE) greater than 13 out of 20 for at least 20 minutes 3 times per week using BWSTT and the EKSO.

Outcomes: A patient who was non-ambulatory after acute stroke participated in HIGT using BWSTT and the EKSO. She achieved the targeted heart rate and BORG RPE without adverse events. Outcome measure changes exceeded minimal detectable change values. At discharge, the patient was walking household distances with steadying assistance from a caregiver.

Discussion: There is strong evidence for HIGT after stroke but there are challenges to providing this intervention for patients with significant assistance needs. In this case example, BWSTT and EKSO interventions were used to achieve HIGT for the recommended duration and frequency.

Clinical Relevance: BWSTT and robotic-assisted gait training may be useful tools to provide HIGT for individuals who are non-ambulatory after acute stroke.

High Intensity Gait Training Post Covid-19 Diagnosis

Author:

Liam Barton, P.T., DPT, ATP/SMS

Abstract:

Background/Purpose: High intensity gait training (HIGT) has been shown to be an effective treatment to improve walking and balance outcomes. The purpose of this retrospective case report is to present outcomes following HIGT on a patient post COVID-19.

Case Description: A 66-year old male was diagnosed with COVID-19 and resultant pneumonia leading to respiratory failure requiring a hospitalization. Physical therapy evaluation revealed mild intention tremors in bilateral upper extremities and decreased sensation in right foot. Patient required use of an ankle foot orthosis due to foot drop. Patient participated in HIGT for 4 of his 9 days each session lasting between 30-60 minutes. Patient was educated on the Borg scale and target heart rate training zone of 65-85% of heart rate maximum. During HIGT oxygen remained predominantly at 92% or above but did briefly drop below 92% to 83% during HIGT.

Outcomes: Six-minute walk test improved from 316 m to 381 m. Five-time Sit To-Stand improved from 21.21 seconds to 14.85 seconds. Dynamic gait index improved from 11/24 to 20/24. Functional gait assessment improved from 8/30 to 18/30. Two-minute step test improved from 43 to 64. Short Physical Performance Battery improved from 9/12 to 10/12. Berg Balance test improved from 41 to 54.

Discussion: HIGT is believed to have been crucial in the patient's endurance and functional progress. Constant heart rate and oxygen saturation monitoring ensured patient remained safe throughout HIGT. Despite gains age-matched norms were not obtained by discharge.

Clinical Relevance: HIGT was safe and effective post COVID-19 diagnosis

How practice consistency impacts repetition-based learning

Authors:

Jonathan Wood, PT DPT NCS, University of Delaware

Susanne Morton, PT PhD, University of Delaware

Hyosub Kim, PT DPT PhD, University of Delaware

Abstract:

Purpose/Hypothesis: “Repetition matters” is a fundamental tenet of neuroplasticity. Yet it is not clear how similar movement patterns must be to engage this “use-dependent” learning process. We compared two competing hypotheses from the use-dependent learning literature, each predicting different amounts of dependence on practice consistency.

Participant(s): Fifteen young healthy individuals between the ages of 18-40.

Methods: Participants completed three sessions of treadmill walking, each including Baseline, Learning, and Washout phases. During the Learning phase, visual feedback provided participants with step length targets to encourage walking with a novel step length asymmetry. We manipulated the consistency of this asymmetry by moving the target locations with increasingly greater variability across the Constant, Low Variability, and High Variability sessions, respectively, while keeping the average amount of asymmetry the same. Session order was counterbalanced. Our measure of use-dependent learning was the amount of implicit asymmetry (bias in the practiced direction) remaining during Washout, when participants were asked to return to normal walking without visual feedback. We focused our analyses on the Initial Bias (mean asymmetry of the first 5 strides of Washout) and the Early Bias (strides 6 to 30 of Washout).

Results: Initial Bias increased with greater practice consistency. However, practice consistency did not have a significant impact on Early Bias.

Conclusions: Consistency of practice is necessary to optimize repetition-based learning of asymmetries during walking. However, this effect is not sustained during the remaining Washout phase.

Clinical Relevance: Clinicians should focus on practice consistency when using repetition to improve walking patterns.

Hybrid combination of clinical mobility test items for evaluating individuals with mild traumatic brain injury

Authors:

Patrick Michielutti PT, DPT, OCS, Courage Kenny Research Center-Allina Health, Minneapolis, MN, USA

Peter Fino PhD, University of Utah, Salt Lake City, UT, USA

Margaret M. Weightman PT, PhD, Courage Kenny Research Center-Allina Health, Minneapolis, MN, USA (submitting)

Ryan Pelo PT, DPT, NCS, University of Utah, Salt Lake City, UT, USA

Lucy Parrington PhD, Oregon Health & Science University, Portland, OR, USA

Leland E. Dibble PT, PhD, University of Utah, Salt Lake City, UT, USA

Carrie Hoppes PT, PhD, OCS, NCS, Army-Baylor University DPT Program, Fort Sam Houston, TX, USA

Mark Lester PT, PhD, Texas State University, Round Rock, TX, USA

Laurie King PT, PhD, MCR, Oregon Health & Science University, Veterans Affairs Portland Health Care System, Portland, OR, USA

Abstract:

Purpose: The Functional Gait Assessment (FGA) and High Level Mobility and Assessment Tool (HiMAT) are clinical batteries frequently used to assess people with mild traumatic brain injury (mTBI) despite not being developed for this population. The FGA was developed for individuals with vestibular impairments, and the HiMAT for individuals with more severe TBI. These batteries can be time consuming and may have items not useful in individuals with mTBI. The purpose of this study was to determine which combination of FGA and HiMAT items best discriminated persons with persistent mTBI from controls.

Participants: Fifty-three symptomatic individuals with mTBI (21% male, age 31(9.5) years, 328 (267) days since injury) and 57 healthy adults (28% male, age 32(9.6) years) participated across 3 sites.

Methods: The FGA and HiMAT were evaluated in one session as part of a larger study. Backward logistic regression was used to select the optimal combination of FGA and HiMAT items and the area under the receiver operator curve (AUC) was calculated.

Results: The AUCs for FGA and HiMAT total scores were 0.68 (C.I. 95%=0.58-0.78) and 0.65 (C.I. 95%=0.54-0.75), respectively. Backward stepwise regression selected four items: FGA walk with horizontal head turns, HiMAT walk forward, HiMAT walk backward, and HiMAT walk over obstacle, and yielded an AUC of 0.75 (C.I.95%=0.66-0.84).

Conclusions/Clinical Relevance: A four item subset of FGA and HiMAT items improves classification and provides initial evidence for components of a reduced item, hybrid mobility assessment for evaluating individuals with mTBI.

Implementation of high intensity stepping training in early post-stroke during inpatient rehabilitation: a case series

Authors:

- Abbey Plawecki, PT, Rehabilitation Hospital of Indiana, Indianapolis, IN
- Christopher E. Henderson, PhD, DPT, Rehabilitation Hospital of Indiana, Indianapolis, IN, Department of Physical Medicine and Rehabilitation, Indiana University School of Medicine, Indianapolis IN
- Jennifer K. Lotter, DPT, Rehabilitation Hospital of Indiana, Indianapolis, IN
- Molly E. Scofield, DPT, Rehabilitation Hospital of Indiana, Indianapolis, IN
- Emily Lucas, BS, Rehabilitation Hospital of Indiana, Indianapolis, IN
- Michael Flores, DPT, James A. Haley Veterans Hospital, Tampa, FL
- T. George Hornby, PhD, DPT, Rehabilitation Hospital of Indiana, Indianapolis, IN, Department of Physical Medicine and Rehabilitation, Indiana University School of Medicine, Indianapolis IN

Abstract:

Background/Purpose: Previous data suggest high-intensity gait training (HIT) may improve locomotor function and facilitate home discharge. Clinical implementation of HIT early post-stroke can be difficult due to medical, motor and cognitive deficits. The purpose of this case series is to detail the feasibility and decision-making processes to deliver HIT early post-stroke during inpatient rehabilitation.

Case Descriptions: Four participants < 3 months post-stroke with severe to moderate motor impairments are presented. Attempts to maximize stepping at < 85% heart rate (HR) max were performed with HRs and steps/day documented. Outcomes included the 10MWT, 6MWT, BBS, and FIM. Interventions were altered due to specific barriers and facilitators.

Outcomes: 3/4 patients presented with BBS < 5, with one exhibiting contraversive pushing. All required total to moderate assistance to ambulate but were able to achieve 1579±979 steps/day with 55% of sessions performing HIT. Specific facilitators included equipment to facilitate stepping activity, availability of clinical aides, and organizational support. Barriers included difficulty achieving higher HRs in more impaired patients. Gains in BBS (16±14), 10MWT (0.24±0.24 m/s), and 6MWT (106±129 m) were observed. Three required no more than minimum assistance at discharge, including resolution of contraversive pushing and most discharged home.

Discussion: HIT was possible and tolerated by participants within the first 3 months post-stroke in inpatient rehabilitation with gains in walking and non-walking outcomes achieved. These interventions are difficult to deliver in patients with greater impairments, although specific facilitators enhanced delivery of HIT.

Clinical Relevance: HIT can be implemented early post stroke in inpatient rehabilitation.

Implementation of the Core Outcome Measures CPG: Assessing the Know-Do Gap

Authors:

Suzanne Trojanowski, PT, DPT; Board Certified in Neurologic Physical Therapy. University of Michigan-Flint, Flint MI.

Nora Fritz, PT, DPT, NCS, PhD; Board Certified in Neurologic Physical Therapy. Wayne State University, Detroit, MI.

Meghan Malley, PT, DPT; The Recovery Project

Cheris Grasse PT, MPT; The Recovery Project

Emilee Bohde, PT, DPT; The Recovery Project

Amanda Woodruff BS, SPT. University of Michigan-Flint, Flint, MI

Emily Hein BS, DPT. University of Michigan-Flint, Flint, MI.

Amy Yorke, PT, PhD; Board Certified in Neurologic Physical Therapy. University of Michigan-Flint, Flint MI.

Abstract:

Purpose: The Knowledge-to-Action (KTA) Cycle is an example of a knowledge translation framework. One of the first steps of the KTA Cycle is assessing the Know-Do Gap, the difference between research recommendations and clinical practice. The purpose of this study was to assess the Know-Do Gap of physical therapist use of the clinical practice guideline recommended core set of outcome measures (OMs) for neurologic conditions.

Participants: One neurologic outpatient physical therapy organization with three clinical sites.

Methods: Retrospective medical record review of initial evaluation and discharge documentation from a five month period (October 2019 - February 2020).

