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Poster Abstracts

A Beta Test of DizzyDx, an Innovative Clinical Decision Support Tool

Authors:

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Abstract

Purpose/Hypothesis: Innovative, responsive, and clinically relevant support tools are useful adjuncts to physical therapy education and clinical competency. DizzyDx is a mobile web application to guide physical therapy students and clinicians through prioritized impairments, building an evidence-supported and case-specific differential diagnosis for the perception of dizziness. The purpose of this Beta Test was to evaluate product design, receive feedback regarding usability, and determine user interest.

Participant(s): DPT students in the Regis University School of Physical Therapy class of 2021 (n=81) were invited to utilize DizzyDx as a supplemental resource for classroom lecture and lab activities related to concussion. Thirty three students and 9 of 12 invited physical therapists practicing in neuromuscular and vestibular rehabilitation engaged with the Web App.

Methods: A video case study provided a clinical reasoning activity for students, while clinicians engaged with the product independently. Google Analytics filtered data for site usage, and participants completed an electronic survey about their user experience.

Results: All users who responded to the post-study survey agreed that DizzyDx was useful, particularly for descriptions of clinical presentations and to differentiate impairments related to dizziness. Through the use of the App, ¾ of the students accurately identified the primary symptoms and impairments in the case. Clinicians intuitively used the App to explore specific impairments, critical thinking, tutorial videos, and supporting evidence topics. Enrollment, time engaged with the App, and feedback from participants were impacted by the onset of COVID-19.

Conclusions: Students were successfully able to navigate DizzyDx in a focused manner to promote early clinical reasoning. Experienced clinicians retrieved specific information to potentially elaborate on their prior knowledge. Clinical Relevance: DizzyDx is an innovative clinical decision support tool warranting further development for clinical reasoning in DPT education, as a responsive clinical resource, and as a mentoring tool.

A Case of Mistaken Identity: Bell's Palsy versus Ramsay-Hunt Syndrome

Authors:

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Abstract

Background and Purpose: Idiopathic facial paralysis, often referred to as Bell's Palsy, is the most common cause of unilateral lower motor neuron facial paralysis. Once more insidious causes of facial paralysis such as acute stroke are ruled out, patients often present to physical therapy with a diagnosis of Bell's palsy without further investigation. Ramsay-Hunt syndrome causes LMN facial paralysis that often mimics Bell's palsy but has a poorer prognosis and may affect multiple cranial nerves. A thorough evaluation of patients referred to physical therapy with facial paralysis is warranted to ensure all deficits are identified and more accurate treatment to improve functional outcomes and quality of life is provided for patients.

Case Description: 60-year-old female evaluated in the emergency department on 5/20/20 for sudden onset facial paralysis. She was diagnosed with Bell's Palsy.

She was referred to physical therapy for evaluation and treatment of Bell's palsy on 2/3/2021. Findings on initial evaluation included left facial muscle weakness, tightness, and asymmetry. Subjective complaints included feelings of tightness and involuntary movement on the left side of her face and "Feels like my eyes and head are not connected, difficulty with turning".

Outcomes: Cranial nerve examination revealed CN VII and CN VIII dysfunction. mCTSIB revealed severely impaired use of vestibular cues for balance. SOT composite score below normal at 41/100. Gaze stabilization was not measurable on the right.

This patient was referred to audiology for vestibular function testing which revealed an 85% unilateral left vestibular hypofunction.

The patient was referred to a trained vestibular rehabilitation specialist resulted in an improvement in balance, gait, and motion sensitivity. It is imperative for physical therapists to properly evaluate all patients with facial paralysis for vestibular impairments due to misdiagnosis of Ramsay-Hunt syndrome which can affect multiple cranial nerves, including the vestibular nerve.

A Survey of Clinical Readiness for Practice in Vestibular Rehabilitation by Entry-level Physical Therapist Graduates

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Abstract

Purpose/Hypothesis:

Vestibular rehabilitation (VR) education in physical therapy curricula shows wide variability in content and expected competence of graduates. Clinical needs and expectations of new physical therapist (PT) graduates to perform VR are unknown. The purpose of this research is to determine PTs' and PT managers' perceptions of new graduates' knowledge, skills, and level of competence needed to practice VR.

Participants:

Eighteen PTs from 4 US geographical regions. Most respondents (66.7%) worked in privately-owned outpatient facilities and had input on hiring decisions (66.7%). Fifteen (83.3%) described their level of VR competence as intermediate or expert.

Methods:

Survey content was adapted from our prior survey of academic programs. The survey examines three themes: 1) Clinician and Clinical Entity Demographics; 2) Expected Level of Knowledge of Foundational Sciences, Diagnostic Groups, Examination and Intervention Knowledge and Skills, and Clinical Decision-Making (rated on a 5-item Likert scale from "Not Important" to "Very Important"); and 3) Level of Expected Clinical Performance in VR (rated on a 6-item Likert scale from "Beginner" to "Specialized"). For the pilot, the survey was distributed to a purposive sample of 30 PTs.

Results:

The four diagnostic groups most frequently rated as "very important" were: BPPV-posterior canal, unilateral vestibular hypofunction, post-concussive dizziness, and central vestibular dysfunction. Eight of eleven oculomotor and vestibular tests were rated "very important". Canalith repositioning maneuver (posterior and lateral canals) and balance re-education were most frequently rated as "very important". Fifty-eight percent of respondents rated expected clinical performance as "intermediate". There was no correlation between expected level of clinical performance and respondents' self-reported competence in VR.

Conclusions/Clinical Relevance:

The pilot study suggests variability of clinical readiness needs. A revised survey planned for Summer 2022 will further describe clinical needs and expectations of new graduates' performance in VR which may influence physical therapist education.

An ear-regular vestibular presentation: Evaluation of a patient with suspected Meniere's Disease

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Background/purpose. Acute dizziness is a common reason that physical therapy (PT) is consulted in the emergency department (ED). The cause of dizziness is often challenging to determine due to the various possible diagnoses including vestibular, cardiovascular, or neurologic processes. Physical therapists with knowledge of the vestibular system can aid in the differential diagnosis of patients presenting to the ED with peripheral causes of dizziness.

Case Description. A 73 year-old male presented to the ED with complaints of room-spinning dizziness, nausea, and vomiting lasting several hours as well as a 2-day history of right ear pain and tinnitus. Initial medical workup revealed a normal computed tomography (CT) of the head. PT was consulted to evaluate the patient for peripheral dizziness. Upon initial examination, the patient had a unidirectional right-beating nystagmus evident through closed eyelids, and the nystagmus was confirmed with fixation removed in infrared goggles. PT made recommendations to the ED providers on symptom management for an acute peripheral vestibular dysfunction; however, even after receiving diazepam and meclizine, the patient continued to experience severe symptoms and required an overnight stay in the hospital for observation.

Outcomes. When the patient was re-assessed by PT the day following symptoms onset, his symptoms were mostly resolved. He denied any dizziness or nausea but endorsed persistent right ear tinnitus. Examination revealed a negative head impulse test, no visible nystagmus with fixation present in room light, and left-beating nystagmus with fixation removed in the infrared goggles. The patient was able to ambulate independently without any evidence for loss of balance. PT determined that outpatient vestibular therapy was not warranted but recommended follow up with a medical provider specializing in diagnosis of vestibular conditions.

Discussion. When an individual presents to the ED with complaints of dizziness, ED providers must be able to differentiate between different types of peripheral dizziness. A patient's description of symptoms including onset, triggers, duration, and concurrent aural symptoms, can be correlated with the presence of nystagmus to help guide a clinician's differential diagnosis. This case describes a patient who experienced an episode of spontaneous vertigo that lasted several hours as well as aural symptoms. His initial nystagmus beat towards the symptomatic ear, suggestive of an irritation or excitation of the right vestibular system that can be seen with an acute Meniere's attack. As the patient's symptoms subsided, the nystagmus changed directions to reveal a left-beating nystagmus, suggesting an inhibition of the right vestibular system. This change in nystagmus is seen during the recovery phase of a Meniere's attack. Therefore, it was concluded that the patient's clinical presentation was most consistent with Meniere's disease.

Clinical Relevance. The role of PTs in evaluation and treatment of acute dizziness in the ED has continued to grow. While vestibular therapy is not typically indicated in an acute Meniere's attack, PT can provide recommendations regarding acute symptom management and provider

ANAM cognitive battery associations with physical performance in individuals with mild traumatic brain injury

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Abstract

Purpose: The Automated Neuropsychological Assessment Metrics (ANAM) is a computerized assessment of cognitive function used by the Department of Defense as part of a comprehensive health assessment. While relationships have been described between cognitive batteries and tests of physical performance in adolescent athletes, no studies have described a relationship between ANAM scores and tests of physical performance in adults. Understanding the relationship between the ANAM component scores and physical performance in adults recovering from mild traumatic brain injury (mTBI) may assist in a recognition of lingering multisystem impairments. Thus, the purpose of this study was to assess the association between ANAM throughput scores and the outcomes of two challenging physical performance tests – the modified Illinois Agility Test (mIAT) and the High-Level Mobility Assessment Tool (HiMAT).

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

Methods: As part of a larger study, participants completed the ANAM, the HiMAT, which assesses functional mobility during walking, running, hopping, etc., as fast as possible, and the mIAT, which requires maximum speed agility running. Backward logistic regression identified the relationship between the ANAM component throughput scores and the HiMAT score and mIAT time.

Results: Six of the 7 ANAM throughput scores were correlated to the HiMAT total score ($r=.447-.578$) or mIAT time ($r=-.445--.597$). The Mathematical Processing throughput showed no correlation ($r=.044$). Backward stepwise regression retained two statistically significant variables, Matching to Sample and Simple Reaction Time Repeat as associated with HiMAT. Procedural Reaction Time and Simple Reaction Time Initial were associated with the mIAT time.

Conclusions/Clinical Relevance: Identifying components of cognitive functioning that relate to performance on challenging physical tasks may assist clinicians in identifying subtle deficits that may affect duty or activity readiness. Verification is needed in military and athletic civilian populations.

Balance deficits after mild Traumatic Brain Injury differ across timeframes of recovery

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Abstract

Purpose/Hypothesis: Recovery after mild Traumatic Brain Injury (mTBI) is complex and ongoing balance complaints are slow to resolve. We explored sensory and motor contributions to balance control after subacute (3 months).

Participant(s): Participants included 58 healthy controls (HC) (mean±SD: 36.9±12.7 yrs, 35 F), 112 people with subacute mTBI (34.1±11.8 yrs, 85 F, median 45 days post-mTBI), and 49 people with chronic mTBI (38.8±11.2 yrs, 33F, 398 days post-mTBI).

Methods: Central Sensorimotor Integration test measured sensory ('vestibular weighting'), motor activation ('stiffness') and time delay in response to low amplitude surface perturbations with eyes closed. General linear models evaluated group differences. Bonferroni corrected p-values with Cohen's D effect sizes (ESd) on pairwise group differences are reported.

Results: The subacute mTBI group had significantly lower vestibular weighting relative to HC group ($p < 0.001$, ESd=0.53) and chronic mTBI group ($p=0.01$, ESd=0.39). There was no difference between HC and chronic mTBI groups. The chronic mTBI group had significantly reduced stiffness relative to HC group ($p=0.003$, ESd=0.66) and to subacute mTBI group ($p=0.003$, ESd=0.43), with no difference between HC and subacute mTBI groups. Relative to the HC group, the mean time delay was significantly longer for subacute mTBI ($p < 0.001$, ESd=0.69) and chronic mTBI groups ($p < 0.001$, ESd=0.82), with no difference between the mTBI groups.