Results: 225 notes were reviewed (evaluation = 134; discharge = 91), performed by 19 physical therapists. 39 unique OMs were used during the 5 month reporting period. Results of the six core OMs were performed at the following frequencies: Six Minute Walk Test 82.2% (n = 185); Berg Balance Scale 43.1% (n = 97); 5 Times Sit-to-Stand 16.9% (n = 38); 10 meter Walk Test 14.7% (n = 33); Functional Gait Assessment 3.1% (n = 7); and the Activities-Specific Balance Confidence Scale 1.8% (n =4).

Conclusions: Implementation of the six core OMs in this outpatient physical therapy organization was variable. This assessment of the know-do gap is the first step in the KTA Cycle. Future steps include continuing to utilize the KTA Cycle to increase uptake of the core set of OMs.

Clinical Relevance: Outcome measure use is critical to assessing the effectiveness of rehabilitation interventions and to decrease unwanted variation in practice.

Implementing the Neuro Core Outcome Measures in Outpatient Rehabilitation: A Knowledge Translation Project

Authors:

Laura, Patrick, PT, DPT, NCS, AdventHealth Sports Med and Rehab Central Florida Division
Samantha Corkwell, PT, DPT, NCS, AdventHealth Sports Med and Rehab Central Florida Division

Abstract:

Purpose: Our goal in our outpatient hospital based was to reduce variability in outcomes to better assess change across clinics, populations, and aid in future knowledge translation projects through Core Outcomes CPG implementation

Participants: 16 physical therapists in a hospital-based outpatient rehabilitation system across 4 facilities

Methods: Knowledge to Action Cycle with assessment of the know/do gap, review of current literature, adapting to local context, Tailored KT interventions, Monitoring Knowledge Use, and now looking at Sustaining Practice. Goal for compliance: 90% at initial evaluation with use of at least 2 core outcomes, 1 core outcome assessed monthly, and repeated 2 at discharge.

Results: Q4 2018 initial audit: Initial evaluation: 34%. Monthly: 0% Discharge:28%
Q42020 Audit: Initial Evaluation: 98%. Monthly: 65%. Discharge: 100%

Conclusions and Clinical Relevance: We have not yet met our goal of 90% compliance for initial evaluation, monthly, and discharge but we have made a significant change in use of the core outcomes. Through used of the iterative knowledge to action cycle we have continued to improve our use quarterly by addressing barriers and continued focus on improving reliability both intra and inter. A planned knowledge translation cycle can be successful in implementing use of the core outcomes in an outpatient setting.

Knowledge Translation Frameworks Applied to Implement Person-Centered Care after Stroke

Authors:

Jillian MacDonald, PT, DPT, Shirley Ryan AbilityLab

Carolyn Sykes, PT, DPT, Shirley Ryan AbilityLab

Miriam Rafferty, PT, DPT, PhD, Shirley Ryan AbilityLab, Northwestern University

Abstract:

Purpose/Hypothesis: The purpose of this study is to demonstrate how using knowledge translation (KT) frameworks can improve adoption of person-centered care (PCC) for individuals post-stroke in one outpatient therapy department.

Participants: Administrative (patient service representatives, leaders) and clinical staff (physical therapists, speech therapists and occupational therapists) in one department.

Methods: A pre-implementation survey and a retrospective electronic medical record (EMR) review provided insight into knowledge, attitudes and behaviors. Frameworks applied were the Knowledge-to-Action Cycle, Consolidated Framework for Implementation Research (CFIR) and Expert Recommendations for Implementing Change (ERIC). A team, including a facilitator and champions, adapted and implemented strategies including: assessment of barriers and facilitators; education/training; EMR recommendations, and reminders. The RE-AIM (reach, adoption, effectiveness, implementation fidelity, maintenance) framework will be applied with pre- & post-survey data, EMR review, and staff engagement.

Results: The pre-test survey reached 39 of 52 potential team members. Initial survey revealed clinical staff felt confident engaging in PCC with a median rating of 75% (range= 20-100%), and the value placed on PCC was 90% (range= 70-100%). In pre-test EMR review, clinicians documented characteristics of PCC in the evaluation only 59% of the time (530/900 evaluations in a 1.5 year period). Post-test results will be completed in June 2021.

Conclusion: A need to provide targeted strategies to improve PCC delivery and documentation was identified in one outpatient department. Knowledge translation directed the implementation plan in this clinic environment.

Clinical Relevance: Use of KT to tailor strategies in an outpatient department can reach both clinical and administrative staff.

Knowledge Translation of the Core Outcomes CPG Across Physical Therapy (PT) Settings: A Collaborative Approach

Authors:

Alicia Esposito O'Hara, PT, DPT, Tufts University
Neurologic Certified Specialist
Gallo, Estelle, PT, DPT, NYU Langone Health
Neurologic Certified Specialist
Kedzierksa, Iwona, PT, MSPT, MA, NYU Langone Health
Neurologic Certified Specialist
Mia Palazzo, PT, DPT, NYU Langone Health

Abstract:

Purpose: The purpose is to utilize the Knowledge to Action (KTA) framework to implement the CPG, "A Core Set of Outcome Measures for Adults with Neurologic Conditions Undergoing Rehabilitation," across inpatient and outpatient PT settings. The goal is to achieve and maintain at least 90% adherence over a 2-year period.

Participants: Team includes content experts, Administrators and PTs providing services to patients with neurological conditions.

Methods: To identify the problem, a chart audit tool was created to capture baseline use of the core set. Baseline knowledge was captured via quizzes from learning modules provided by the ANPT Synapse Center with a cut off score set at 90%. To adapt knowledge, diagnoses were defined and action statement 9 was removed. A barriers/facilitators survey was distributed. Interventions included general education via asynchronous webinars and meetings with staff to discuss barriers. Additional interventions are currently being designed.

Results: 0% of charts were compliant (n=73). Across settings, the most prevalent barriers were time and environment. Facilitators included self-reported knowledge of core set. Average quiz score was 70% (n=120). Score details related to specific outcomes and settings to be provided in poster.

Conclusions: No charts were compliant and 21.7% of quizzes met cutoff threshold of 90% despite self-reported knowledge of the core set on surveys.

Clinical Relevance: Consistent and accurate utilization of outcomes across settings allows us to measure, track and build confidence in data collected. Sharing data allows staff, departments, the health system and the profession to generate knowledge rapidly and inform clinical decisions.

Large Scale Implementation of a Core Set of Outcome Measures is Possible

Authors:

Patricia L Scheets, PT, DPT MHS NCS, Vice President Quality & Clinical Outcomes, Infinity Rehab; Michael Billings, PT, DHSC, MS, CEEAA, Chief Strategy & Business Development Officer, Infinity Rehab; Patrick Hennessy, PT, MPT, NCS, Clinical Knowledge Broker, Infinity Rehab

Abstract:

Purpose/hypothesis: To implement a core set of standardized tests to: 1) measure single patient outcomes, 2) aggregate data for analysis, and 3) build the foundation for practice-based evidence study.

Participants: This project was initially implemented in 180 skilled nursing facilities (SNF) treating 15000 patients/year. 480 physical (PT) and 279 occupational (OT) clinicians completed the initial training over 4-months.

Design: Stakeholders from PT and OT determined constructs to measure and identified tests through evidence review. A set of tests was piloted and modified secondary to feasibility constraints. The final set was: Short Physical Performance Battery (SPPB), 6-minute Walk Test (6MWT), and grip strength (Grip). The St. Louis Mental Status Examination (SLUMS) was implemented to stratify patients. A data pipeline was established through electronic health record (EHR) customization, extraction and transformation rules, data warehouse creation, and dashboard visualization using PowerBI(TM) software. Clinical knowledge tools were developed. Operational and clinical incentives were aligned. Metric adherence to each required test was measured.

Results: Initial adherence was 38.3%, 28.4%, and 51.7% for SPPB, 6MWT, and Grip respectively. (Reporting for SLUMS was not available). Adherence improved over the following 11 months and stabilized at 70% (SPPB), 60% (6MWT), and 80% (Grip). Adherence targets were established at 70% for SPPB and 6MWT and 80% for Grip.

Conclusions: It is possible to implement and sustain collection of a core set of standardized tests on a large scale.

Clinical Relevance: When clinicians collect the same data on all patients, they use the data to inform their clinical decisions.

Limitations in volitional head movements during dynamic gait tasks following mild traumatic brain injury

Authors:

Leland E. Dibble PT, ATC, PhD, FAPTA, University of Utah, Salt Lake City, UT

Brian Loyd, PhD, PT, University of Montana, Missoula, MT

Carolyn Taylor, PhD(Cand), University of Utah, University of Utah, Salt Lake City, UT

Peter Fino PhD, University of Utah, Salt Lake City, UT

Maggie Weightman PT, PhD, Courage Kenny Research Center, Allina Health, Minneapolis MN

Ryan Pelo PT, DPT, NCS, University of Utah, Salt Lake City, UT

Lucy Parrington PhD, Oregon Health & Science University, Portland OR

Carrie Hoppes PT, PhD, OCS, NCS, Army-Baylor University Doctoral Program in Physical Therapy, For Sam Houston, TX

Mark Lester PT, PhD, Texas State University, Round Rock, TX

Laurie King PT, PhD, Oregon Health & Science University, Portland OR

Abstract:

Purpose/Hypothesis: Individuals with mild traumatic brain injury (mTBI), may complain of dizziness and imbalance during gait tasks, particularly those requiring head motions. In this study examining volitional head motion during a clinical gait assessment, we hypothesized that individuals with mTBI would demonstrate reduced speed and amplitude of head rotation when combining head motions with gait.

Methods: Thirty-eight adults with mTBI [mean (SD) age = 33.14 (9.52) years, time since injury = 341 (298) days] and 44 age and sex matched healthy adults [31.91 (9.84) years] from two sites consented to participate in this IRB-approved study. Participants completed item 3 (Horizontal head turns during walking) and 4 (Vertical head nods during walking) of the Functional Gait Assessment (FGA) while wearing inertial measurement units on their forehead. Primary outcomes were mean peak angular amplitude and speed of yaw (FGA3) and pitch plane (FGA4) head movements. Between-group differences were tested using independent sample t-tests ($p < 0.05$).

Results: Individuals with mTBI demonstrated smaller and slower yaw rotation (FGA3: amplitude = 109.1(21.1) deg ;speed = 353.8(119.4) deg/s) and slower pitch plane rotation (FGA 4;speed = 240.8(73.0) deg/sec) compared to healthy controls (FGA3 amplitude =119.7(17.8) deg ;speed = 409.1(125.9) deg/s; FGA 4 speed = 268.5(78.3) deg/s)

Conclusions: Individuals with mTBI exhibited reduced head motion during dynamic gait tasks compared with healthy adults during a commonly administered evaluation of dynamic gait.

Clinical Relevance: Constraints on head motion persist following mTBI, future research should explore if rehabilitation can influence recovery of head-trunk coordination during daily life.

Mini Balance Evaluation Systems Test: balance deficits by domain after mild traumatic brain injury

Authors:

Kathleen T Scanlan PT, DPT, NCS - Oregon Health and Science University, Portland, Oregon
Jennifer Wilhelm PT, DPT, NCS - Oregon Health and Science University, Portland, Oregon
Natalie Pettigrew PT, DPT – Center for Regenerative Medicine, Oregon Health and Science University, Portland, Oregon
Akira Neilsen PT, DPT - Oregon Health and Science University, Portland, Oregon
Lucy Parrington, Ph.D. - Oregon Health and Science University, Portland, Oregon
Laurie A. King, PT, MCR, Ph.D. - Oregon Health and Science University, Portland, Oregon

Abstract:

Purpose: Balance abnormalities are common during the subacute period following mild traumatic brain injury (mTBI). The Balance Error Scoring System (BESS) is most often used to assess static stability under different sensory conditions. Comparatively, the Mini Balance Evaluation Systems Test (mini-BESTest) is a validated balance test that measures balance by including multiple domains: anticipatory postural adjustments (APA), reactive postural control (RPC), sensory orientation (SO), and dynamic gait (DG). The purpose of this report was to compare mini-BESTest balance domains after mTBI (< 3 months) with healthy controls (HC).

Participants/ Methods: Participants (n=94 mTBI, 18% male, age=33.8±12.0, 50.4±22.4 days since injury and n=38 HC, 24% male, age=37.6±13.5) completed the mini-BESTest. Between-group differences were evaluated using Mann-Whitney U tests.

Results: The mTBI group (Mdn[*min-max*], 24[18-28]) had a significantly worse mini-BESTest total score than HC (26[23-28], $z=-3.681$, $p < 0.001$). The mTBI group performed significantly worse in 3 of the 4 balance domains compared to the HC: RPC 5[2-6] vs 6[3-6], $z=-2.098$, $p=0.036$; SO: 6[5-6] vs 6[6-6], $z=-2.296$, $p=0.022$; DG: 8[6-10] vs 9[8-10], $z=-4.845$, $p < 0.001$. There was no significance between groups in the APA domain (5[3-6] vs 5[3-6]; $z=-0.319$, $p=0.750$).

Conclusions: The mini-BESTest identified deficits in people with subacute mTBI in total score and 3 out of 4 domains, suggesting it may be helpful to use in the clinic to identify balance domain deficits in the subacute mTBI population. Research into sensitivity and specificity is warranted.

Clinical Relevance: The mini-BESTest is a clinical test that may identify balance domain deficits in the subacute mTBI population.

MS & Social/Emotional Aspects of Quality of Life: What's Grit Got to Do with It?

Authors:

Susan G. Klappa PT, MPT, PhD, MA University of North Georgia

Kelli Block SPT University of North Georgia

Taylor Grant SPT University of North Georgia

Abstract:

Purpose/Hypothesis: Grit is defined as perseverance and passion for long-term goals. A diagnosis of multiple sclerosis (MS) can be a challenging event influencing quality of life (QOL). We hypothesize individuals diagnosed with MS with higher grit scores will have higher social and emotional function after receiving their diagnosis. The purpose of this study was to investigate how grit levels may influence quality of life among individuals diagnosed with MS.

Participants: 51 individuals diagnosed with MS.

Methods: Mixed methods (survey and phenomenological interviews) were used to answer questions regarding grit and QOL among individuals with MS.

Results: Among participants diagnosed with MS (n=51), grit values averaged 3.77 ± 0.47 . Grit was positively correlated to QOL per total SF-36 score ($r = +.330$, $p = 0.05$). Emotional coping with problems and grit were positively correlated ($r = +.476$, $p < 0.001$). Grit and emotional wellbeing were positively correlated ($r = .542$, $p < .001$). Finally, social functioning and grit were positively correlated ($r = .448$, $p < .001$). Cronbach alpha for the SF-36 was .954. Qualitative themes included: 1) the shock factor, 2) Identity shift, and 3) Little Victories.

Conclusion: Grit is a measure of a person's strategies for dealing with challenges and overcoming obstacles. For those with MS, grit was positively correlated with better QOL in the areas of social and emotional functioning.

Clinical Relevance: Grit may influence social/emotional coping strategies after a diagnosis of MS.

Observational and Inertial Sensor Measures Discriminate Active Duty Service Members with mTBI from Healthy Controls in the POWAR-TOTAL task

Authors:

Karen L. McCulloch, PT, PhD, FAPTA, UNC-Chapel Hill

Amy Cecchini, PT, DPT, Geneva Foundation

Oleg Favorov, PhD, UNC-Chapel Hill

Wanqing Zhang, PhD, UNC-Chapel Hill

Abstract:

Purpose/participants: Cross-sectional assessment (observational and inertial sensors) with Portable Warrior Test of Tactical Agility (POWAR-TOTAL) contrasting 64 active duty service members with mTBI referred for physical therapy, and 64 active duty healthy controls (HC).

Methods: In a single test session participants completed self-reports Neurobehavioral Symptom Inventory, DVBIC Pain Scale, PCL-C (post-traumatic stress), and performance based tests: High Level Mobility Assessment Test (HiMAT), and the POWAR-TOTAL (requiring rapid position changes, running, combat rolls while carrying a simulated weapon, including dual-task trials - working memory task). Smartphone inertial sensors placed on the head and torso captured movement, testing was hand timed and the cognitive task scored by observation.

Results: Group demographics were well matched except for educational level. mTBI group had higher levels of self-reported symptoms, pain and post-traumatic stress. POWAR-TOTAL indicators were significantly different for those with mTBI (motor - slower, cognitive - poorer) as detected by simpler clinical measures. Motor variables correlated significantly with HiMAT scores. Inertial sensor measures allowed detection of phases of the complex tactical maneuver, and revealed group differences driven by transitional movements (stand to prone, combat rolls). Ability to discriminate between groups was good for manual timing (AUC= .73), but improved with inertial sensor phase duration measures (AUC=.84).

Conclusions: This high level military-type training task was effective in differentiating ADSM with mTBI from those without injury.

Clinical Relevance: Challenging mobility tasks may be necessary for mTBI military return to duty assessment and can be implemented with simple clinical measures, but also benefit from inertial sensor measurement.

Outcomes of High-Intensity Gait Training: A Case Series in Three Subacute Neurologic Diagnoses

Authors:

Maghan Bretz, PT, MPT, NCS- Residency Program Director

Jenni Moore PT, DHS, NCS- Residency Didactics Mentor/Facilitator

Abstract:

Background/purpose: Research suggests that maximizing intensity, specificity, and repetition is important during rehabilitation to facilitate recovery post neurologic injury. High-intensity gait training (HIGT) is defined as large amounts of structured walking practice delivered at high cardiovascular intensities. HIGT is feasible and effective post-stroke, but its efficacy is unclear in other neurologic diagnoses. This case series aims to describe the functional outcomes of HIGT when applied to three neurologic diagnoses within a community-based inpatient rehabilitation facility.

Case Description: Three patients (stroke, incomplete spinal cord injury, and acute disseminated encephalomyelitis) participated in up to 35 sessions ranging between 30-60 minutes across ~three weeks. HIGT interventions were delivered overground and on a treadmill with minimal body weight support. Sessions challenged the biomechanical subcomponents of gait and aimed to achieve 75-85% of maximum heart rate. The 10 Meter Walk Test, 6 Minute Walk Test, and Berg Balance Scale were administered at evaluation and discharge. Stepping activity was monitored with an accelerometer.

Outcomes: Clinically meaningful improvements were achieved in all functional outcomes. 56% of sessions prioritized walking with an average of 3,985 steps/day. Greater than 36% of sessions achieved targeted heart rate and RPE ranges.

Discussion: HIGT was feasible and effective in improving functional outcomes across diagnostic groups. All three patients have discharged home independently or with assistance.

Clinical Relevance: HIGT is a promising intervention strategy for patients undergoing neurologic rehabilitation. The intervention should be tested further in other diagnoses to assess the effectiveness of improving gait-related outcomes.

Perceived Brain Fog in Individuals with Primary Immunodeficiency Disease

Authors:

1. Kerri Sowers, PT DPT Ph.D., Stockton University
2. Christine A. Gayda-Chelder, Ph.D., Stockton University
3. Mary Lou Galantino, PT MS Ph.D. MSCE, Stockton University, University of Pennsylvania, University of Witwatersrand, Johannesburg, South Africa

Abstract:

Purpose/Hypothesis: Individuals with Primary Immunodeficiency Disease (PID) have increased risk for infection, autoimmune conditions, and inflammatory disorders. Cognitive impairment, also referred to as brain fog, has been recognized in other medical conditions and as a side-effect of treatments; however, has not been previously reported in individuals with PID. This research investigates the perceived memory function of individuals with a diagnosis of PID.

Methods: 292 respondents completed a survey using several reliable and valid questionnaires: Memory Functioning Questionnaire, Beck's Depression Inventory II, and Beck's Anxiety Inventory. There was no report of any co-morbid neurological diagnosis or incident of concussion (both of which could influence perceived memory function) by 133 of the respondents.

Results: The respondents in this study were found to have significantly greater perceived memory impairment compared to normative values in all categories: Frequency of Forgetting (133.89 +/- 39.11); Seriousness of Forgetting (67.88 +/- 26.30); Retrospective Functioning (13.19 +/- 5.88); and Mnemonics Usage (19.32 +/- 9.49). The respondents also had significantly higher scores for anxiety (20.25 +/- 12.82) and depression (19.13 +/- 11.32) as compared to non-anxious and non-depressed normative scores.

Conclusion: This study finds that individuals with a diagnosis of PID have a greater degree of perceived memory impairment, or brain fog, in addition to greater levels of anxiety and depression.

Clinical Relevance: Individuals with a diagnosis of PID would benefit from prospective surveillance through a comprehensive neuropsychological assessment. Providers should routinely track cognitive status and implement corrective measures if a decline in cognitive status is identified.

Perspectives of People with Parkinson Disease Managing Exercise during the COVID-19 Pandemic: A Qualitative Study

Authors:

Jamie Haines, PT, DScPT Central Michigan University, Physical Therapy Department
Amy Yorke, PT, PhD, University of Michigan-Flint, Physical Therapy Department
Quinn Hanses, BA, University of Michigan-Flint, Occupational Therapy Department

Abstract:

Purpose: Exercise is an essential component to manage symptoms for people with Parkinson disease (PwPD). In person community-based group exercise classes provide the social support and exercise opportunities for long-term symptom management. Access to these opportunities was terminated in March 2020 in the state of Michigan (U.S.A) due to COVID-19 mandated stay-at-home orders. The purpose of this study was to explore the experiences of PwPD in managing their exercise during the first four months of the pandemic.

Participants: Twenty PwPD who regularly attended community-based exercise classes prior to COVID-19.