Conclusions: Vestibular weighting was reduced in subacute mTBI but resolved over time. Both mTBI groups had lengthened time delays. Stiffness was initially unaffected by injury but later was reduced in the chronic mTBI group. Stiffness reduction may be a compensation for lengthened time delays.

Clinical Relevance: Depending on time since injury, different rehabilitation approaches may be needed with a focus on vestibular reweighting in subacute and motor activation in chronic mTBI.

Blood Flow Restriction and Endurance Training to Improve Sexual Mobility for an Individual with Chronic Incomplete Spinal Cord Injury

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Abstract

Background/purpose: To report the successful application of blood flow restriction training to improve mobility and endurance for sexual activity in an individual with chronic incomplete spinal cord injury.

Case Description: 59 year old cis gendered male 18 years following nontraumatic incomplete spinal injury. Primary goals were to improve sexual mobility and endurance.

Outcomes: Patient attended 14 sessions of physical therapy emphasizing blood flow restriction training during task specific exercise and endurance training. Blood flow restriction was applied during bridging, tall kneeling, and supine hip abduction exercises. Endurance training included recumbent stepper and treadmill training. Significant subjective improvements were reported in sexual mobility (Patient Specific Functional Scale improved from 5/10 to 8/10; MDC = 2), physical quality of life (WHOQOL-BREF physical domain improved from 38% to 50%) and social quality of life (WHOQOL-BREF social domain improved from 31% to 69%). Objective improvements included changes in functional strength (5 Times Sit to Stand improved from 27 seconds with upper extremity support to 16 seconds with no upper extremity support; cut off score=12), and endurance (6 Minute Walk Test improved from 143m to 163m; MDC =45m).

Discussion: Task specific exercises in combination with blood flow training and endurance training were successful in improving sexual mobility and endurance in an individual with chronic incomplete spinal cord injury.

Clinical Relevance: In order to improve the participation level of the ICF model, physical therapists should consider sexual mobility and quality of life when indicated by patient goals. Blood flow restriction training may be a beneficial intervention to improve function related to sexual mobility and endurance.

Can rehabilitation of turning in people with Parkinson's disease improve daily life turns and falls?

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Abstract

PURPOSE/HYPOTHESIS: The majority of people with Parkinson disease (PD) have difficulty turning, even early in the disease. We currently lack interventions aimed specifically at improving turning in PD. Therefore, we developed a Turning Rehabilitation program, to target the underlying constraints that impair turning. We hypothesize that rehabilitation focused on the underlying constraints that impair turning will improve quality of turning in daily life and reduce falls.

PARTICIPANTS: We will recruit 60 people with PD (55-85 years; Hoehn & Yahr score of II-IV), who have experienced one or more falls in past 12 months.

METHODS: Participants will be randomized into either Turning Rehabilitation or Control (no intervention). For the intervention (3 times per week for 6 weeks), participants will spend 10-15 minutes at each exercise station focusing on particular constraints of turning ability including, axial rotation, weight-shifting, and functional turning of various speeds and angles.

To measure turning at home, participants will wear inertial sensors on feet and lumbar level (APDM) for seven days and the primary outcome will be the change in turn angle amplitude during daily-life, a measure known to be impaired in people with PDs. We will also track prospective falls over 12 months.

RESULTS: We are presenting the protocol for our Turning Rehabilitation program, so there are no results to include now but we anticipate an interim analysis by the time of the conference.

CONCLUSIONS: We anticipate that the intervention group will improve turning during daily life, leading to reduced falls in the subsequent year.

CLINICAL RELEVANCE: Our results could shape how physical therapists focus their intervention on turning in people with PD and our novel measurements of turning over seven days of daily life with body-worn, inertial sensors could provide novel functional outcomes to measure efficacy after rehabilitation.

CANVAS: A Case Presentation

Authors:

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Abstract

Background/Purpose: Cerebellar Ataxia with Neuropathy and Vestibular Areflexia Syndrome (CANVAS) is a rare genetic disorder that is thought to be underdiagnosed. The syndrome can lead to impaired mobility, falls, and other comorbidities.

Case Description: The patient is a 63-year-old male with history of CANVAS with genetic testing positive for RFC1 expansion. Peripheral neuropathy, tinnitus, oscillopsia, history of falls, and impaired fine motor control combine to limit functional mobility. On initial evaluation Activities Balance Confidence (ABC) 76%, Dizziness Handicap Inventory (DHI) 44/100, Functional Gait Assessment (FGA) 20/30, clinical Dynamic Visual Acuity (DVA) 5-line loss and gait speed 1.02 m/sec. Evaluated using Vestaid, which demonstrated impaired head speed compliance and eye gaze compliance across multiple background/target scenarios. Initiated dynamic balance activities including eyes closed to remove visual input, dynamic balance on uneven surfaces, narrow base of support, gaze stabilization, and visual motion sensitivity training.

Outcomes: After completing seven visits of vestibular physical therapy, patient's ABC score 81%, DHI 50/100, FGA 27/30, DVA 4-line loss, and gait speed 1.13 m/sec.

Discussion: More improvements were noted with balance, opposed to subjective dizziness reports. Educated on leading with eyes prior to head movement to improve vision when turning, vision removed and uneven surface balance for neuropathy impairments demonstrated carry over to functional activities. Convergence exercises were utilized for retraining. Due to the complexity of CANVAS effecting multiple neurological processes, a multifactorial approach was utilized. His gaze and head speed accuracy were improved at visit seven.

Clinical Relevance: This patient's gait and balance improved over 3 months of balance, gait, and eye movement retraining.

Changes in Head Kinematics Post Vestibular Rehabilitation.

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Abstract

Purpose/Hypothesis: Several studies demonstrated significant differences in head kinematics (HK) between patients with vestibular dysfunction (VD) and healthy controls(1–4) that go beyond postural sway. This study aimed to determine whether sensory integration strategies via HK change in patients with VD following vestibular rehabilitation.

Participants: 30 patients with VD were recruited, 12 did not complete (6 due to covid-19 pandemic, 6 for other reasons), 1 is still participating. Nine patients randomized to the traditional group, and 8 to the app group completed.

Methods: Participants stood on floor, feet hips-width apart, looking straight ahead. They experienced 2 levels of stars (static or moving anterior-posterior at 0.2 Hz, 32mm) and white noise (none or rhythmic) via the HTC Vive. Each scene lasted 60 seconds and repeated twice (8 minutes total). Head Directional Path (DP) and Root Mean Square Velocity (RMSV) was quantified in 5 directions: anterior-posterior, medio-lateral, Pitch, Yaw, and Roll. Participants performed the assessment prior to randomization into an 8-week virtual reality or traditional vestibular rehabilitation program and post completion.

Results: No changes were observed with rhythmic sounds hence sounds levels were combined. Mediolateral RMSV ($P < 0.05$) and anterior-posterior DP and RMSV ($P < 0.01$) showed a significant increase between the static and dynamic visual conditions. Both groups showed significant decreases in HK following 8 weeks rehabilitation in mediolateral RMSV ($P < 0.01$), pitch DP and RMSV ($P < 0.01$).

Conclusion: Both groups changed HK similarly regardless of rehabilitation approach. While differences between the static and dynamic scenes did not change, HK decreased overall, potentially due to the static visual scene being different from real-world visuals.(5)

Clinical Relevance: Changes in HK indicate possible changes in sensory integration post rehabilitation. This is a small sample, and larger studies are needed. HK could be a good in-clinic assessment of vestibular dysfunction and potential outcome measure for rehabilitation.

Changes in Perceived Sense of Direction in Persons with Vestibular Disorders

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Abstract

Purpose/hypothesis: This study aimed to determine if there were any changes in perceived spatial navigation abilities after the onset of vestibular disorders by using the Santa Barbara Sense of Direction Scale (SBSOD).

Participants: One-hundred participants (mean age:49±1 years; 73% female) diagnosed with vestibular disorders were recruited from a tertiary care clinic.

Materials/Methods: Participants completed the SBSOD scale (1-7, higher scores indicate a better sense of direction) to report their sense of direction prior to dizziness (SBSOD-prior) at the beginning of the baseline visit, then were asked to complete the SBSOD later in the same visit (SBSOD-Baseline), and electronically at three months (SBSOD-3M). Participants completed the Dizziness Handicap Inventory (DHI, 0-100, lower is less handicap) and the Activities-specific Balance Confidence scale (ABC, 0-100%, higher scores indicate greater confidence) at baseline. Wilcoxon signed-ranks test was used to measure the difference between each SBSOD measurement pair. Spearman's correlation coefficient rho was used to determine the association of the SBSOD-baseline with the DHI and the ABC.

Results: The mean scores were 4.6±1.1 for the SBSOD-prior; 4.5±1.2 for the SBSOD-Baseline; and 4.7±1.2 for SBSOD-3M. There was a statistically significant difference between SBSOD-prior and SBSOD-3M, with better scores prior to the onset of dizziness ($Z=-2.9$, $p=.003$). The SBSOD-baseline had a significant positive correlation with the ABC score ($\rho=0.4$, $p<0.001$) and a significant negative correlation with the DHI total score ($\rho=-0.3$, $p=0.001$).

Conclusions: Sense of direction was worse prior to the onset of dizziness compared to the three-month follow-up. A higher SBSOD (better sense of direction) was associated with less dizziness-related perceived disability and better balance confidence.

Clinical relevance: Spatial abilities can be affected in persons with vestibular disorders. The SBSOD scale is a patient-reported outcome measure that could assist in identifying spatial navigation problems and can be easily administered in the clinic.

Clinical Decision-Making Algorithms for Use of the Updated Clinical Practice Guideline for Peripheral Vestibular Hypofunction: From Research to Practice

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Abstract

Purpose: The purpose is to introduce two algorithms for clinical decision-making for evaluating and treating patients with peripheral vestibular hypofunction based on the updated Clinical Practice Guideline (CPG) for Peripheral Vestibular Hypofunction.

Description: The Vestibular Rehabilitation for Peripheral Vestibular Hypofunction CPG was updated in 2021. The CPG Knowledge Translation Task Force, appointed by the Academy of Neurologic Physical Therapy, developed and updated knowledge tools, including clinical decision-making algorithms that synthesize and disseminate recommendations in the updated CPG.

Summary of Use: The first algorithm is intended to assist licensed physical therapists to select examination tools and outcome measures for patients with peripheral vestibular hypofunction who are experiencing symptoms. The second algorithm assists clinicians to make treatment decisions based on their assessment.

Importance to Neurologic Physical Therapy: Peripheral vestibular hypofunction can lead to falls, difficulty with occupational and recreational activities as well as activities of daily living, and decreased quality of life. The updated Vestibular Rehabilitation for Peripheral Vestibular Hypofunction CPG strongly recommends supervised vestibular rehabilitation for patients with acute, subacute, and chronic peripheral vestibular hypofunction. New recommendations include early intervention for patients with an acute peripheral hypofunction and the inclusion of dynamic balance exercises in the vestibular rehabilitation program. We will demonstrate how algorithms can be effectively used to guide evidence-based examination and intervention for patients with peripheral vestibular hypofunction.

Clinical Implementation of Vagus Nerve Stimulation Paired with Rehabilitation in Stroke

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Abstract

Purpose: Propose guidelines for evidence-based clinical implementation of Vivistim Vagus Nerve Stimulation (VNS) paired with rehabilitation for upper limb deficits after stroke.

Description: VNS paired with rehabilitation for upper limb motor deficits after ischemic stroke was recently approved by the FDA. The approval was supported by data from a multisite, randomized, triple-blind, sham-controlled trial (VNS-REHAB trial, NCT03131960). We will summarize the trial results and propose implementation strategies and guidelines to support its use in rehabilitation clinics.