Methods: Participants were purposely recruited via convenience sampling. Semi-structured interviews were completed using video conferencing system four months after classes were canceled. Questions focused on pre-COVID-19 exercise prior to and during stay at home orders. Audio recordings were transcribed and the constant comparative method was used for theme identification.

Results: Overall, participants held active lives exercising an average of 4.2 days/week (range 1-7 days) with over half self-reporting frequency of exercise was significantly decreased after stay-at-home orders. Four themes were identified (1) Initial Fear and Loss; (2) Exercise is Essential; (3) Factors that Influenced Exercise Frequency (4) Future of Community Based Classes.

Conclusions: COVID-19 changed the way that PwPD managed their exercise. Key factors impacting transitions included reliance on care partner support, willingness to try alternatives, and ability to utilize technology.

Clinical Relevance: Understanding key factors that impacted frequency of exercise during the pandemic in PwPD provides insight to the support needed to navigate exercising in a post-COVID environment.

References:

Physical assistance impacts surf practice and competition ranking in para surfers with spinal cord injury- a correlational study

Authors:

Heather M. David, PT, MPT, EdD, University of St. Augustine for Health Sciences
Maureen E. Johnson PhD, MS, OT/L, University of St. Augustine for Health Sciences
Mohan Ganesan, PT, MPT, PhD, University of St. Augustine for Health Sciences

Abstract:

Purpose/Hypothesis: To find the co-relation of the number of people required to assist a surfer with the number of practice sessions (per month), practice duration (hours per month), and final competition ranking. We hypothesized that an increased number of assistants for surf practice would have a negative impact on practice time and competition ranking.

Participant(s): Thirty-six para surfers (26 males, 10 females) with spinal cord injuries

Methods: Archived data from a 2020 international para surfing competition is used in this study. Self-reported data on number of people required to assist and the number of surfing sessions, practice duration, and final competition ranking by the judges were extracted. Spearman co-relation co-efficient $c(\rho)$ was used to find the co relation between the variables.

Results: The number of people required to assist was significantly correlated with a decreased number of surfing practice sessions ($\rho = -0.418$; $p = .012$), decreased surf practice duration ($\rho = -0.570$; $p = .001$), and worse final competition ranking ($\rho = -0.341$; $p = .033$).

Conclusions: The number of people required to assist a para surfer to or in the water limits the number of practice sessions and practice duration, and results in worse competition ranking. Improving accessibility to the ocean may improve practice opportunities and improve performance for para surfers.

Clinical Relevance: Physical therapists play a key role in facilitating para sports participation for individuals with spinal cord injury and other mobility-restricted conditions. Recognizing the impact of environmental and physical barriers to participation is important to create opportunities for increased accessibility of sport environments.

Physical Therapy Interventions in a Patient with Traumatic Brain Injury and Severe Contraversive Pushing

Authors:

Alexis Cherven, PT, DPT, Mary Free Bed Rehabilitation Hospital and Grand Valley State University
Residency in Neurologic Physical Therapy Graduate

Cathy Harro, PT, DPT, MS, NCS, Mary Free Bed Rehabilitation Hospital and Grand Valley State University
Residency in Neurologic Physical Therapy Assistant Director

Abstract:

Background and Purpose: Contraversive Pushing is a perceptual-motor deficit that causes marked balance dysfunction. Remediation of contraversive pushing in individuals with traumatic brain injury (TBI) is uniquely challenging due to the complex cognitive and behavioral impairments that adversely affect motor learning. The purpose of this case report is to describe therapeutic interventions to address contraversive pushing and facilitate functional recovery in a patient with a severe TBI and orthopedic injuries during inpatient rehabilitation.

Case Description: The patient was a 58-year-old man with a diffuse axonal brain injury, pneumothorax, unstable rib and scapula fractures due to a motorcycle accident. At admission he was dependent for all mobility tasks with severe cognitive and motor deficits, contraversive pushing, and impaired balance. Interventions focused on forced use of the balance system, provision of midline cues, and task-specific training. Key considerations were his inability to recognize his aberrant midline position, impaired safety and judgment, medical restrictions, and high fall risk.

Outcomes: After 44 days he improved in functional mobility skills (36% gain in Quality Reporting Program-Mobility score), midline orientation (Clinical Scale of Contraversive Pushing-admission 6/6, discharge 0/6) and functional balance (Function in Sitting Test-admission 0/56, discharge 47/56; Berg Balance Scale admission 0/56, discharge 21/56). He remained at a high fall risk due to distractibility, poor deficit awareness, and lack of reactive balance strategies.

Discussion/Clinical Relevance: Despite the severity of his lateral lean and postural instability during early recovery, locomotor training was prioritized to challenge his postural control system and engage him in concrete, meaningful tasks.

Postural and Head Control: The role of environmental context

Authors:

Anat V. Lubetzky, PT, PhD, CSCS, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Jennifer L. Kelly, PT, DPT, NCS, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Bryan D. Hujsak, PT, DPT, NCS, MBA, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Jenny Liu, MSc, New York University, Department of Applied Statistics, Social Science and Humanities, Steinhardt School of Culture Education and Human Development

Daphna Harel, PhD, New York University, Department of Applied Statistics, Social Science and Humanities, Steinhardt School of Culture Education and Human Development

Maura Cosetti, MD, Department of Otolaryngology-Head and Neck Surgery, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Abstract:

Purpose: How do postural sway and head kinematics change in response to auditory and visual perturbations? Does this response vary by context?

Participants: Healthy adults (n=25), people with diverse monaural hearing (n=7), or unilateral vestibular dysfunction (n=7).

Methods: Participants stood naturally on a stable force-plate and looked at 2 environments via the Oculus Rift (abstract 'stars'[1]; busy 'street') with 3 visual and auditory levels (static, 'low', 'high'). We quantified medio-lateral (ML) and anterior-posterior (AP) postural sway path from the center-of-pressure data and ML, AP, pitch, yaw and roll head path from the headset.[2]

Results: We found no differences between the different combinations of 'low' and 'high' visuals and sounds. We combined all perturbations data into one 'dynamic' level and compared it to the static level. The increase in path between 'static' and 'dynamic' was significantly larger in the city environment for: Postural sway ML, Head ML, AP, pitch and roll. The majority of the vestibular group moved more than controls, particularly around the head, when the scenes, especially the city, were dynamic. Several patients with monaural hearing performed similar to controls whereas others, particularly older participants, performed worse.

Conclusions: Responses to sensory perturbations are magnified around the head. Significant differences in performance difference between environments support the importance of context in sensory integration.

Clinical Relevance: Future studies should investigate the sensitivity of head kinematics to diagnose vestibular disorders[3,4] and the implications of aging with hearing loss to postural control.[5] Balance assessment and rehabilitation should be conducted in different environmental contexts.

Proximal Muscle Use in Functional Mobility and Balance in Community Dwelling 40-59 Year Olds

Authors:

Dr. Sharon Fleming Walsh, PT, DCS, MA, PCS, Emeritus, The University of Findlay
Monica Boswell, SPT, The University of Findlay
Mackenzie Ringwald, SPT, The University of Findlay
Lorin Denney, SPT, The University of Findlay
Allison Thobe, SPT, The University of Findlay
Cole Kelly, SPT, The University of Findlay
Logan Konst, SPT, The University of Findlay

Abstract:

Purpose: As adults age falls can lead to serious injury and decline. Individuals who have fallen display a greater incidence of gluteus medius (GM) weakness. This study investigated the activation of lower extremity musculature, specifically GM, in 40-59-year-olds during the Community Balance and Mobility Scale (CBM). Participants: 55 community dwelling adults between the ages of 40-59 yrs. (n=25, 40-49 yrs. and n=30, 50-59 yrs.).

Methods: Subjects were stratified as 5x/week for 30 minutes of exercise by using the Global Physical Activity Questionnaire. sEMG was gathered from bilateral erector spinae, GM, gluteus maximus, rectus femoris, anterior tibialis and lateral gastrocnemius during the CBM.

Results: There was a mild negative correlation of GM activation with CBM score ($r = -.3721$). GM activation was significantly greater in the 40-49 year olds as compared to the 50-59 year olds, ($p = .0251$) during a dual task walking activity. There was no significant difference on the CBM between age groups. As age increased GM activation decreased during dual task walking activities ($p = .0190$ and $.0442$). Those who exercised at least 3x/week or 5x/week for 30 minutes scored significantly higher on the CBM ($p = .0023$ and $.0001$) and activated GM less during up and down stair tasks ($p = .0183$, $.0447$, and $.0463$).

Conclusions: There were suggestions of significant differences as subjects aged in balance and GM activation. Exercise provided some positive affect to both balance and GM activation. Clinical

Relevance: Identifying changes in proximal muscle use as adults age and the affects exercise can play is important to mediate future fall risk.

Psychosocial Aspects of Perceived Fatigue are Associated with Mobility Outcomes in People Multiple Sclerosis

Authors:

Rashelle Hoffman, PT, DPT, PhD, GCS; Affiliations: Physical Therapy Program, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO & Geriatric Research Education and Clinical Center, VA Eastern Colorado Healthcare System, Denver, CO

Graciela Salinas, SPT,MS; Affiliations: Physical Therapy Program, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO

Cory Christiansen, PT, PhD; Affiliations: Physical Therapy Program, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO & Geriatric Research Education and Clinical Center, VA Eastern Colorado Healthcare System, Denver, CO

Mark Mañago, PT, DPT, PhD, NCS; Affiliations: Physical Therapy Program, Department of Physical Medicine and Rehabilitation, University of Colorado, Aurora, CO & Department of Neurology, School of Medicine, University of Colorado, Aurora, CO

Abstract:

Purpose/Hypothesis: Rehabilitation interventions designed to improve functional mobility in people with MS commonly target physical components of fatigue and focus less on psychosocial aspects. The aim of this project was to determine the relationship of physical, psychosocial, and cognitive aspects of fatigue with common mobility outcomes. We hypothesized that psychosocial fatigue would correlate significantly with mobility outcomes.

Participant(s): Seventy-two individuals with MS (age: 47.7+11.3 yrs; Expanded Disability Status Scale: 3.5+1.1; 83.3% female) participated in this cross-sectional study.

Methods: The 21-item modified fatigue impact scale (MFIS total and physical, psychosocial, and cognitive subscales) measured fatigue, with higher scores representing a larger impact of fatigue on the individual's activities. Dynamic Gait Index, 6-min Walk Test, Timed Up and Go, and the Timed 25-Foot Walk Test measured mobility. Relationships between fatigue and mobility outcomes were determined by Pearson correlations.

Results: For all outcomes, worse mobility performance was associated with greater perceived fatigue as measured by the total MFIS score ($r=0.287$ to 0.434 , $p < 0.02$). The MFIS psychosocial subscale was weakly-to-moderately correlated with all mobility outcomes ($r=0.326$ to 0.425 , $p < 0.01$). The MFIS physical subscale was moderately correlated with all mobility outcomes ($r=0.483$ to 0.572 , $p < 0.001$). The MFIS cognitive subscale was not correlated to mobility outcomes.

Conclusions: Greater perceived psychosocial and physical aspects of fatigue were related to worse mobility performance.

Clinical Relevance: In addition to physical components of fatigue, evaluation and intervention of psychosocial aspects of fatigue through behavioral intervention frameworks may be important when seeking to improve mobility in people with MS.

Relationship between Head and Center-of-Mass Kinematics during a Head-Mounted Display Balance Assessment

Authors:

Brittani Morris, PT, DPT, PhD Student, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Madison A. Pessel, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Susan R. Lunardi, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Sarah Mischianti, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Andrew Medlin, SPT, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Maura Cosetti, MD, Department of Otolaryngology-Head and Neck Surgery, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Jennifer Kelly, DPT, NCS, Vestibular Rehabilitation, New York Eye and Ear Infirmary of Mount Sinai, New York, NY, USA

Anat Lubetzky, PT, PhD, CSCS, Department of Physical Therapy, Steinhardt School of Culture, Education and Human Development, New York University, New York, NY, USA

Abstract:

Purpose: Standing balance requires keeping the body's center of mass (COM) inside its base of support.[1] It has been proposed that the human body acts as an inverted pendulum in standing.[2] Head-mounted display paradigms provide accurate assessment of head kinematics but do not assess COM.[3–5] We investigated the relationship between head and COM kinematics in standing. We hypothesized that deviations from the inverted pendulum model will be observed with sensory perturbations provided via the headset.

Participants: 14 adults (8 females, mean age=45, SD=18.19): healthy individuals (N=6), vestibular dysfunction (N=4), or hearing loss (N=4) were tested at the Mount Sinai Ear Institute.

Methods: Individuals stood hip-width apart wearing the HTC Vive Pro Eye. A Vive tracker was placed between the posterior-superior-iliac-spines. Two levels of visual and sound (static and dynamic) were implemented in 4 scenes, each 60-seconds long, performed twice. We analyzed intraclass correlations (ICC, [95% Confidence Interval]) for head and COM path and acceleration in the medio-lateral and anterior-posterior directions and inspected bland-Altman plots measures for between-segment bias.

Results: Medio-lateral: strong absolute agreement for: Path ICC=0.89 [0.25-0.97] and Acceleration: ICC=0.91 [0.81-.95]. Anterior-posterior: Moderate agreement for Path ICC=0.772 [0.68-0.84] and weak for Acceleration ICC=0.42 [0.1-.74]. A positive bias demonstrated increased head movement relative to COM across measures.

Conclusion: The increase in the difference between head and COM in response to perturbations, suggests a deviation from a standing inverted pendulum model.

Clinical Relevance: Head-mounted displays paradigms involving a Vive headset and a COM Vive tracker provides a comprehensive, accurate, in-clinic balance assessment.

Relationship between multiple chronic comorbidities and functional outcome in individuals after stroke

Authors:

Elizabeth Thompson PT, PhD, NCS; Darcy Reisman PT, PhD
Department of Physical Therapy, University of Delaware

Abstract:

Purpose/Hypothesis: The impact of multiple chronic conditions (MCC) on functional outcome after stroke is not fully understood.^{1,2,3,4,5,6} Recent work noted inconsistencies in the literature,^{3,4,6,7} and a need to understand mediating factors.^{3,7} The purpose of this study was to investigate the relationship between MCC and functional outcome after stroke, and variables that influence this relationship.

Participants: 226 stroke survivors (age 63.2 ± 12.8 , 36.6 ± 46.9 months since stroke).

Methods: Retrospective analysis of data from the university's Stroke Research Registry. Modified Cumulative Illness Rating Scale (MCIR)⁸ measured MCC; the Stroke Impact Scale – Participation (SIS-P)⁹ measured global function. Age, Fugl Meyer Assessment lower extremity scores (FMA-L), Activity-Specific Balance Confidence (ABC) Scale, Yesavage Geriatric Depression Scale (GDS), and gait speed (6meterwalk) were analyzed as possible mediators. These variables were selected after demonstrating significant correlation with SIS-P in preliminary analysis. Ordinal regression and mediation analysis were used to investigate relationships.

Results: MCIRS was predictive of SIS-P ($p = 0.019$). Mediation analysis found ABC ($\beta=0.310$, $p < 0.001$), GDS ($\beta=-0.286$, $p < 0.001$), and age ($\beta=0.113$, $p =0.003$) significant mediators of the relationship between MCIRS and SIS-P. 6meterwalk and FMA-L were not ($p=0.728$ and $p=0.075$).

Conclusions: There was a significant relationship between MCIRS and SIS-P. This relationship was mediated by age, self-efficacy (ABC), and depression symptoms (GDS), but not by gait speed (6meterWT) or limb impairment (FMA-L).

Clinical Relevance: The relationship between chronic comorbidities and function after stroke must be viewed by incorporating measurements including self-efficacy, depressive symptoms, and age.

Reliability of the Intersection Point Balance Metric in Community-dwelling Adults

Authors:

Colin R. Grove, PT, DPT, PhD, University of Wisconsin-Madison

Jennifer N. Bartloff, PT, DPT, University of Wisconsin-Madison

Kreg G. Gruben, PhD, University of Wisconsin-Madison

Abstract:

Purpose/Hypothesis: The intersection point (IP) represents the interaction of the direction and center of pressure of the ground-on-foot force. We aimed to determine the reliability of repeated IP measures.

Participant(s): One-hundred-forty-six community-dwelling adults from two age groups, younger (n = 83; mean age = 27.5 [\pm 7.6] years old; 53 female) and older (n = 63; mean age = 72.2 [\pm 6.4] years old; 51 female), were included.

Methods: Complete sets of force-plate data from non-disabled subjects in the Human Balance Evaluation Database were analyzed. Data from three consecutive trials of four posturography conditions were processed: C1) firm/eyes open, C2) firm/eyes closed, C3) foam/eyes open, and C4) foam/eyes closed. The height of the intersection point (zIP) during each trial was calculated and plotted as a curve across 17 frequency bands (0.3 Hz to 3.7 Hz; 0.2 Hz increments). The analysis metric was the mean value for each curve. Reliability was assessed using the intraclass correlation coefficient (ICC[3,1]).

Results: The ICC(3,1) values (95% confidence interval) were C1 = 0.793 (0.732, 0.845), C2 = 0.897 (0.863, 0.924), C3 = 0.728 (0.653, 0.793), and C4 = 0.750 (0.680, 0.811) for younger adults and C1 = 0.660 (0.559, 0.749), C2 = 0.858 (0.806, 0.900), C3 = 0.757 (0.676, 0.824), and C4 = 0.686 (0.590, 0.769) for older adults.

Conclusion(s): Repeated measures of mean zIP curve values have moderate to excellent reliability across sensory conditions.

Clinical Relevance: Clinicians may view this promising new metric as a precise and more complete characterization of balance control.

Spinal cord tissue bridges validation study: predictive relationships with sensory scores following spinal cord injury.

Authors:

Andrew C. Smith, PT, DPT, PhD, University of Colorado School of Medicine, Department of Physical Medicine and Rehabilitation, Physical Therapy Program

Denise R. O'Dell, PT, DSc, NCS, Regis University School of Physical Therapy

David Dungan, MD, Radiology Imaging Associates

Ashesh Thaker, MD, University of Colorado School of Medicine, Department of Radiology

Robyn Gisbert, PT, DPT, University of Colorado School of Medicine, Department of Physical Medicine and Rehabilitation, Physical Therapy Program

Kenneth A. Weber II, DC, PhD, Stanford University School of Medicine, Department of Anesthesiology, Perioperative and Pain Medicine

Jeffrey C. Berliner, DO, Craig Hospital

Stephanie R. Albin, PT, DPT, PhD, Regis University School of Physical Therapy

Abstract:

Purpose/Hypothesis: Using magnetic resonance imaging (MRI), widths of ventral tissue bridges demonstrated significant predictive relationships with future pin prick sensory scores, and widths of dorsal tissue bridges demonstrated significant predictive relationships with future light touch sensory scores, following spinal cord injury. These studies involved smaller participant numbers and external validation of their findings is warranted. The purpose of this study was to validate these previous findings using a larger independent external data set. We hypothesized that our findings would be in alignment, and thus validate, the previous investigations.

Participants: 136 participants with spinal cord injury.

Methods: In this retrospective study, widths of ventral and dorsal tissue bridges were quantified using mid-sagittal T2-weighted MRI (average 3.7 weeks post injury), and pin prick and light touch sensory scores were acquired at discharge from inpatient rehabilitation.

Results: Wider ventral tissue bridges were significantly correlated with pin prick scores at 13.5 weeks post injury ($r = 0.31$, $p < 0.001$, $N = 136$) and wider dorsal tissue bridges were significantly correlated with light touch scores ($r = 0.31$, $p < 0.001$, $N = 136$).

Conclusions: This retrospective study's results provide external validation of previous findings, using a larger sample size. Following spinal cord injury, ventral tissue bridges hold significant predictive relationships with future pin prick sensory scores and dorsal tissue bridges hold significant predictive relationships with future light touch sensory scores.

Clinical Relevance: The healthcare team could use these relatively simple tissue bridge measures, in conjunction with information from clinical examination, to help prognose future light touch or pin prick sensory recovery following spinal cord injury.

Telehealth Delivery of Treatment with a Gait Device for Stroke Survivors During the COVID-19 Pandemic

Authors:

Brianne Darcy, PT, DPT - Moterum Technologies, Inc.
Lauren Rashford, PT, DPT - Moterum Technologies, Inc.
Tyler Shultz, PT, DPT, OCS - Wingate University
Nancey T. Tsai, MD, FABPMR - Moterum Technologies, Inc.
David Huizenga, PhD - Moterum Technologies, Inc.
Stacy Bamberg, ScD - Moterum Technologies, Inc.

Abstract:

Purpose/Hypothesis: This study aimed to investigate the feasibility of remote treatment with a gait device in stroke survivors.

Participants: Participants included five individuals with chronic stroke (average age 72 years and 84 months post-stroke). Four of the participants had previously begun in-person treatment with the gait device. Upon worsening of the coronavirus pandemic, they transitioned to telehealth delivery to continue their gait treatment remotely. The fifth participant performed all study-related activities remotely.

Methods: Activities were overseen remotely by physical therapists. The protocol included a virtual caregiver training session followed by three months of remote treatment with the gait device. Gait sensors were utilized to monitor gait patterns and treatment compliance. Functional assessments including the 10-Meter Walk Test (10MWT), the Timed Up and Go (TUG) test, the Six-Minute Walk Test (6MWT), and the Stroke Specific Quality of Life Scale occurred at baseline and after each month of treatment.