Summary: 108 chronic stroke survivors with moderate to severe arm impairment were implanted with the Vivistim device. Participants received rehabilitation combined with VNS (Paired VNS) or sham stimulation (Control). The rehab treatment component in both groups was based on task-specific, goal-directed, and high-repetition upper limb practice. Participants completed 18 sessions of in-clinic therapy (90 minutes/session, >300 repetitions, on average), followed by 3 months of daily home exercises. Participants who received Paired VNS showed statistically significant and clinically meaningful improvements in both impairment and function that were 2-3 times greater compared to Controls. A clinically meaningful response occurred in approximately 50% of participants who received Paired VNS. There were no serious adverse events related to stimulation. A post-hoc analysis found that beneficial effects of Paired VNS were not influenced by age, sex, severity, time from stroke, stroke location, and paretic side. These findings suggest that therapy parameters from the VNS-REHAB trial should be implemented clinically to ensure similar outcomes.

Importance: VNS paired with rehabilitation is a promising therapy for stroke survivors with chronic upper limb impairments, with Physical and Occupational Therapy as key drivers of the treatment. Understanding important criteria including patient selection by the interdisciplinary team, safety, therapeutic components, consistency in delivery, reimbursement landscape, and experience gained from clinicians will facilitate implementation and garner wider adoption of an evidence-based neurorehabilitation therapy for stroke survivors.

Clinical Practice Guideline on Physical Therapy Management After Concussion: Clinician Knowledge and Perceptions Impacting Implementation

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Abstract

Purpose: The clinical practice guideline (CPG) for PT evaluation and treatment after concussion¹ summarizes current best evidence and recommendations to aid clinical decision making around examination and intervention when managing patients after concussion. Translation of research to clinical practice can take up to seventeen years, but focused implementation programs may reduce this time and improve evidence-based patient care.³⁻⁵ The knowledge-to-action cycle outlines a framework to guide implementation programs and begins with assessing the know-do gap.³⁻⁵ The purpose of this study was to 1) assess clinicians' perceived knowledge, confidence, and barriers in applying CPG recommendations¹ and 2) assess clinicians' baseline knowledge of CPG recommendations.

Participant(s): Twelve clinicians (9 PT's, 3 PTA's) practicing in an outpatient setting completed the perceptions survey. Eighteen clinicians completed the knowledge of CPG pre-test assessing baseline knowledge.

Methods: Clinicians completed an anonymous survey assessing perceived knowledge, confidence, and barriers in applying the recommendations from the CPG.¹ Clinicians participating in the implementation program completed a 20-question pre-test to assess baseline knowledge prior to beginning a concussion CPG education program

Results: 67% of clinicians were unaware of the published CPG. 71% of clinicians who have treated patients with concussion indicated weakness addressing vestibulo-ocular management. 71% identified addressing exertional tolerance and progressing patients as a weakness. Clinicians (n=18) scored an average of 64% (range 50-80%) on the 20-question baseline knowledge assessment.

Conclusions: The main barrier to implementation was the lack of knowledge of CPG recommendations. Content with low baseline knowledge included prioritization of examination, vestibular domain, and application of exertional tolerance interventions, correlating with reduced clinician confidence with the vestibular-ocular domain.

Clinical Relevance: It is important to assess confidence and baseline knowledge of clinicians on CPG recommendations to help guide the development of an implementation program tailored to the needs of the clinical setting.

Comparing Pre and Post Physical Therapy Core Outcomes after Implementation of High Intensity Gait Training for Chronic CVA, iSCI, and TBI

Authors:

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Abstract

Purpose: The Academy of Neurologic Physical Therapy published a Clinical Practice Guideline to improve locomotor function of chronic CVA, iSCI, and TBI in January of 2020. The purpose of this project was to retrospectively compare patient outcomes from pre and post implementation of HIGT.

Participants: Examined patient populations included subacute and chronic CVA, iSCI, and TBI.

Methods: The implementation of the clinical practice guideline was guided by the Knowledge to Action Framework. Six months after implementing the project, data was collected retrospectively via chart review. Information reviewed included progress in the 10mWT, 6minWT, and number of sessions to reach the MCID in one of these outcome measures. Data was pulled for 15 patients both pre and post implementation.

Results: Of the 15 patients seen prior to implementation, 53% met the MCID on the 10MWT with an average visit count of 15.25. None of the patients prior to implementation received the 6minWT during initial evaluation, progress note, or discharge. Of the 15 patients post implementation, 63% met the MCID on the 10MWT and 81.25% met the MCID on the 6minWT with an average visit count of 14.14. Therapists were successful in meeting the patient intensity goal in 62.73% of sessions.

Conclusions: Implementation of the clinical practice guidelines of high intensity walking interventions for subacute and chronic CVA, iSCI, and TBI resulted in higher success rates for both walking speed and walking endurance when compared to traditional therapy. More so, these improvements were seen in fewer sessions. These benefits demonstrate that higher intensity walking interventions are both feasible in the outpatient rehabilitation setting as well provide improved recovery and utilization of resources.

Clinical Relevance: High intensity gait training is feasible in a multicenter outpatient neurological center for improving rate of recovery for subacute and chronic patients with CVA, iSCI, and TBI.

Concussion self-efficacy in screening, examination, and intervention: Knowledge Translation Approach

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Abstract

Purpose/Hypothesis:

The purpose of this project is to examine Physical Therapist (PT) self-efficacy related to managing individuals who have experienced a concussion/mTBI. Our survey aimed to analyze confidence in practice patterns since publication of the PT Evaluation and Treatment After Concussion/Mild Traumatic Brain Injury (CPG). This survey also allowed us to identify knowledge gaps and CPG use for creating interventions for patients.

Participant(s):

PTs and PTAs

Methods:

A longitudinal survey design methodology was utilized to gather baseline data of current confidence and practice patterns among PTs in the United States. An electronic survey platform, Qualtrics™ was used to query constructs of self efficacy using the General Self Efficacy scale adapted to concussion management. Self-efficacy was rated using a Likert scale 1-5 (not confident at all to confident). Statistical analysis was performed using SPSS, version 27.

Results:

179 therapists with experience of five or less years (24.5%), six to 10 years 26.3%, and greater than 10 years 49.2%. 70.9% had read or used the CPG resources. Mean satisfaction of patient outcomes was 3.83 (.85). Significant differences between groups existed for those who had used the CPG ($p \leq .001$) and those who had completed CEU training ($p \leq .001$) for all areas of self efficacy. The most preferred method of CPG dissemination was patient education material followed by CEUs courses.

Conclusions:

Therapists demonstrated overall high self-efficacy in the management of concussion/mTBI, but differences still existed between groups. Future knowledge translation projects should target easy to use CPG patient education materials and accessibility to CEUs on this topic.

Clinical Relevance:

Surveying Physical Therapists' knowledge, confidence level and clinical practice patterns can help drive continuing education opportunities, further research, and resource development.

Could vestibular-ocular dysfunction contribute to exercise intolerance after mild Traumatic Brain Injury?

Authors:

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Abstract

Purpose/Hypothesis: Exercise intolerance is a known deficit in patients with mild traumatic brain injury (mTBI), thought to be attributed to autonomic dysfunction. Another possible contributor to exercise intolerance could be non-resolving vestibular-ocular motor deficits that could evoke symptoms on the Buffalo Concussion Treadmill Test (BCTT), a common test measuring exercise intolerance. The goals of this study were to 1) characterize improvements in exercise intolerance in adults with mTBI after multi-modal rehabilitation and 2) determine if people with persistent exercise intolerance, post-rehabilitation, had non-resolving vestibular-ocular symptoms.

Participants: Thirty-six exercise intolerant people with subacute mTBI (mean±SD; age 36.0±12.2 yrs, 28 F, 73.9±33.2 days post mTBI), who were still symptomatic (Neurobehavioral Symptom Inventory 35.4±16.4) were included in this study. One extreme outlier was removed from analysis.

Methods: Exercise intolerance was assessed using the BCTT (intolerance defined as increase of ≥ 3 symptoms during testing). Vestibular-ocular symptoms were assessed using the Vestibular Ocular Motor Screening (VOMS) tool total change scores; before and after 6-weeks of multi-modal rehabilitation including cervical, aerobic, static and dynamic balance exercises. T-tests compared groups with significance set at $p=0.05$.

Results: After rehabilitation, 63% of the participants who were initially intolerant, passed the BCTT, leaving 43% participants who remained exercise intolerant. There were no differences (p -values > 0.5) in baseline characteristics (age, time since injury) and VOMS of those who did not improve compared to those who improved in exercise tolerance. After rehabilitation, participants who remained exercise intolerant had smaller improvements compared to those who became exercise tolerant in the VOMS (-0.4 ± 8.7 vs -8.7 ± 9.3 ; $p=0.02$).

Conclusions: Although the majority of participants improved their exercise tolerance with multi-modal rehabilitation, some participants remained intolerant. This non-responder group also did not improve on VOMS testing.

Clinical Relevance: Ongoing impairments in vestibular-ocular function may contribute to exercise intolerance in people with mTBI.

Determining the validity of the Ability Lab Vestibular Screening Tool (AVEST+) in moderate to severe TBI patients in an acute IP Rehab Setting

Authors:

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Jenny Sampras, PT, DPT
Hannah King, PT, DPT, NCS

Abstract

Purpose:

To determine the incidence of vestibular dysfunction in patients with traumatic brain injury admitted to acute inpatient rehabilitation, and to determine the validity of the AVEST (subjective questionnaire) and AVEST+ (additional brief oculomotor screen and vestibular exam) as effective screening tools for vestibular dysfunction.

Hypothesis:

The AVEST and AVEST+ are effective and efficient tools for assessing the incidence of vestibular dysfunction in patients with moderate to severe traumatic brain injuries admitted to acute inpatient rehabilitation.

Participants:

- Patients admitted to an inpatient brain injury service with a diagnosis of acute/subacute moderate to severe traumatic brain injury, defined by an initial Glasgow coma scale < 13 and/or evidence of intracranial injury on neuroimaging
- Able to complete vestibular screening evaluation
- Age >18
- Fluent in English

Methods:

All patients admitted to acute inpatient rehabilitation with the diagnosis of acute/subacute moderate to severe traumatic brain injury were considered for inclusion. 100 subjects consented. Trained assessors administered the AVEST and the AVEST+. Of the 100 patients consented, 85 patients completed a full vestibular exam by a trained vestibular therapist. The vestibular therapist was blind to the results of the AVEST and AVEST+.

Results:

The AVEST and AVEST+ were not sensitive tools to detect vestibular dysfunction in this patient population. The AVEST had a Cohen's Kappa value of .120 and $p=.221$. The AVEST+ had a $k=.066$ and $p=.520$.

Conclusions:

Our secondary aim looking at incidence revealed 65% of the subjects had vestibular dysfunction. 33% of patients that screened negative on the screening tools tested positive for vestibular dysfunction after a full exam, with 57% having posterior canal BPPV.

Clinical Relevance:

It is critically important that this patient population receives a full vestibular evaluation when able to safely participate, even in the absence of subjective symptom report, to better inform plan of care.

Development of Person-Centered Reference Values for Computerized Dynamic Visual Acuity to Support Customized Treatment Decisions in Vestibular Rehabilitation

Authors:

Andrew Kittelson, PT, PhD

Michael Schubert, PhD

Dale Roberts, MS

Brian Loyd, PhD

Abstract

Purpose: Clinical practice guidelines for vestibular rehabilitation recommend customized treatment plans. Additionally, computerized Dynamic Visual Acuity (cDVA) is a recommended outcome measure. However, cDVA varies substantially across individuals according to non-modifiable characteristics (e.g., age), potentially impeding customized care decisions. The purpose of this study was to develop person-centered reference values for cDVA scores and compare these to reference values based on age alone.

Participant(s): This analysis used cDVA scores from adults who participated in the NIH Toolbox Study (n=1193, 762 female).

Methods: The cDVA measure consisted of computerized assessments of visual acuity; cDVA scores were operationalized as the difference in LogMAR between static and dynamic conditions. Age-based reference values for cDVA were calculated using Generalized Additive Models for Location Scale and Shape (GAMLSS package; R Statistical Computing). Person-centered reference values were calculated via a neighbors-based approach, wherein a person's 100 nearest neighbors were selected from the full sample based on age, sex, and static visual acuity. The cDVA scores from these 100 neighbors were used as reference values. Reference values were examined via the following metrics: 1) Precision: the average width of the interquartile range (IQR) of the reference values, and 2) Coverage: the proportion of realized measurements that fell within the IQR.

Results: Age-based reference values for cDVA demonstrated a mean IQR (95% Confidence Interval) of 0.241 (0.233, 0.250) LogMAR. Person-centered reference values demonstrated a precision of 0.191 (0.189, 0.192) LogMAR. For age-based reference values, 54.8% (53.4, 56.2) of realized measurements fell within the IQR; for person-centered reference values, 49.7% (48.3, 51.1) of realized measurements fell within the IQR.

Conclusions: Person-centered reference values for cDVA scores demonstrated greater accuracy and precision compared to age-based reference values.

Clinical Relevance: Person-centered reference values may improve customization of treatment plans in vestibular rehabilitation by offering enhanced precision when interpreting cDVA scores.

Development of Transdisciplinary Care Teams for Vestibular Rehabilitation

Authors:

Anna Mangano, PT, DPT
Paige Stivers, PT, DPT, ATC

Purpose: To improve patient outcomes and cost effectiveness with Vestibular Physical Therapy (VRT) through a transdisciplinary team approach.

Description: The Transdisciplinary team includes an ENT, Audiologists, multiple Physical Therapists, Speech Therapists, Neuropsychologist, Counselors, Occupational Therapists, Neuro-ophthalmologists and Neurologists.

Summary of Use: Our team will receive a patient from a Physician to “evaluate and treat” for PT. During the evaluation, therapists assess for vestibular involvement, visual impairment, physiological distress, cervical spine screening, and a global neurological screen. If further vestibular work up is warranted, the patient with dizziness is sent to the ENT who works with our team. Experience has taught the therapists that patients recover the fastest when they have a confirmed vestibular diagnosis. While awaiting confirmation of diagnosis the PT will make appropriate referrals to other healthcare providers, including Counselors and Neuropsychological services. Physical therapist testing that is positive for central based dysfunction without explanation or a positive cervical spine screen will be sent back to the referring physician in order to get imaging to rule out red flags. During treatment, our team starts with one PT treating the patient; however, depending on complexity and patient progression or plateau, other PT’s are included on the treatment team. This improves patient outcomes and builds an atmosphere of learning within the team. Consistent and frequent communication occurs between PT’s and other members of the care team to ensure patients’ needs are being addressed.

Importance to Neurologic Physical Therapy: Use of a transdisciplinary team improves healthcare costs and patient recovery time. It creates an atmosphere for education among the team and fosters lifelong learning.

Differences in Head Kinematics between individuals with Bilateral and Unilateral Hearing Loss

Authors:

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Abstract

Purpose/Hypothesis: Head Mounted Displays with varying sensory perturbations have been suggested as valid postural control assessments(1,2). Hearing loss (HL) may alter sensory integration for postural control but differences across types and severity of hearing loss are unclear(3–5). The purpose of this study was to compare head kinematics in response to visual and auditory perturbations between people with bilateral (BHL) and unilateral hearing loss (UHL).

Participants: 23 individuals with UHL (mean age=45.74, SD=16.76) and 13 with BHL (mean age=71.69, SD=7.97) participated.

Methods: Participants were standing on the floor, hips-width apart, and looked straight ahead. They experienced two levels of stars (static or moving front to back at 0.2 Hz, 32mm) and white noise (none or rhythmic). Each scene lasted 60 seconds and was repeated twice. The 8-minutes long assessment was conducted in a clinic. Participants' head kinematics were recorded via the HTC Vive. We quantified head Root Mean Square Velocity (RMSV) in the anterior-posterior and medio-lateral directions. Participants also performed the Four Step Square Test (FSST) and the Timed Up and Go (TUG).

Results: Adjusting for age and HL severity, individuals with BHL demonstrated a significant increase in medio-lateral RMSV in response to moving visuals ($p < 0.05$), UHL did not. Individuals with UHL demonstrated significantly lower anterior-posterior RMSV than BHL ($p < 0.05$). Sounds and severity of HL did not contribute to the model. While the UHL group was on average younger, there were no significant differences between groups on TUG (BHL Mean=8.82, SD=3.52; UHL mean=7.32, SD=1.79) or FSST scores (BHL Mean=9.95, SD=3.89; UHL mean=9.04, SD=3.34)

Conclusion: People with BHL demonstrated an expected increase in movement with dynamic visuals but people with UHL had overall reduced movement.

Clinical Relevance: Further understanding of the implications of the type of HL to postural control is needed. Clinicians should incorporate balance assessments in individuals with HL.

Differences in Self-Efficacy and Quality of Life in People Attending a Virtual Parkinson's Disease Exercise Program

Authors:

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Susan Kasser, PhD
Nathanial Stewart, Student

Abstract

Purpose/Hypothesis

Parkinson Disease (PD) is a progressive disorder with a range of symptoms that compromise quality of life (QoL). Exercise is an effective management tool for people with PD, although participation can be limited by many factors. This study examined QoL and self-efficacy for exercise (SEE) from participating in a virtual exercise program for people with PD.

Participants

Participants were recruited from historical records of participation in the "PushBack at Parkinson Disease" program at the University of Vermont Medical Center. Potential participants included 102 individuals diagnosed with PD who had participated in Pushback exercise classes.

Methods

This cross-sectional study used REDcap surveys to assess participation outcomes after 16 months of attendance in a virtual exercise class. Seventy electronic surveys were returned, 53 of which were fully complete. QoL was measured using the PDQ-39 with analysis of the total score and 8 contributing domains. SEE was measured using the Self-Efficacy for Exercise Scale. Participants were divided into 4 subgroups based on class attendance. Due to differences in normality and homogeneity of variances, a Kruskal-Wallis test for independent samples and Dunne post-hoc tests were conducted. Significance was set at $p < .05$.

Results

Significant differences between attendance groups were found for the PDQ-39 total score, ($p = .048$), mobility subscale ($p = .043$), activities of daily living (ADL) subscale ($p = .018$). In general, those with greater attendance reported better quality of life in these domains. There were no significant differences between attendance groups on the other QoL domains or SEE.

Conclusions

Virtual exercise may help foster improved QoL, especially in the domains of mobility and ADLs. Further study and development of virtual platforms is necessary to promote and support these findings.

Clinical Relevance

Physical therapists should encourage community exercise participation for people with PD, including participation in virtual exercise classes, as this may promote QoL.

Does Backward Walking Training have a Role in Decreasing Fall Incidence Post-Stroke?

Authors:

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Abstract

Purpose/Hypothesis: Falls remain a common complication post-stroke. Given the unique postural and motor control demands of walking backward, Backward Walking Training (BWT) may provide benefit. This randomized controlled trial compared fall incidence and walking speed in the first 14 months post-stroke for those who received BWT 2-4 months vs. 1-year post-stroke.

Participants: Fifty-nine adults (40 male; 2.7 ± 0.8 months post-stroke; 33 left hemisphere lesion age: 57.8 ± 12.9 years, mean gait speed 0.38 ± 0.03 m/s).

Methods: Participants were randomized to eighteen sessions (3x/week for 6 weeks) of BWT for 20 minutes on a treadmill with Body Weight Support and 20 minutes over-ground at 2-4 months (Early; n=31) or 1-year post-stroke (Late; n=28) with fall incidence documented monthly. Four categories characterized falls: non-fallers; single, noninjurious falls (S/NI); multiple, noninjurious falls (M/NI) and injurious falls (I). Ten-Meter Walk Test (10MWT) and 3-Meter Backward Walk Test (3MBWT) were assessed at study baseline and completion. Paired t-tests compared the baseline to study completion change scores between the two groups (Bonferroni correction $p < 0.01$).

Results: Fall categorization: 32% (n=19) non-fallers, 17% (n=10) S/NI fallers, 49% (n=29) M/NI fallers, 2% (n=1) I fallers. There were no differences in any category between Early vs. Late group. There were non-significant trends for greater gains in the Late vs. Early group for 10MWT (0.26 vs. 0.19 m/s) and 3MBWT (0.23 vs. 0.15 m/s); $p > 0.01$).

Conclusion: Over half of the cohort experienced at least one fall. BWT at 2-4 months post-stroke did not decrease fall incidence compared to those who did not receive Early BWT (Late group). BWT improved forward and backward gait speed regardless of intervention timing.

Clinical Relevance: Although BWT increased forward and backward gait speed, these gains did not parlay into decreased fall incidence. As fall causation is multi-factorial, a multi-faceted approach is necessary to address this post-stroke challenge.

Does walking capacity contribute to walking activity in Parkinson disease?

Authors:

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Abstract

Purpose/Hypothesis: The purpose of this study was to determine the extent to which walking capacity contributed to walking performance in persons with Parkinson disease (PD) and how this might differ in less active and more active subgroups. We expected capacity to contribute significantly to performance, moreso in less active individuals, but hypothesized a large amount of the variance unexplained.

Participant(s): Cross-sectional baseline data (n=82) were analyzed from a randomized controlled PD trial [1].

Methods: Walking capacity was measured using 6-Minute Walk Test distance (6MWT) and 10-Meter Walk Test fast gait speed (10MWT). Walking performance, operationalized as daily steps and weekly moderate intensity minutes, was captured via an accelerometer over seven days. Regression analyses evaluated contributions of walking capacity to performance for: (1) the whole sample, and (2) less active and more active subgroups.

Results: For the whole sample, 6MWT and 10MWT significantly contributed to daily steps ($R^2=.13$, $p=.001$; $R^2=.07$, $p=.017$, respectively) and weekly moderate intensity minutes ($R^2=.10$, $p=.004$; $R^2=.07$, $p=.015$, respectively). For the less active subgroup, 6MWT was a significant contributor to daily steps ($R^2 = .09$, $p=.045$); both 6MWT and 10MWT were significant contributors to weekly moderate intensity minutes ($R^2 = .25$, $p=.001$; $R^2 = .21$, $p=.002$, respectively). Walking capacity did not contribute significantly to performance in the more active subgroup.

Conclusions: Walking capacity may have limited benefit in understanding some components of walking performance in PD. Other factors should be considered when making inferences about amount and intensity of real-world walking.

Clinical Relevance: Walking limitations are one of the most disabling features in PD and a primary reason for seeking out rehabilitative services [2-5]. Clinicians often assess walking limitations using standardized measures of walking capacity to make inferences about walking performance. However, capacity measures might not tell the whole story, suggesting performance may need to be measured directly.

Effectiveness of Implementing a Single Session of Perturbation Training in the Clinic with Chronic Stroke.

Authors:

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Jennifer Fay, PT, EdD
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Abstract

Background/Purpose: Rates of falls in individuals with chronic stroke are two times higher than those without a neurological condition. It has been found that a single session of perturbation-based balance training (PBBT) can effectively reduce fall risk in the geriatric population, however only study protocols 6-7 weeks long have been explored in the chronic stroke population. The purpose of this study was to investigate the effect of a single session of PBBT on balance and fall risk in an individual with chronic stroke in the clinical setting.