Results: No significant adverse events occurred and survey responses indicated a high level of acceptability for remote treatment delivery. Participants complied with >94% of remote treatment sessions and 100% of assessments. Additionally, average improvement on the 10MWT, TUG, and 6MWT surpassed the minimal clinically important difference or minimal detectable change value.

Conclusions: Results indicate considerable promise for the feasibility of remote treatment with the gait device.

Clinical Relevance: Utilization of telehealth technologies has expanded considerably as a result of the COVID-19 pandemic. This study depicts a replicable framework for the remote delivery of gait treatment.

The Community Balance and Mobility Scale in community-dwelling older adults: implications for other populations

Authors:

Holly J. Roberts, PT, PhD, GCS, NCS University of Puget Sound, Tacoma, WA

Lindsay Durringer, SPT University of Puget Sound, Tacoma, WA

Ana Sabates, SPT University of Puget Sound, Tacoma, WA

Alex Carr, SPT University of Puget Sound, Tacoma, WA

Hannah Johnson, SPT University of Puget Sound, Tacoma, WA

Elise Whisler, SPT University of Puget Sound, Tacoma, WA

Abstract:

Purpose/Hypothesis: To determine the convergent validity, age-referenced scores, and ceiling and floor effects for the Community Balance and Mobility Scale (CB&M) in community-dwelling older adults. We hypothesized that CB&M scores would decrease with age.

Participants: 89 community-dwelling older adults (76+/-7 years, 54 female, 1.10+/-2.46 falls in the previous year)

Methods: Participants completed the CB&M, Functional Gait Assessment (FGA), and Activities-specific Balance Confidence scale (ABC) and were stratified into three age groups: 65-74 (n=41), 75-84 (n=33), and 85+ years (n=15). A one-way ANOVA was calculated to determine differences in outcome measure scores among age groups. Spearman's rho were calculated to determine the correlations between the outcome measures.

Results: There were moderate to high convergent validities ($\rho=0.63$ to 0.89 , $p \leq 0.001$) among the CB&M, FGA, and ABC. CB&M scores for each age group were: 71.54 ± 17.38 (65-74), 48.18 ± 21.55 (75-84), and 30.67 ± 17.39 (85+), and differed among all age groups ($p \leq 0.01$). There were no ceiling or floor effects for any outcome measures.

Conclusions: The CB&M is a valid measure of balance and dynamic gait for community-dwelling older adults. CB&M scores decreased with age. The lack of ceiling and floor effects suggest the CB&M may be a useful measure for high-functioning individuals with subtle balance impairments.

Relevance: There has been a recent emphasis on detecting subtle changes in balance in high-functioning older adults. These are the first age-referenced scores for the CB&M in this population. These values establish reference points for clinicians evaluating balance and dynamic gait in community-dwelling older adults with and without neurologic conditions.

The Core Set of Outcome Measures for Adults with Neurologic Conditions: A Survey Study

Authors:

Stacey D Rittenberg, PT, DPT, NCS, Mercy College

Megan J. Cotta, SPT, Mercy College

Juliana De Oliveira, PT, DPT*, Mercy College

Lauren M Giannoni, PT, DPT*, Mercy College

Jennifer Llanos, PT, DPT*, Mercy College

Marc Campo, PT, DPT, OCS, PhD, Mercy College

*Authors were students at the time of involvement in this study.

Abstract:

PURPOSE/HYPOTHESIS: The Academy of Neurologic Physical Therapy (ANPT) recently created a clinical practice guideline surrounding a core set of Outcome Measures (COM-CPG) for adults with neurologic conditions. Baseline knowledge surrounding COM-CPG is unknown. The purpose of this study is to determine baseline knowledge of neurologic PTs regarding COM-CPG. Board certification (NCS) and confidence administering COM-CPG was also investigated. We hypothesized these factors would be positively associated with knowledge of COM-CPG.

PARTICIPANTS: Participants were 137 licensed U.S. PTs working with adults undergoing neurologic rehabilitation. Eighty-seven (64%) were NCS PTs. Most participants (69%) had more than 5 years experience.

METHODS: Study design was quantitative, non-experimental, cross-sectional electronic survey using convenience sampling. Questions were formulated based on the Recommended Standardized Administration of COM-CPG published by the ANPT. All participants gave informed consent electronically.

RESULTS: Completed surveys were received from 137 PTs. Scores on knowledge tests were generally low, ranging from 42% (6MWT) to 76% (BBS). NCS PTs scored significantly higher in knowledge of all instruments except the BBS. Significant, moderate correlations were noted between confidence in administering the 10mWT and the ABC scale. Remaining correlations were low and/or not significant.

CONCLUSION: In conclusion, although PTs believe they're correctly utilizing COM-CPG a gap in baseline knowledge exists. Sample bias in favor of PTs interested or knowledgeable of COM-CPG may exist, however scores were still lower than needed for effective clinical decision making.

CLINICAL REVELANCE: For COM-CPG to demonstrate value it must be utilized correctly. Education is needed to enhance efficacious application of COM-CPG.

The Effects of Ischemic Conditioning on Motor Performance Post Stroke.

Authors:

Saad Z. Alqahtani, PT1; Zhilun Zhou, MS, ME1; Jennifer N. Nguyen, BS2; Francesco Negro, PhD3;

Matthew J. Durand, PhD2; Brian D. Schmit, PhD4; Allison S. Hyingstrom, PT, PhD1

1 Department of Physical Therapy, Marquette University, Milwaukee, WI, USA

2 Department of Physical Medicine and Rehabilitation, Medical College. of Wisconsin, Milwaukee, WI, USA

3 Department of Clinical and Experimental Sciences, Università degli Studi di Brescia, Brescia, Italy

4 Department of Biomedical Engineering, Marquette University and the Medical College of Wisconsin, Milwaukee, WI, USA

Abstract:

Purpose: Quantify the effects of a single session of ischemic conditioning (IC) on sub-maximal force regulation and neuromuscular fatigability post stroke. There is emerging evidence IC may improve motor performance post stroke by increasing the neural activation of paretic muscles (1,2).

Understanding how IC affects different types of contractions is important for determining its use as a potential physical therapy adjunct.

Hypothesis: Following IC, stroke survivors will have improved sub-maximal force regulation and increased task endurance as compared to IC-Sham.

Participants: 10 stroke survivors participated (13.1±7.3yrs post stroke, 51.2±14.2yrs).

Methods: Participants completed two sessions (IC or IC-Sham). An inflatable cuff was placed over the paretic thigh and inflated/deflated for five minutes cycles at 225 mmHg (IC) or 10-20 mmHg (IC-Sham). Pre- and post-testing included: maximal voluntary contractions (MVCS) of the knee extensors, sub-maximal ramp contractions of 20 and 60% MVC, and a sub-maximal sustained knee extension fatiguing task. The coefficient of variation (STDev Torque/Mean Torque) and task duration were calculated.

Results: On average, following IC, there was a larger percent decrease in the coefficient of variation during the 20% and 60% conditions compared to IC-Sham, respectively (-10.9±9.9% vs 15.4±11.1%) and (-3.9±5.1% vs 5.8±10.9%). The task duration for the fatigue task was greater for the IC versus IC-Sham condition (468.7±95.5s vs 394.9±112.4s).

Conclusions/Clinical Relevance: During sub-maximal contractions, IC improved force regulation and task endurance. IC may be a potential physical therapy adjunct to optimize the performance of sub-maximal tasks which are important for activities of daily living post stroke.

The Importance of the Measurement of Cardiovascular Autonomic Dysfunction after Mild Traumatic Brain Injury due to Symptom Overlap and Mechanism of Injury

Authors:

Ryan Pelo PT, DPT, University of Utah, Lee Dibble PhD, PT, University of Utah, Peter Fino, PhD, University of Utah, Melissa M. Cortez, DO, University of Utah

Abstract:

Purpose: Exercise intolerance after mild traumatic brain injury (mTBI) is often thought to be indicative of a reduction in cerebral blood flow (CBF), and attributed to cardiovascular autonomic dysfunction (CAD). Yet limited understanding of how clinical exercise testing relates to CAD poses a major challenge; further, symptom provocation to exercise testing is nonspecific, and may reflect an array of physiological changes that are not necessarily restricted to CAD.

Description: Cardiovascular autonomic control is largely driven by brainstem nuclei, which maintain homeostasis of blood pressure (BP) and heart rate (HR). mTBI has been associated with stress and strain on brainstem structures, which may result in impaired BP/HR regulation, and thereby, impaired CBF. Change in CBF is associated with symptoms of fatigue, headache, memory dysfunction, attention complaints, brain fog, anxiety, depression, and insomnia – all of which are commonly reported symptoms following mTBI.

Summary of Use: Standardized cardiovascular autonomic testing such as, HR variability to deep breathing/Valsalva and tilt-table testing can provide localizing information about CAD (e.g. cardiovagal/parasympathetic, cardiovascular adrenergic/sympathetic). Further, frequency domain analysis of HR/BP can also provide insight into parasympathetic/sympathetic outflow.

Importance to Neurologic Physical Therapy: Evaluation of mTBI continues to be a complex challenge. Clinical correlation of post-mTBI symptoms and clinically utilized exercise tolerance testing with standardized autonomic testing measures would enhance understanding of underlying physiological changes. Although access to specialized autonomic testing can be a barrier, an increased push for directed CAD testing would improve identification of clinically informative physiological deficits and guide individualized treatments.

The Occurrence of Benign Paroxysmal Positional Vertigo Following Moderate to Severe COVID-19: A Case Series

Author:

Branden, Dennis, PT, DPT, NYU Langone Health: Rusk Rehabilitation

Abstract:

Background/purpose: COVID-19 proved to be one of the leading causes of hospitalization within the past year. The novelty of the virus has presented an array of impairments that are still not fully understood. The purpose of this study is to illustrate the occurrence of Benign Paroxysmal Positional Vertigo (BPPV) in a series of individuals, who have recovered from moderate to severe COVID-19, and discuss the response to vestibular rehabilitation therapy (VRT).

Case Description: This case series included four individuals, ranging from 33 to 72 years old, in inpatient rehab. Treatment involved traditional interventions with specific emphasis on VRT. Outcome measures specific to VRT related to a negative finding on the Dix-Hallpike/Roll Test or denial of vertigo with bed mobility.

Outcomes: Three out of four patients reported a reduction in the severity of symptoms and/or complete resolution following one to two treatments. One patient was not provided treatment due to the acuity of his impairments associated with prolonged hospitalization and hypoxic brain injury.

Discussion: Several potential theories have been hypothesized that could explain this occurrence. Perhaps, the COVID-19 virus targets the vestibulocochlear nerve similar to a vestibular neuritis. Other potential associations could be the multitude of new pharmaceuticals and/or due to prone positioning. In conclusion, I'm unable to state a definitive correlation between BPPV and COVID-19 but would inquire more research to investigate if a true relationship exists.