Case Description: Participant was a 46-year-old male, 3 years post left CVA. The participant was independent with ADLs, ambulates without an assistive device with norm speed of .93m/s wearing a right AFO. Participant completed one session of 4, 2-minute rounds of random slips/trips while in a harness.

Outcomes: Clinically significant changes were seen on the reactive section of the Mini-BESTest and the FSST. Slight increases were seen in both comfortable and fast 10-meter walk speeds. The participant progressed to using both impaired and unimpaired legs to take recovery steps by the last round.

Discussion: This study indicated that a single session of PBBT has the potential to improve reactive balance in a patient post CVA. In this study, as the intervention progressed and the force of perturbations increased, the participant began to step with his impaired limb while wearing an AFO.

Clinical Relevance: In one training session the participant demonstrated a new strategy to recover. These improvements have the potential to decrease fall risk, as measured by the performance on the reactive portion of the Mini-BESTest and FSST. Further research implementing a single session of PBBT should be completed with a larger sample size, long term follow up and fall monitoring in order to determine who is best fit for this intervention.

Effects of a telerehabilitation mobility exercise program on motor function of people with chronic stroke

Authors:

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Brittany Samulski, DPT, PhD
Karen Royall, PT, DPT
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Abstract

Background/Purpose: Stroke is a leading cause of long-term disability causing altered mobility, low levels of physical activity, and increased falls. The study purpose is to examine the effects of a group exercise program delivered via telerehabilitation on leg strength, balance confidence, and walking ability in people with chronic stroke.

Case Description: Case series with 4 cases (1 female, 3 males) ages 63-71 years and 3-17 years post-stroke. Assessment of outcomes and intervention were performed via telerehabilitation including Five Times Sit To Stand (FTSTS), 2-minute step test (2MST), 10 Meter Walk Test, and Activities-Specific Balance Confidence (ABC) Scale. Assessment done at program start, 12 weeks and 16 weeks. 45-minute group exercise sessions were completed bi-weekly for 12 weeks.

Outcomes: During FTSTS, three out of 4 cases exhibited faster times at 12 weeks and all cases met MDIC by 16 weeks. MCD was met for Case 2 at week 12 and Case 4 at week 16. During 10MWT (both self-selected and fast speed), all measure changes exceeded MCD and MCID by 16 weeks. Gait changes were associated with a reduction in gait speed. Per ABC Scale, three out of 4 cases indicated increased confidence by week 12, but MDC and MDIC were not met. During 2MST, all cases exhibited an increase in the number of steps from baseline by week 12 and the change persisted at 16 weeks, however there was no significant difference in the number of steps at 12 and 16 weeks.

Discussion: Barriers to community-based programs for stroke were exacerbated by the pandemic. Preliminary results from this case series indicate positive benefits in functional mobility, balance and endurance for individuals with chronic stroke using telerehabilitation exercise evaluation and intervention.

Clinical Relevance: Community wellness program administered as part of a telerehabilitation program can be beneficial for patients post stroke.

Electrical Stimulation and Exercise to Facilitate Recovery from Anterior Femoral Cutaneous Nerve Traumatic Injury

Authors:

Nicole Keller, SPT

Abraham Lieberman, PT, DPT, FAAOMPT, NREMT

Abstract

Background/purpose:

Cutaneous nerve injuries may result in paresthesias and weakness to the extremities. We describe electrical stimulation (e-stim) use in regaining sensation and motor control to the anterior femoral cutaneous nerve (AFCN).

Case Description:

A 24-year-old female with left quad weakness and sensation loss due to AFCN injury following a dog bite. The soft tissue injury healed unremarkably with suturing at the ER. Six months later, paresthesias in the left VMO and tibial tuberosity persisted. Neurology referral to physical therapy for evaluation and treatment revealed mild left quad weakness and nearly complete lack of cutaneous sensation from left anterior femoral cutaneous nerve (3.61 monofilament tool). Femoral nerve and AFCN tension tests were negative.

Outcomes:

After 4 weeks of daily e-stim at parameters 20 Hz with 100 microseconds^{1,2}, the patient regained full cutaneous sensation to the AFCN field located on left thigh³ and demonstrated 5/5 MMT in quad strength.

Discussion:

Literature is limited regarding the use of e-stim promoting peripheral sensation regeneration following a traumatic injury.⁴ Research discovered the expression of nerve growth factor in sensory Schwann cells reach a peak within 15 days, after which they generally decline to baseline levels by 35 days after their denervation.⁵ Although our patient was six months post injury without prior observed improvements in her sensation, she experienced full recovery with this program. Our patient previously used e-stim units for other injuries and felt comfortable to set herself up on the machine at home. Including a home e-stim use may not be appropriate for every patient.⁶

Clinical Relevance:

Electrical stimulation helped our patient completely recover from a traumatic cutaneous nerve injury and has potential to help other patients in conjunction with exercise and manual therapy in outpatient physical therapy

Evaluation of Mobile Applications in Neurologic Clinical Practice Using the Mobile App Rating Scale (MARS)

Authors:

Qing Zhang, PT

Hina Garg, PT, MS, PhD, CEEAA

Abstract

Purpose: More than 350,000 mobile health applications (apps) are currently available with 6.7 million people using them.^{1,2} However, there is a lack of understanding on which apps are most appropriate for Physical Therapists (PT) to use in a virtual or telehealth visit. The Academy of Neurologic Physical Therapy (ANPT) formed a Telehealth Taskforce (TT) and the TT, as one of its charges, reviewed mobile apps for neurologic clinical practice. The purpose of this abstract is to describe the process of searching and reviewing current neurologic mobile apps using the Mobile App Rating Scale (MARS) and to provide recommendations for their use in a neurologic telehealth PT visit by providers and patients.

Description: Apps included were freely available in the Apple store till January 2022 and referenced the neurologic Clinical Practice Guidelines (CPGs). Two reviewers from the TT searched and appraised the mobile apps using the MARS independently and categorized them into PT assessment, treatment, and patient education categories.^{3,4,5} The MARS objectively assessed app quality on four dimensions, including engagement, functionality, aesthetics and information. The entire TT reviewed the final process and results. Summary of use: 20 mobile apps were assigned to assessment (n=7), treatment (n=8), and patient education (n=5) categories. Based on the MARS domains, iWalkAssess and P&O Comet (PT assessment), the HR Zone-Target Heart Rate and Instant Heart Rate: HR Monitor (PT treatment), and the BPPV Helper and BPPV Treatment (patient education) were highly ranked. Potential challenges and limitations include lack of generalizability to Android platform, the constant need to update the search to include current apps or updates for the app; and the significant amount of screening needed.

Importance to Neurologic Physical Therapy: These recommendations can enhance the quality of virtual telehealth PT visits by providing ways to include mobile technology in clinical practice and CPGs implementation.

Evaluator Position Influences the Dix-Hallpike Test: A Cross-Sectional Repeated Measures Design

Authors:

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Alexandra Borstad, PT, DPT, FAAOMPT, NREMT

Jon Nelson, PT, PhD

Abstract

Purpose/Hypothesis: Due to the prevalence of false negatives, repeated Dix Hallpike tests are recommended to diagnose Benign Paroxysmal Positional Vertigo (BPPV). The effect of evaluator position on outcome is unknown. This study quantified head movement of a standardized patient (SP) during the Dix Hallpike performed by cranially and laterally oriented evaluators. Head position was compared to the recommended 20° of extension and 45° of rotation; movement velocity was quantified.

Participants: 13 individuals trained to perform the Dix Hallpike participated.

Methods: Participants performed the Dix Hallpike test ten times with an SP from their preferred position. Motion capture markers placed on the SP's head and thorax were used to determine velocity, cervical rotation, and extension. Data were processed with Visual3D and analyzed using t-tests, with the alpha at $p = 0.05$. Error related to position, within, and between participants was calculated using Evaluation of Measurement Systems in JMP. Results: 47 cranial and 76 lateral tests were analyzed. The mean difference from 45° rotation was 4.82° ($p < .001$) for cranial and -.91 ($p = .279$) for lateral evaluators. The mean difference from 20° extension was 11.62° ($p < .001$) for cranial and 13.26° ($p < .001$) for lateral evaluators. With the cranial and lateral respectfully, 23% versus 20% did not achieve 20° extension, and 7% versus 55% did not reach 45° rotation. The lateral evaluators' mean velocity was significantly faster ($p = .049$). The evaluator position contributed to 20% of the variance with rotation but did not contribute to variance with extension or velocity.

Conclusions: Differences in testing within and between evaluators contribute to variation in patient positioning with the Dix Hallpike, adversely affecting repeatability and reliability.

Clinical Relevance: Determining the optimal speed of testing and strategies to improve achieving the recommended head positioning may make BPPV diagnosis more accurate.

Facilitating growth in skills and confidence through interprofessional collaboration between students of physical therapy and optometry to improve care for individuals with traumatic brain injury.

Authors:

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Yutaka Maki, OD, MS
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Susan Smith, PT, DPT, PCS

Abstract

Background/Purpose

-Traumatic brain injury (TBI) often results in complex and diverse functional limitations that are affected by the visual system
-Almost 90% of individuals with TBI experience oculomotor dysfunction, therefore, to achieve optimal outcomes, neurological PTs must screen for referral to and collaborate with Optometrists.
-Interprofessional (IP) care decreases redundancies and improves outcomes, however, few health professions curricula provide IP experiences involving PT and Optometry thus decreasing the likelihood of IP care in practice.

Case Description

-Fifty second-year Doctor of Physical Therapy students and 60 third-year Doctor of Optometry students, in groups of 8-12, participated in collaborative evaluation and treatment of community volunteers with chronic TBI.
-Students completed a preparatory assignment and pre-activity survey, participated in a pre-briefing discussion, completed the collaborative evaluation and treatment, participated in a de-briefing discussion, and completed a post-activity survey.

Outcomes

-108 students completed both the pre and post survey.
-A paired-samples t-test indicated that the differences between pre and post scores were significant at the 95% confidence level on questions 2 through 16 ($p = .001$).
-Qualitatively students reported increased
-Awareness of overlapping roles/areas of treatment,
-Depth and breadth of evaluation and treatment strategies
-Awareness of interdependence of professions
-Mutual appreciation
-Confidence to know when and to whom to refer

Discussion

-Confidence in roles and responsibilities, interprofessional collaboration, and teams and teamwork was improved by a single intentional experiential learning opportunity, addressing numerous three barriers to IP collaboration, which increases the likelihood that students will practice collaboratively.

Clinical Relevance

-PTs with direct access must be prepared to identify, screen, and refer patients with TBI.
-Due to the high incidence of visual impairments following TBI, IP care teams that include Optometry are optimally positioned to improve outcomes.
-Increasing SPT collaborative care capacity for individuals with TBI is vital for optimal patient outcomes.

Feasibility and accuracy of remote aerobic exercise monitoring in people with Parkinson disease

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Abstract

Purpose

Regular aerobic exercise (AE) may alter the progression of Parkinson disease (PD). Unfortunately, most people with Parkinson Disease (PwPD) do not achieve recommended AE guidelines (90-150 min/week). In-home interactive exercise platforms may facilitate access to AE. Commercial platforms, such as Peloton, do not distinguish valid from “test” exercise sessions. As part of an on-going clinical trial (NCT04000360), we implemented an approach to estimate actual in-home AE behavior over 12 months.

Participants

81 PwPD [52(64%) male, age 64.±8.4 yrs; Hoehn and Yahr 2.28(.66)]

Methods

Participants were instructed to cycle 3x/week for 12-months on a Peloton cycle (Peloton Interactive, New York, NY). Successful implementation of monitoring of AE behavior was defined as the ability to gather summary exercise performance data (e.g., ride duration (min), cadence (rpm), workload (kJ) and heart rate (HR [bpm]) for each ride. Once gathered, summary exercise data for bout duration and intensity were examined to identify rides that provided insufficient AE stimulus (ie limited duration; workload, low HR).

Results

Over 9,100 exercise sessions were recorded for 81 participants. Ride duration ranged from 5->60 minutes. In sum, 8,435 of those sessions were considered valid exercise sessions. Participants completed 92.84% of prescribed 150 rides (50 weeks x 3 rides/wk) with a mean/SD of 129.26±53.36).

Conclusion

Using an engaging commercial exercise platform, we successfully implemented a monitoring approach to understand in-home AE behavior in PwPD. The use of workload and intensity data gathered by the platform provided insight into exercise bouts that were of sufficient intensity and duration to contribute to AE physiologic adaptation and to aid in individual exercise progression.

Clinical relevance

Virtual cycling platforms can be used to monitor AE variables in PwPD during home exercise.

Functional Ambulation Category (FAC) in Acute Stroke Predicts Disability at 3 Months

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Julie DiCarlo, MS
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Abstract

Purpose/Hypothesis:

It is difficult to reliably and consistently capture gait speed following stroke in the acute care setting. Therefore, the aim of this study was to determine if the Functional Ambulation Category (FAC) in acute stroke can predict functional outcomes at 3 months as assessed by the modified Rankin Score (mRS). We hypothesized that there would be a strong association between FAC and outcome on the Modified Rankin Scale at 3 months post-stroke.

Participants:

128 individuals enrolled in the Stroke Motor Rehabilitation and Recovery Study at Massachusetts General Hospital (51.6% male; median/IQR age = 64/56-72 years) with ischemic stroke (58.6% cortical) who were ambulatory pre-stroke.

Methods:

The FAC was rated retrospectively by experienced acute care physical therapists through review of physical therapy notes during the acute stroke study period (0-7 days post stroke). mRS was assessed at 3 months by trained examiners. For analysis, mRS was dichotomized as good (0-2) or poor (3-6) outcome. The association between acute care FAC and 3-month post-stroke mRS was analyzed using logistic regression. Baseline variables demonstrating a significant association with both the predictor (FAC) and outcome (mRS) were included as covariates.

Results:

The unadjusted logistic regression showed that FAC=0 (OR 38.5, 95% CI 4.4-340.3) was a strong predictor of poor outcome, relative to FAC=5, and FAC explained 31.6% of the variance in mRS. After adjusting for covariates, FAC=0 remained a significant predictor (OR 30.4, 95% CI 3.9-273).

Conclusion:

FAC is a feasible measurement for categorizing ambulatory status in acute stroke and is strongly associated with disability status at 3 months.

Clinical Relevance:

Given the challenges in capturing gait speed in acute stroke, FAC may have greater clinical utility in the acute setting for categorizing ambulatory ability and predicting disability at 3 months than traditional gait speed measurements.

High Intensity Gait Training with Severe Motor Incomplete SCI: A Case Series

Authors:

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Anna Dawson, PTA,CBIS, CLT-LANA

Abstract

Background/Purpose: Literature regarding use of High Intensity Training (HIT) with motor incomplete spinal cord injury (iSCI) is limited and primarily focuses on those who are ambulatory. This case series considered feasibility and utilization of HIT within the first four months following severe iSCI to non-ambulatory individuals in inpatient rehabilitation (IRF).

Case Description: Four clients admitted to IRF with AIS C iSCI (neurologic levels C1-T3) who were non-ambulatory participated in HIT aimed to achieve up to 85% of heart rate max and/or a Borg Rate of Perceived Exertion (RPE) scale of $\geq 14/20$. Intensity measured via continuous heart rate monitoring and RPE rating. Ten Meter Walk Test (10MWT), 6 Minute Walk Test (6MWT), and ASIA were used as pre and post outcome measures. Clients were assisted as needed and progressed towards independent stepping in complex environments. Kinematics were not emphasized rather, intensity and time in target heart rate zones were prioritized.

Outcomes: Clients completed 11-14 HIT sessions during IRF length of stay. All clients transitioned from AIS C to D classification, achieved Minimal Detectable Change for 10MWT and 6MWT, and ambulated household or limited community distances at IRF discharge or within 4 months of intervention. Two clients exceeded MDC for 10MWT and 6MWT at IRF discharge.

Discussion: This case series considered feasibility and utilization of HIT following acute, severe iSCI in non-ambulatory individuals. All clients increased walking speed, distance, and ambulatory function within 4 months of intervention. Despite severe impairment and non-ambulatory function at admission, the clients were able to participate and tolerate HIT interventions without adverse events.

Clinical Relevance: Given the lack of current literature discussing HIT in non-ambulatory iSCI, this case series demonstrates potential benefits and efficacy of its application in acute, severe iSCI populations. Further research is warranted to examine walking function following early HIT interventions in ASIA C iSCI.

Hitting the Target? Achieving optimal cardiovascular intensity for persons with spinal cord injury and stroke

Authors:

Zachary Crump, PT, DPT
Amol Karmarkar, PhD

Abstract

Purpose: To investigate the feasibility of achieving the American Physical Therapy Association Locomotor Clinical Practice Guideline's cardiovascular intensity recommendations for persons with acute/sub-acute spinal cord injury (SCI) and acute/sub-acute stroke (CVA).

Participants: 64 persons with acute/sub-acute SCI who participated in 206 locomotor sessions and 57 persons with acute/sub-acute CVA who participated in 142 locomotor sessions. Median admission Berg Balance Scale score= 3 for CVA cohort and median admission Walking Index for Spinal Cord Injury II= 0 for SCI cohort. **Methods:** A retrospective data-analysis for all patients referred to the Locomotor Specialist from June 2020-June 2022 at a 114 bed inpatient rehabilitation hospital. Locomotor sessions were 30-60 minutes in duration and aimed to utilize advanced rehabilitation technology in order to achieve clinical practice guideline target heart rate recommendations within 60-80% Heart Rate Reserve. Main outcomes included target heart rate, average maximum heart rate with activity, average heart rate with activity, gait distance, and rating of perceived exertion (RPE).

Results: 25% of persons with acute/sub-acute CVA achieved target heart rate via maximum heart rate, while 15% of persons with SCI achieved target heart rate via maximum heart rate. Median RPE was 17 and 15 for SCI and CVA cohorts, respectively. Average session walking distance for persons with SCI and CVA were 1,307.80 feet and 1,376.11 feet, respectively.

Conclusions: Achievement of Locomotor Clinical Practice Guideline target heart rate values appear to be more feasible for persons with acute/sub-acute CVA than for SCI, although attainment of target heart rates were low for both groups. Gait distance and RPE scores were similar between groups, although heart rate responses appeared to be different.

Clinical Relevance: Achieving Locomotor Clinical Practice Guideline heart rate intensity recommendations may not be feasible for persons with CVA and SCI receiving locomotor training during inpatient rehabilitation.

Impact of mild traumatic brain injury on performance of a vestibular exercise using wearable sensors.

Authors:

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Prokopios Antonellis, PhD
Douglas Martini, PhD
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Abstract

Purpose: Vestibular rehabilitation is used to treat dizziness after mild traumatic brain injury (mTBI), despite limited evidence for effectiveness in this population. One reason for suboptimal rehabilitation outcomes could be the lack of objective performance tracking of the vestibular rehabilitation exercises (e.g. speed, amplitude, substitution patterns). Wearable sensor technology may aid clinical assessment by adding objective performance quantification, potentially improving vestibular rehabilitation efficacy. The purpose of this study was to 1) use wearable sensors to quantify head and trunk speed and amplitude during gaze stabilization, a common vestibular rehabilitation exercise and 2) compare performance to healthy controls.

Participants: 50 healthy controls (23M, mean±SD: 39.4±12.2yo) and 62 people with mTBI (13M, 35.4±12.7yo, 70.8±32.0 days from injury) participated.

Methods: Participants wore an Opal V2 sensors (APDM, Portland, OR) on their head and trunk while performing a seated gaze stabilization exercise. Each trial consisted of 2, 30 second bouts of horizontal head turns. Sensor-based outcome measures included angular velocity and range of motion (ROM). Independent t-tests were calculated and $\alpha < 0.05$ was set a priori.

Results: The mTBI group had slower head velocity ($156.1^\circ/s \pm 48.6$ vs $246.5^\circ/s \pm 71.2$; $p < 0.001$) but greater head ROM ($70.6^\circ \pm 19.3$ vs $55.2^\circ \pm 17.6$; $p < 0.001$), and had greater velocity and ROM of the sternum ($15.6^\circ/s \pm 30.7$ vs $5.9^\circ/s \pm 2.2$; $p < 0.05$ and $9.4^\circ \pm 22.5$ vs $1^\circ \pm 0.5$; $p = 0.2$, respectfully) during the seated gaze stabilization exercise.

Conclusions: Quantitative measures of head and trunk movement suggest that although people with mTBI move their heads through a greater ROM, head movement is significantly slower compared to controls. Additionally, the mTBI group demonstrated altered kinematics with poor separation of the head and trunk, with increased ROM of the sternum when intended to be still.

Clinical Relevance: Wearable sensors are sensitive to deficits in mTBI and could help physical therapists establish clear goals for vestibular rehabilitation, ultimately improving efficacy of treatment.

Impact of Neighborhood Walkability on Community Ambulation in Healthy Older Adults and Stroke Survivors

Authors:

Kanika Bansal, PT, MPT, PhD
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Dorian Rose, PT, PhD

Abstract

Purpose/Hypothesis: Despite regaining sufficient walking ability, stroke survivors (SS) are often limited in their community ambulation. Environmental factors are now known to influence total daily walking activity, even beyond one's physical capacity. It is unknown if neighborhood walkability, i.e., the availability of meaningful destinations such as restaurants, and supermarkets within one mile of one's residence, influences a SS's mobility outside-of-home. We hypothesized that neighborhood walkability will be positively associated with walking activity outside-of-home for SS and healthy older adults (HA).

Participants: 36 community-dwelling SS (62.3±9.8 years old, 5.4±3.3 years post-stroke, six-minute walk test (6MWT): 259±82m) and 18 HA (60.4±9.2 years old, 6MWT: 445±59m).

Methods: An accelerometer quantified daily steps and a Global Positioning System (GPS) device recorded step location for seven days in this cross-sectional study. Outside-of-home steps were differentiated into two geographical zones: neighborhood (within one mile of home), and community (beyond one mile from home), using GPS coordinates. Walk Score® quantified neighborhood walkability through each participant's residential address. Spearman's Rho examined the relationship between neighborhood walkability and location-specific walking activity.

Results: For HA, neighborhood walkability correlated with community steps/day ($r=0.53$; $p=0.03$) and showed associative trends with neighborhood steps/day ($r=0.45$; $p=0.06$). However, for SS, neighborhood and community steps/day were not associated with their neighborhood's walkability, even after accounting for their 6MWT measures.

Conclusion: The availability of meaningful destinations within walking distances of one's home facilitates outdoor walking for HA, but not for SS. It is plausible that walking to destinations even within one mile from home may not be feasible for SS, given personal barriers like increased fatigue and/or time required to complete errands on foot versus driving; and warrants exploration.

Clinical Relevance: Physical therapists may need to train SS in environments that mimic patient's own community to promote community ambulation, irrespective of their neighborhood walkability or walking capacities.