Clinical Relevance: This case series is clinically relevant due to the potential for a missed diagnosis of BPPV within this patient population.

The role of the physical therapist in facilitating acceptance post-stroke: a possible knowledge gap

Authors:

Olivia Harris, SPT University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Megan Marie Maag, SPT University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Ally Mohler, SPT University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Valerie Hill, PhD, OTR/L University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Chalee R. Engelhard, PT, EdD University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Erin Wagner, MS, CCRP University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Kari Dunning, PT, PhD University of Cincinnati, College of Allied Health Sciences, Department of Rehabilitation, Exercise and Nutrition Sciences

Abstract:

Purpose/Hypothesis: Survivors who find acceptance after stroke have lower rates of depression and anxiety. Recent studies report strategies to facilitate acceptance post-stroke including a potential role for the physical therapist. The purpose of this project was to determine possible gaps in knowledge among physical therapists.

Participants: 31 therapists (26PT, 5PTA); 29 female; average age 37.2 years; number of clients with stroke per month 5 clients (n14).

Methods: A 1-hour educational webinar was conducted. Before the webinar (PRE), attendees rated their knowledge: Extremely well, Somewhat well, Not sure, Not really well, or Definitely not well. After the webinar (POST), attendees were asked: "After taking this course, do you think there is a gap in PT knowledge regarding the journey to stroke acceptance?": Yes definitely, Yes perhaps, Not sure, No not really, or Definitely not.

Results: At PRE:16.1% understood the journey of acceptance post-stroke "Extremely" or "Somewhat" well; 20.0% were "Extremely" or "Somewhat" familiar with the literature; 12.9% knew factors/strategies that facilitated acceptance "Extremely" or "Somewhat" well. Therapists who saw less than 5 clients with stroke per month were more likely to report not understanding the journey ($p=.002$). At POST, 86.7% stated either "Yes, definitely" or "Yes, perhaps" there is a gap in knowledge among physical therapists.

Conclusions: Physical therapists may benefit from education regarding acceptance after stroke, especially those who see fewer clients with stroke.

Clinical Relevance: Educating physical therapists regarding the journey of acceptance post-stroke may improve therapeutic interactions and client outcomes.

Toward Implementing High Intensity Gait Training in Inpatient Rehab: A Knowledge Translation Journey

Authors:

Ryan Gorecki, PT, DPT, NCS - Zablocki VA Medical Center, Milwaukee, WI

Brittany Kennedy, PT, DPT, NCS - Zablocki VA Medical Center, Milwaukee, WI

Abstract: Conventional interventions to improve walking after neurologic injury lack principles of neuroplasticity and motor learning including task specificity, repetition, and intensity.¹ Recent CPG's recommend: 1) utilize core measures to track patient function,² and 2) maximize gait training dosage at 70-85% HR max.³ Our project's goals were to: 1) Evaluate how our facility's practice patterns compared to these CPG's, and 2) Utilize knowledge translation strategies to improve our clinic's fidelity to those CPG's and ultimately provide best care.

A retrospective chart review revealed practice patterns were not consistent with above recommendations. 70% age-predicted HR max.

The Knowledge-to-Action framework⁴ was utilized to identify and address barriers to implementing the above recommendations. Barriers included knowledge gaps, beliefs, equipment needs, and workflow issues. A variety of strategies were utilized to address these barriers.

Ongoing data collection shows a significant improvement in percentage of sessions where exertional heart rate is documented (>60%) and reaches >70% HR max (>40%), well above the 60%, 80%, and 50% respective baselines. This suggests our clinics are progressing toward improved fidelity to above CPG's.

Our current KT effort requires a multifaceted strategy. Without the resources of an in-house research team, it has been feasible to use key data from chart reviews to meaningfully evaluate practice patterns before and during KT efforts.

Transforming Culture by Monitoring Fidelity to Treatment Parameters: Implementing High Intensity Gait Training in an Acute Inpatient Brain Injury Program

Authors:

Irene Ward PT, DPT, NCS, Kessler Institute for Rehabilitation
Erin Donnelly PT, NCS, Kessler Institute for Rehabilitation
Marisa King PT, DPT, Kessler Institute for Rehabilitation
Justine Mamone-Lucciola PT, DPT, NCS, Kessler Institute for Rehabilitation
Shannon Motisi PT, DPT, NCS, Kessler Institute for Rehabilitation
Brittany O'Reilly PT, DPT, Kessler Institute for Rehabilitation
Melissa Perret PT, DPT, NCS, Kessler Institute for Rehabilitation
Jordana Reich PT, DPT, Kessler Institute for Rehabilitation
T. George Hornby PT, PhD, Indiana University School of Medicine

Abstract:

Purpose: Improving walking function after an acquired brain injury is one of the most common goals stated by patients and/or caregivers receiving inpatient physical therapy. Given the strength of evidence in favor of high intensity gait training (HIT) and recent practice recommendations from the ANPT, our therapy team in the Brain Injury Unit and Kessler Institute for Rehabilitation (KIR) has initiated an implementation project to integrate HIT into the standard of care. This project will illustrate the relevance of monitoring treatment fidelity as a first step in delivering HIT within an inpatient brain injury program.

Participants: Adults with acquired brain injury receiving acute inpatient rehabilitation

Methods: Quantitative analysis of frequency of HIT variables (number of HIT sessions, time in heart rate (HR) zone, rate of perceived exertion (RPE) and step count) documented in a consecutive sample of patients thought to have received HIT during their inpatient rehabilitation.

Results: Documentation of 60 physical therapy sessions in 3 patients was reviewed. Of those, HIT was provided in 20 out of 60 sessions. However, time in HR zone was documented in only 6/20 HIT sessions, RPE in only 10/20 HIT sessions and step counts were not in any HIT sessions.

Conclusions: While RPE may be easier to obtain, other measures are necessary to understand whether HIT was delivered with fidelity to allow comparisons to published implementation efforts.

Clinical Relevance: Clinical programs are encouraged to monitor treatment fidelity through chart audits as a first step towards consistently delivering the targeted intervention.

Usability and Comprehensibility of a Computerized Measure of Dynamic Visual Acuity for Assessing Vestibular Function

Authors:

Christy Heidema, PhD, University of Montana School of Physical Therapy and Rehabilitation Science
Andrew Kittelson, PhD, University of Montana School of Physical Therapy and Rehabilitation Science
Brian Loyd, PhD, University of Montana School of Physical Therapy and Rehabilitation Science

Abstract:

Purpose/Hypothesis: Computerized assessment of Dynamic Visual Acuity (cDVA) is a reliable and validated measure of vestibular function, which was recently deployed in the National Institutes of Health Toolbox. However, the clinical feasibility yet to be established. The purpose of this project was to examine patient usability and comprehensibility of cDVA via qualitative and quantitative methods, to inform future clinical implementation work.

Participants: Nine healthy adults were prospectively enrolled.

Methods: Participants underwent testing over a three-day period. On day 1, a trained research assistant oriented the participants to the wearable sensors, testing software, performance of the measure, and interpretation of the cDVA score. On day 2 and 3, participants independently performed cDVA testing. Post-assessment, participants underwent a semi-structured interview and completed questionnaires (System Usability Scale and NASA Task Load Index).

Results: Qualitative analysis revealed barriers to usability and comprehensibility. Limitations in usability related to technological and engineering constructs: engaging the tablet stand, navigating the software, and inserting wearable sensors into the fitted headband. Comprehensibility of the system was negatively impacted by difficulty communicating the meaning and relevance of the cDVA score.

Quantitative analysis revealed acceptable Systems Usability Scale (Median: 90; Range: 65-95) and NASA Task Load Index (Median: 40.0; Range: 26.7-44.17) scores.

Conclusion: Usability and comprehensibility of the cDVA system may be improved through streamlining of the assessment technology and testing steps, as well as by anchoring scores against normative data or risk of vestibular impairment.

Clinical Relevance: The cDVA system may be used clinically to monitor vestibular function.

Use of the Outcome Measure Core Set for Adults with Neurologic Conditions in Acute Care

Authors:

Kirsten Potter, PT, DPT, MS (1); Jessica Bollinger, SPT (1); Alexandra Hill, SPT (1); Morgan Keesee, SPT (1); Elise Watts, PT, DPT (2); Kelly Kantor, PT, DPT (2); Jennifer Moore, PT, DHSc, NCS (3). 1: Rockhurst University; 2: St. Luke's Health System; 3: Institute for Knowledge Translation

Abstract:

Purpose: The core set of outcome measures (OM) Clinical Practice Guideline (CPG) recommends six OMs: Berg Balance Scale (BBS), Functional Gait Assessment (FGA), Activities-Specific Balance Confidence (ABC), 10-Meter Walk Test (10mWT), 6-Minute Walk Test (6MWT), and 5-Times Sit to Stand (5TSTS). The purpose of this study was to establish the knowledge and opinions of acute care physical therapists (PT) regarding the core set and barriers to use.

Participants: 23 PTs and 6 PTAs.

Methods: An online survey was administered to PTs treating adults with neurologic conditions in acute care.

Results: 24.14% of respondents had read the CPG abstract and summary and 31.03% knew which OMs comprised the core set. Nearly 38% find the core set OMs useful, but 6.9% do not use any core set OMs. 77.78% agreed that using OMs helps direct patient care. 82.76% use the BBS and 5TSTS; fewer use the FGA (41.38%), 6MWT (34.48%), 10mWT (17.24%), and ABC (10.34%). Few always or frequently use any core set measures. The 5xSTS was used most frequently at initial exam (29.63%), discharge (25%), and interim times (24.14%). Clinicians feel most confident using the BBS, 5TSTS, FGA, and 6MWT. The top barriers to using the OMs are too long to administer (78.57%), insufficient time in sessions (67.86%), and knowledge of how to complete (42.86%).

Conclusion: The respondents have positive attitudes about the OM benefits and use some, but not all, core set OMs due to knowledge and time limitations.

Relevance: Study findings will inform KT efforts to enhance OM adoption.

Using Clinical Knowledge Brokers as a Part of an Ongoing KT Effort Leads to Improved Clinical Practice

Authors:

Patrick Hennessy, PT, MPT, NCS, Clinical Knowledge Broker, Infinity Rehab; Sarah E Townsend-Grant, PT, DPT, OCS, Clinical Knowledge Broker, Infinity Rehab; J Kele Murdin, PT, GCS, CEEAA, GTC, Clinical Knowledge Broker, Infinity Rehab; Patricia L Scheets, PT, DPT MHS NCS, Vice President Quality & Clinical Outcomes, Infinity Rehab

Abstract:

Purpose/hypothesis: Clinical Knowledge Brokers (CKBs) may assist in closing gaps in implementing evidence in practice by facilitating desired behavior changes. The questions are: 1) Will using CKBs improve skills with standardized evidence-based guidelines? and 2) Will a virtual CKB strategy be as effective as face-to-face (F2F)?