Impairment-Based Clinical Decision-Making for the Use of Ankle-Foot Orthoses in Individuals with Acquired Brain Injury

Authors:

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Abstract

Acquired brain injury (ABI) describes post-natal damage to the brain, and is traditionally classified as traumatic or non-traumatic including stroke which can impact an individual's ability to ambulate safely and efficiently. Recently published Clinical Practice Guidelines (CPG) indicate that ankle-foot orthoses (AFO) can improve functional outcomes in individuals with post-stroke, but a current limitation is the lack of education for physical therapists on impairment-based clinical decision making (CDM) tools for AFO selection. The purpose of this manuscript is to identify current impairment-based CDM tools for AFO prescription and demonstrate the utility of these tools using case examples of individuals with ABI. A comprehensive literature review was performed and identified four key resources that provided impairment-based CDM for AFOs. The Rancho R.O.A.D.M.A.P. provided a CDM algorithm to help physical therapists prescribe AFOs. The utility of this tool was confirmed using clinical case studies. Finally, suggestions for adding foot plate modifications to AFOs to maximize gait function in the presence of spasticity were recommended. In conclusion, impairment-based CDM tools are a useful progression of the recently published CPGs to help physical therapists select AFOs for patients with ABI.

Implementing Evidence to Standardize Outcome Measurements in Outpatient Neurologic Physical Therapy: A Case Study

Authors:

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Abstract

Background/purpose: In 2018, a clinical practice guideline (CPG) was published recommending a core set of outcome measures (OMs) for patients with neurologic conditions who receive PT (NOM-CPG). Knowledge translation (KT) assists in the implementation of evidence, including CPGs. The purpose of this study was to evaluate the impact of a KT project to standardize the use of OMs in a neurologic outpatient PT clinic.

Case Description: One neurologic outpatient rehabilitation organization partnered with clinical researchers to implement the NOM-CPG. The final OM battery included the 6 minute walk test (6MWT), 10 meter walk test (10MWT), Function in Sitting Test (FIST), Functional Gait Assessment (FGA), and Berg. The FIST was added to accurately assess patients who have a lower level of function. A comprehensive KT intervention was implemented and included educational videos (post-test), environmental modifications, decision algorithms, documentation template with phrases, and creation of a website where all information was centrally located. Chart audits were completed on a monthly basis and feedback provided to the clinics.

Outcomes: Three months after implementation, 178 charts were audited. On average, the physical therapists implemented four OMs on initial evaluation, of which three were from the final OM battery. The 5TSTS (71%) and 6MWT (69%) were used most frequently and the FIST used least frequently (15%). Template phrases created for goals were used 73% of the time.

Discussion: An outpatient PT practice successfully adapted knowledge and implemented a core set of OMs in three months. Knowledge tools facilitate the implementation and will be used to sustain practice in this ongoing project.

Clinical Relevance: OM use is critical to assessing the effectiveness of rehabilitation interventions and to decrease unwanted variation in practice. Faced with increasing demands on productivity, partnership between clinicians and researchers can facilitate the uptake of evidence.

Incorporating High Intensity Training with a Severe Brain Injury Patient in the LTACH Setting Partnering with Family to Meet Patient's Full Potential

Authors:

Trianna Warkentin, PT, MS

Abstract

Intensity has long been recognized as one of the main principles in Neuroplasticity and Motor Learning and is now being heavily researched as it applies to a variety of diagnoses and interventions specific to the neurologic patient population. This course will review some of the recent findings in the literature regarding the benefits of high intensity training in aiding in neuroplasticity and, more specifically, in gait training of the neurologic patient. The course will then review findings regarding positive results of involving family members in treatments of the severely injured traumatic brain injury patient. These principles will then be applied in a case study presentation involving a 20 year old severe TBI patient admitted to the Disorders of Consciousness Program that progressed from a minimally conscious state to ambulating without an assistive device while performing dual tasks during his 6-week LTACH stay, deemed too high level for inpatient rehabilitation setting, and how his family played an integral partnership in his rehabilitation.

Knowledge Translation Project: Use of the Hammersmith Infant Neurological Examination by pediatric physical therapists

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Therese O'Bright, PT, DPT

Abstract

Purpose: The purpose of this Knowledge Translation (KT) project was to implement use of the Hammersmith Infant Neurological Examination (HINE) as standard practice by pediatric physical therapists for children 2-24 months of age who are at risk of cerebral palsy (CP) or who have already been diagnosed with CP. The HINE has been established as a valid and reliable tool to identify individuals at risk for CP.

Participants: Knowledge users were 31 pediatric physical therapists practicing at four outpatient clinics within a specialty healthcare system.

Methods: The Knowledge-to-Action (K2A) framework provided the structure for the methodology of this KT project. Audits of the electronic medical record (EMR) and therapist surveys were used to identify the know-do gap and adapt to the local context. Surveys were also used before and after interventions to identify barriers and guide selection of additional KT interventions. KT interventions included an independent study course, presentations and provision of testing kits, documentation supports and scripts for communication with providers and parents. Audits of the EMR were continued after interventions to assess adherence to HINE.

Results: Survey results demonstrated that therapists report greater ease in use of the HINE following KT interventions, but that there continued to be barriers to its use. Electronic medical record audits confirm that physical therapists are completing the HINE more frequently following KT interventions.

Conclusions: Use of the HINE was successfully implemented as part of standard practice by pediatric physical therapists in this outpatient clinic setting.

Clinical Relevance: The K2A framework was helpful to guide implementation of a new assessment tool into standard practice. This framework structure can be applied to facilitate translation of knowledge in physical therapy practice.

Knowledge-to-Action: Implementation of Clinical Practice Guidelines in Inpatient Rehabilitation

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Louis Nicolosi, PT, DPT

Abstract

Purpose/Hypothesis:

There is a delay in knowledge transfer in healthcare. The objective of this project was to utilize the Knowledge to Action (KTA) process framework to promote the use of intensity monitoring and utilization of selected measures from the core set in the inpatient rehabilitation setting.

Participant(s):

Knowledge users included approximately 39 physical therapists and physical therapist assistants who provided clinical care to adults with primary diagnoses of stroke, motor incomplete spinal cord injury, and brain injury at the participating institution.

Methods:

One inpatient rehabilitation facility utilized the KTA framework to guide implementation efforts.

Results:

A 1-month initial retrospective chart audit revealed a know-do gap. Out of 662 therapy sessions that prioritized gait, few instances of intensity monitoring were documented. Low utilization of the Berg Balance Scale, 10-meter Walk Test and 6 Minute Walk Test was observed (i.e., 11% of initial evaluations included all three measures). A barrier assessment revealed barriers in the following domains: environmental context and resources, knowledge, motivation and goals, social influences, culture, and leadership support. Intervention mapping was performed, and interventions (i.e., purchase of heart rate monitors, education, printed materials, and electronic medical record changes) targeted the identified barriers.

Conclusions:

The KTA framework has guided the adoption of clinical practice guidelines in an inpatient rehabilitation facility. Ongoing efforts will include monitoring of knowledge use, evaluation of outcomes, and continued development of a plan for sustainability.

Clinical Relevance:

Therapists do not routinely monitor vital signs even though this can ensure safety of interventions and provide feedback on desired training intensities. It is also important to determine whether locomotor training strategies are effective. To assess changes in locomotor function over time, standardized outcome measures that represent the core constructs of locomotion should be utilized.

Long-term sustainability of iKNOW-PD Outcome Measure Battery: A Case Report

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Abstract

Background/Purpose:

Sustainability of knowledge implementation is a key component of knowledge translation (KT). In July, 2018 a KT project called iKNOW-PD was implemented in an outpatient organization to standardize outcome measures (OMs) used in patients with Parkinson Disease (PwPD). The iKNOW-PD battery includes nine-hole peg test (9HPT), miniBESTest, ten meter walk test (10MWT), and five time sit-to-stand (5TSTS). iKNOW-PD was implemented in 2018 with final assessment in 2019. The purpose of this case study is to assess long-term sustainability of the iKNOW-PD battery.

Case Description:

The outpatient physical therapy clinics who implemented iKNOW-PD were negatively impacted by the pandemic, organizational restructuring, and staff turnover. Initial and discharge evaluations (IE & DC) were reviewed from April to September 2021 for PwPD to assess the long term sustainability of iKNOW-PD.

Outcomes:

Pre-iKNOW PD (January 2017-June 2018), 89 charts were reviewed; post-iKNOW PD (July 2018-April 2019), 52 charts; and sustaining iKNOW-PD, 28 charts. Results for IE (pre, post, sustaining) are as follows: 9HPT (42.2%, 77.8%, 21.4%), miniBESTest (40.0%, 70.4%, 75.0%), 5TSTS (86.7%, 92.6%, 96.4%), 10MWT (20.0%, 66.7%, 100%). Results for DC (pre, post, sustaining) are as follows: 9HPT (36.4%, 68.0%, 14.3%), miniBESTest (40.9%, 60.0%, 60.7%), 5TSTS (56.8%, 88.0%, 71.4%), 10MWT (13.6%, 68.0%, 78.6%).

Discussion:

Outpatient PT Clinics sustained high rates of iKNOW-PD OM usage over a 2-year period. Occupational Therapy charts were not included in this review, which may impact accuracy of 9HPT reporting.

Clinical Relevance:

Long term sustainability of KT is feasible in a clinical environment despite external forces leading to service disruption. Future research should explore factors that lead to successful sustainability.

Motor Abnormalities in Idiopathic REM Sleep Behavior Disorder

Authors:

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Ronald Postuma, MD, MSc; (NAPS) North American Prodromal Synucleinopathy Consortium, Consortium

Abstract

BACKGROUND AND PURPOSE: Idiopathic REM Sleep Behavior Disorder (iRBD) is associated with future neurodegenerative disease such as Parkinson's disease, Lewy body dementia, or multiple systems atrophy[1-3]. Motor abnormalities in people with iRBD have been shown to predict future neurodegenerative disease by ~5-7 years[1]. It is unclear at what rate people with iRBD present with motor abnormalities, what tests are most frequently abnormal, and how abnormalities relate to aging alone. Aim 1: Determine the rate of motor abnormalities in a large iRBD cohort; Aim 2: Estimate the relationship strength between age and motor scores in people with iRBD.

SUBJECT(S): 284 people with iRBD

METHODS: Data were accessed via the North American Prodromal Synucleinopathy Consortium (NAPS) database.

Outcomes: Alternate Tap Test (ATT), Purdue Pegboard (PP), Timed Up and Go (TUG), and MDS-UPDRS Part III scores.

ANALYSES: The percentage of abnormal motor scores were calculated for each test, with the threshold for 'abnormal' based on previous literature in control and iRBD cohorts. Correlation coefficients were calculated to evaluate the relationship between motor outcome scores and age.

RESULTS: Abnormal motor scores were present in 42%, 40%, 38%, and 21% of the cohort for the ATT, PP, TUG, and MDS-UPDRS Part III, respectively. There was a significant correlation between age and worse performance on ATT ($r=-0.20$, $p<0.01$), PP ($r=-0.31$, $p<0.01$), and MDS-UPDRS part III scores ($r=0.21$, $p<0.01$), and no significant relationship between age and TUG ($r=0.13$, $p=0.29$).

CONCLUSIONS: Quantifiable motor abnormalities may be detected in up to 42% of people with iRBD. Outcomes related to upper extremity dexterity and bradykinesia were most frequently found to be abnormal. There was a weak relationship between age and motor scores.

IMPLICATIONS: It may be possible to detect early signs of motor system neurodegeneration with standardized, quantitative motor tests.

Opsoclonus observed during Vestibular Physical Therapy re-assessment led to diagnosis of Paraneoplastic Syndrome

Authors:

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Abstract

Purpose: To highlight a rare case in which a comprehensive video goggle re-assessment led to prompt diagnosis and treatment.