Participants: 102 physical and occupational therapy (PT and OT) clinicians (13 facilities) participated in phase 1 and 59 (7 facilities) in phase 2.

Methods: A clinical model was developed to reduce variability in PT and OT. After clinicians completed training, 3 CKBs assisted in the knowledge translation process by providing 1:1 mentoring and assessment of skills using checklists citing desired practice behaviors and scored on a 3-point scale. Phase 1 consisted of 4 F2F interactions. Phase 2 (modified in response to COVID-19) consisted of 3 virtual interactions. Descriptive statistics and paired and unpaired t-tests were used to measure improvement in checklist scores.

Results: In phase 1, data from 98 clinicians (45 therapists, 53 assistants) with multiple appraisals were included. There was a significant improvement in skills (52.7% \square 30.6, $p < .0001$), with no difference between the initial or final scores of therapists versus assistants. PT clinicians had higher initial and final scores compared to OT clinicians ($p < .001$, $p < .05$, respectively), while OT clinicians demonstrated greater change ($p < .05$). Data from phase 2 are in process.

Conclusions: Clinician behaviors changed significantly with coaching and feedback.

Clinical Relevance: These data are being used to modify knowledge tools and focus attention in ongoing efforts to reduce unwarranted variation in care.

Using Outcome Measures to Promote Clinically Successful High Intensity Gait Training in Stroke Populations

Authors:

Brian Wadsworth, PT, DPT, NCS, NYU Langone Health

Abstract: High intensity variable gait training (HIVGT) promotes improved gait speed and capacity in stroke. Over ground training (OGT) HIVGT is clinically more challenging to achieve than treadmill training (TT). Using outcome measures (OMs) (e.g. 10-Meter Walk Test (10MWT) and 6-Minute Walk Test (6MWT)) is best practice. This case series investigated the use of OMs to identify patients who may be less likely to succeed at OGT HIVGT.

This case series included 5-males and 1-female with stroke (mean: age 46yrs; acuity 3.1yrs). Mean group 10MWT was 0.86m/s (self-paced) and 1.12m/s (fast-paced). Mean group 6MWT distance was 220m. Functional Gait Assessment identified all patients as being at increased fall risk.

Successful vs unsuccessful OGT patients' mean: 10MWT self-paced was 1.08m/s vs 0.75m/s; 10MWT fast-pace 1.61m/s vs 0.87m/s; with a mean 6MWT distance of 398.5m vs 242m, respectively. Unsuccessful OGT patients achieved 110% of their 60% HRR goal during TT versus 84% of this goal during OGT. Successful OGT patients achieved 114% of their target range vs 111% during TT.

Clinically significant differences existed in patients' 10MWT and 6MWT for successful and unsuccessful OGT HIVGT patients. Stroke patients with a self-selected 10MWT of ≤ 0.75 m/s or 6MWT distance of ≤ 242 m may be less likely to succeed at OGT. Further research is needed to validate these findings. TT patients achieved greater training intensity although this mode sacrifices practice variability.

This case series supports the idea that OMs may guide clinician decision making in choosing between TT and OGT for HIVGT and promotes knowledge translation.

Validation of the Intersection Point Balance Metric in Adults

Authors:

Colin R. Grove, PT, DPT, PhD, University of Wisconsin-Madison

Jennifer N. Bartloff, PT, DPT, University of Wisconsin-Madison

Kreg G. Gruben, PhD, University of Wisconsin-Madison

Abstract:

Purpose/Hypothesis: The intersection point (IP) represents how the central nervous system controls the interaction between the direction and center of pressure of the ground-on-foot force during quiet standing. We aimed to demonstrate the concurrent validity of the IP.

Participant(s): Eighty-three young adults (mean age = 27.5 [\pm 7.6] years old; 53 females) and 63 older adults (mean age = 72.2 [\pm 6.4] years old; 51 females).

Methods: Data from non-disabled subjects with complete force-plate data in the Human Balance Evaluation Database were analyzed. Measures included demographics and the Short Falls Efficacy Scale-International (FES-I), Trail Making Test (TMT-A, TMT-B), Mini Balance Evaluation Systems Test (mini-BEST), and force-plate data that was collected following an adapted Clinical Test of Sensory Interaction in Balance (a-CTSIB). The force-plate data were processed to calculate the mean intersection point height (zIP) during each a-CTSIB condition. An overall zIP value was derived by summing the mean zIP values for each a-CTSIB condition. Concurrent validity for the zIP values was assessed using Spearman correlations.

Results: Correlations ([95% confidence interval]; p-value) with the overall zIP value were 0.64 ([0.54, 0.73]; < 0.001) for age, -0.19 ([-0.35, -0.03]; 0.019) for FES-I (total score), 0.45 ([0.31, 0.57]; < 0.001) for TMT-A (time), 0.45 ([0.31, 0.57]; < 0.001) for TMT-B (time), and -0.46 ([-0.58, -0.32]; < 0.001) for mini-BEST (total score).

Conclusion(s): The overall zIP value obtained while assessing sensory interactions in standing is a valid balance metric.

Clinical Relevance: The zIP is a promising new measure for evaluating sensory contributions to balance.

Validity and Reliability of a Computer Vision-based Kinematic Measure of Hand Dexterity

Authors:

Edwin Jung, SPT, SUNY Upstate Medical University
Syna Matchanickal, SPT, SUNY Upstate Medical University
Alexandra Messur, SPT, SUNY Upstate Medical University
Jocelyn Penteck, SPT, SUNY Upstate Medical University

Abstract:

Purpose: To identify the reliability and validity of computer vision-based kinematic measures to assess hand dexterity.

Participants: Sixteen non-disabled young adults (average age of 25, 10 females, 6 males)

Methods: Participants performed Box and Block Test (BBT) and Modified Box and Block using chopsticks (mBBT) on each hand, and Chopstick Object Pickup Test (COPT) on non-dominant hand at two different time points (T1, T2) with a week difference. We recorded the kinematics of chopstick performance during COPT using stereo cameras. Following kinematic variables were calculated: performance duration, peak velocity, time to peak velocity, and movement jerkiness. We performed ICC(3,1) and ICC(3,k) analyses to assess the test-retest reliability of mBBT and COPT, as well as Pearson correlation analysis to assess the concurrent validity of these new tests.

Results: Modified BBT and COPT kinematic variables did not show statistically significant concurrent validity than the BBT (correlation coefficients ranged from 0.01 to 0.41). The mBBT and the COPT performance duration showed moderate test-retest reliability (ICC ranged from 0.61 to 0.79).

Conclusion: Computer vision-based fine hand motor skill kinematic measure is moderately reliable, but these lack significant concurrent validity with the BBT, likely resulting from these measures assessing different domains of fine hand motor skills. Further kinematic studies using a motion capture system are required to accomplish the validity of the computer vision-based kinematic measures.

Clinical Relevance: Fine hand motor kinematic measure using computer vision will allow us to assess hand dexterity more objectively in clinical and home-based rehabilitation settings.

Virtual reality setting influences anxiety without modulating body sway

Authors:

Edward, Chen, Department of Brain and Cognitive Sciences, University of Rochester, Rochester NY, USA
Rodriguez, Raul, PhD, Department of Biomedical Engineering, University of Rochester, Rochester NY, USA

Kyle, Critelli, Department of Otolaryngology, University of Rochester, Rochester NY, USA

Benjamin, Crane, MD, PhD, Department of Otolaryngology, University of Rochester, Rochester NY, USA

Eric, Anson, PT, PhD, Department of Otolaryngology, University of Rochester, Rochester NY, USA

Abstract:

Purpose/Hypothesis: Postural control changes when standing at a high height compared to ground level. Co-contraction increases, sway area decreases, and physiological arousal increases. It is unclear whether vision is used differently for postural control when standing at heights in virtual reality (VR).

PARTICIPANTS: Twenty young adults (28 (11.6) years), 8 older non-fallers (72.3 (5.2) years), and 8 older fallers (74.1 (6.0) years) participated.

METHODS: Subjects stood for 8 minutes 3 times each at both both low and high virtual heights. The virtual environment oscillated in pitch at ± 0.6 degrees at 0.2 Hz. Body sway velocity and electromyography was measured at the lower back, tibialis anterior and medial gastroc. RMS sway velocity and co-contraction index were calculated in 30 second bins. Repeated measures ANOVAs were used to determine whether sway RMS or co-contraction levels differed across virtual heights or between groups. Reported fear, anxiety, and stability were correlated with visually induced sway.

RESULTS: In repeated measures ANOVAS, RMS sway ($F_{2,858} = 22.45, p < 0.001$) and leg co-contraction ($F_{2,858} = 35.49, p < 0.001$) significantly increased across groups. Fear and anxiety were positively correlated with visually induced sway magnitude.

CONCLUSIONS: Older fallers had the highest muscle co-contraction and RMS sway velocity followed by older non-fallers and young adults. Although the VR setting did not impact visually mediated sway velocity or muscle co-contraction, higher anxiety was reported at high virtual heights.

Clinical Relevance: Anxiety may be more of a limiting factor in selecting VR based exercises.

Virtual Simulation to Practice Communication and Demonstration of Empathy for Patients with Multiple Sclerosis

Authors:

Lauren Snowdon, PT, DPT. Seton Hall University

Randy Kolodny, PT, DPT, MA. Seton Hall University

Abstract:

Purpose: Simulation with standardized patients has been shown to enhance student confidence and perceptions of self-efficacy with communication. Challenges in the affective domain pose risks for student success in clinical education experiences, indicating the value of training students in these interpersonal skills early in didactic curricula.

Description: This virtual simulation focused on communicating difficult information regarding prognosis and declining function to standardized patients (SPs) portraying clients with multiple sclerosis (MS). SPs provided verbal and written feedback in ten areas of student communication: introduction, eye contact, body language, voice, questioning, use of jargon, demonstration of empathy, seeking the patient's perspective, data collection, and closing.

Summary of Use: Mean SP ratings out of 5 points ranged from 4.10 to 4.71. Through the Plus Delta form and simulation debriefing, students reported the simulation enhanced their communication skills, confidence in delivering difficult information, and ability to accept feedback. Empathetic communication for patients with progressive neurologic disorders was a course topic prior to the simulation, and students, faculty, and SPs highlighted demonstration of empathy ($M = 4.58$) as a key achievement in this simulation. Furthermore, students who participated in this simulation are currently in terminal clinical experiences, and provided qualitative feedback on how simulation prepared them through enhancing communication skills and managing unexpected interactions comparable to those in the clinic.

Importance to Neurologic Physical Therapy: Opportunities to practice verbal and nonverbal communication skills, including demonstration of empathy, in virtual simulation can help prepare students for working with neurologic clients in clinical education experiences.