Case Description: 27-year-old male presented to Vestibular Physical Therapy (VPT) with 2-month history of motion and positional provoked vertigo. VPT exam revealed mild imbalance, impaired DVA, and motion sensitivity. Smooth pursuits and saccades were normal. Video goggle exam revealed mild left beating spontaneous nystagmus. Positional testing elicited mild left torsional and down beating nystagmus in left Dix-Hallpike and roll tests (bilaterally), inconsistent for BPPV. Due to unclear etiology, Vestibular Testing was recommended, and patient was provided a home exercise program focused on trial particle repositioning maneuvers, adaptation, habituation, and balance exercises.

Two weeks later, Vestibular Testing was completed, revealing no indication of peripheral vestibular or central ocular-motor involvement. VPT re-evaluation with video goggles was negative for BPPV. Due to poor treatment response, referral to Neurology was recommended.

He returned 2 months later with worsening symptoms, awaiting Neurology consultation. VPT video goggle exam revealed new spontaneous vertical opsoclonus, suppressed with visual fixation (will provide QR link to video). Due to new central findings, an urgent brain MRI and referral to Neurology were recommended.

Outcomes: Brain MRI was unremarkable. Neurology ordered imaging in addition to paraneoplastic autoantibody evaluation. Results were positive for paraneoplastic syndrome associated with testicular cancer. Patient underwent a testicular ultrasound, revealing left testicle masses. Due to prompt diagnosis, the patient began treatment for left testicular cancer.

Discussion: This case highlights the importance of obtaining a detailed medical and symptom history, monitoring treatment response, performing appropriate clinical re-assessment including use of video goggles, and identifying red flags that can assist in guiding care.

Clinical Relevance: To demonstrate the importance of clinical re-assessment and interpretation of nystagmus patterns that can help differentiate peripheral versus central pathology.

Outpatient Physical Therapy & Atypical Parkinsonism: Patient and Carepartner Perceptions of Services and Discharge

Authors:

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Kristophe Diaz, PhD

Abstract

Background/Purpose:

Patient advocacy is a critical mission of CurePSP. Our Centers of Care network openly recognize the benefit of physical therapy and many families reach out to CurePSP when those services are discontinued. In order to better understand patient perceptions of physical therapy discharge, CurePSP's Patient & Carepartner Advocacy Committee developed and shared a survey electronically within our community. This survey used your voice to gauge a better understanding behind the rationale provided by outpatient physical therapists when discharging patients living with PSP and other prime of life disease.

Description:

A four-question survey was disseminated via CurePSP's network and website. Respondents indicated the treating diagnosis and insurance coverage of the reporting patient. Twelve options were provided for selection regarding patient and carepartner perceived rationale for discharge, as well as an open-ended option for additional reporting or commentary. The survey was modified as a result of the start of the global pandemic, in order to avoid COVID-related concerns related to discharge.

Outcomes:

140 completed surveys were received and analyzed. 43 respondents indicated discharge due to insurance cap. Of these 43 responses, 32 reported Medicare/Medicaid as the insurance provider. Upon further review of open-ended responses, data reflects that 33.3% of all respondents reported discharge due to limited insurance coverage (CMS and private) and 25.5% reported discharge rationale was due to lack of progress or no longer demonstrating a need for skilled physical therapy.

Discussion:

Knowledge translation among professionals is as important as that which is provided to patient and carepartner communities. The collected survey responses suggest we must not only better convey the practice of episodic care to patients, but also better ensure professionals are aware of practice standards which are supported by current Center for Medicare/Medicaid coverage per the *Jimmo v. Sebelius* Settlement Agreement.

Clinical Relevance:

Patients may benefit from ongoing skilled therapy services in the presence of a neurodegenerative disease, including atypical parkinsonisms. The Center for Medicare/Medicaid *Jimmo v. Sebelius* Settlement Agreement supports the ongoing coverage of skilled maintenance therapy, but a lack of interventional research in these populations is a potential barrier to clinical implementation of a maintenance therapy program. Further research is needed to define recommended interventions and their effectiveness if we are to implement an evidence-based practice strategy. As a profession, we must bridge the gap between patient-centered care and evidence-based practice when serving patients with rare neurologic disorders.

Participation in community-based virtual group exercise: effects on aerobic fitness and quality of life in individuals with spinal cord injury

Authors:

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Abstract

Purpose: Individuals with spinal cord injury (SCI) are at elevated risk for developing cardiovascular disease. Participation in regular moderate to vigorous aerobic activity is recommended to improve cardiovascular fitness; however, options for aerobic exercise are limited in this population. This study investigates the effects of participation in a community-based virtual group exercise program on cardiovascular fitness and quality of life for individuals with SCI.

Methods: Five individuals with SCI completed an 8-week virtual group exercise program. The program consisted of 30-minute aerobic exercise sessions three times per week; two synchronous sessions and one asynchronous. Heart rate (HR), Rate of Perceived Exertion (RPE) and pain using a 0-10 Visual Analog Scale (VAS) were recorded during exercise. A 6 Minute Push Test (6MPT) and the World Health Organization Quality of Life assessment (WHO-QOL BREF) were administered pre and post intervention to evaluate cardiovascular fitness and self-reported quality of life. A qualitative survey was conducted at study conclusion, to collect feedback about the program.

Results: Analysis of pre and post test data reveals a statistically significant difference (p value $\leq .05$) in WHO-QOL BREF scores for psychological and environment subsets. Statistical significance was not reached for physical and social domains. Cohen's d analysis of data reveals a large effect on WHO-QOL BREF environment ($d=0.88$) and RPE reported during the 6MPT ($d=0.91$), and a moderate effect on the WHO-QOL BREF psychological domain ($d=0.68$). Analysis of HR during 6MPT was found not significant. Participants trained in the moderate-vigorous RPE intensity 63% of the time, while reaching target HR intensity 20% of the time. Participants reported improvements in bowel function, endurance and pain, and a preference for the virtual mode of delivery.

Conclusion/Clinical Relevance: A community-based virtual group exercise program may be beneficial in improving cardiovascular fitness and quality of life for individuals with spinal cord injury.

Physical Therapists' Perceptions of Providing Assist as Needed During Gait Training with Neurologic Rehabilitation

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Samantha Gomes, PT/s
Brianna Ku, PT/s
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Christopher Hasson, Ph.D

Abstract

Purpose: Gait training requires the complex skills of Physical Therapists (PTs) to ensure walking activities are safe while optimizing neuromotor recovery. Promoting independent patient mobility may include verbal and tactile cuing; hands-on assistance; variable timing, amount, and method of assistance; and “assist as needed” (AAN) to employ the minimal assistance necessary for task completion. An understanding of PTs’ perspectives of their real-time clinical reasoning and use of AAN is lacking, contributing to the gap in a universal, interdisciplinary definition of AAN. This qualitative study identified perceptions of how PTs provide and adjust their assistance during gait training.

Participants: Eleven PTs working with patients with neurological impairments and practicing in Massachusetts across the continuum of care (acute care, inpatient rehabilitation, outpatient) were recruited and divided into focus groups by years of experience (Novice 0-5 years, Intermediate 6-10 years, Expert 10+ years).

Methods: Focus groups were conducted using a scripted protocol, collecting perceptions of AAN during gait training for improved patient function. The focus groups were recorded, transcribed, and coded to identify major themes in practice.

Results: The Expert focus group is presented. Four AAN themes were identified: Patient Perspective, Optimizing Motor Learning, Sound Clinical Risk Taking, and Skilled Approach. Preliminary coding for Novice and Intermediate focus groups suggests similarities and differences in themes.

Conclusions: PTs’ provision of AAN centers around skilled approaches encompassing risk taking, motor learning, successful task completion, and patient perspectives. PTs use complex, real-time decision-making and AAN to individualize care by considering patients’ goals, self-awareness, and training response.

Clinical Relevance: Though AAN is common in gait training of individuals with neurological impairments, PTs’ language to describe this strategy is diverse. A common language may promote a multidisciplinary framework that applies principles of neuroplasticity, optimizes functional recovery, and bridges the gap between research and clinical practice.

Prehabilitation to minimize Persistent Postural Perceptual Dizziness risk in Meniere's Disease pre and post gentamicin

Authors:

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Tina Stoeckmann, PT, DSc, MA

Abstract

Background/purpose

Persistent Postural Perceptual Dizziness (PPPD) is a comorbidity in 40% of individuals with peripheral vestibular disorders, including Meniere's Disease (MD).[4] The development of PPPD is thought to be related to healing complications[2] and uncertainty of symptoms contributing to anxiety and fear of movement.[7] The purpose of this case report is to introduce a physical therapy approach intended to minimize the risk of developing PPPD related disability in a patient with MD who ultimately received gentamicin injections.

Case Description

A 72-year-old male with history of MD and generalized anxiety experienced increasing MD exacerbations from 2018-2020 with worsening residual symptoms between exacerbations, fear of movement, anxiety and decreasing function. He was considered a high risk for developing PPPD and was seen for 17 PT visits before and after four gentamicin injections in the right ear.

Outcomes

The patient improved 50 points (MDC = 17.18[3]) on the Dizziness Handicap Inventory, 6-8 points (MDC = 2.8[6]) on the Patient Specific Functional Scale and modest improvement was made on the Modified Clinical Test of Sensory Interaction in Balance (mCTSIB) under eyes closed conditions but his Functional Gait Assessment score worsened.

Discussion

Early introduction of individualized interventions related to PPPD education, anxiety management and vestibular therapy as well as patient buy-in led to meaningful changes in disability and function despite continued intermittent symptoms. The patient stated "I [now] expect to have trouble and I know I will survive it...and it will get better" and he identified activities he used to avoid as "good therapy."

Clinical Relevance

Use of "prehab"[1,5] or early intervention in at risk individuals such as those with MD could assist in reducing the chronic loss of function seen with PPPD. Future research is needed to identify the appropriate components of a prehab program as well as identifying which patients will benefit most.

The Feasibility of Physical Therapy Diagnosis and Treatment of BPPV in an Emergency Room Setting: A Case Report

Authors:

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Kristen Andrew, PT, DPT, NCS

Abstract

BPPV is the most common type of peripheral vertigo. Many patients seek care for dizziness in the emergency department (ED). Despite its frequency, BPPV is often misdiagnosed, incorrectly treated, or there is a delay in receiving care from knowledgeable providers. There is some evidence that early treatment of BPPV reduces falls in the elderly and lowers recurrence rates. The purpose of this case report is to illustrate the role of the physical therapist in early diagnosis and treatment of BPPV in the ED.

A 66 year old male presents to the ED for evaluation of 2 days of intermittent dizziness. Neurologic examination by ED providers was notable for poor tandem gait and falling to the right. Imaging was negative for acute findings. Physical therapy was consulted for vestibular evaluation. Further subjective history was suggestive of BPPV. He was diagnosed with a right posterior canal BPPV by a Dix Hallpike test and treated with 3 canalith repositioning maneuvers (CRM).

The patient was successfully examined, diagnosed and treated with CRMs and education within one PT session in the ED of a large teaching hospital. His symptoms fully resolved and he was able to ambulate independently with a gait speed of 1.11 m/s. Education was provided on the mechanism of BPPV, treatment plan, and a vestibular PT clinic for further treatment should his symptoms recur.

Physical therapists are uniquely positioned to provide effective diagnosis and treatment of BPPV in the ED, as well as high quality education on pathophysiology, follow up care, and strategies to reduce fall risk. Early diagnosis of BPPV treatment with a CRM can reduce healthcare costs of unnecessary imaging, reduce fall risk, and avoid unnecessary vestibular suppressant medication.

This case study demonstrates the early diagnosis and effective treatment of an individual presenting to the ED with disabling intermittent dizziness

The Impact of a Pandemic: Influence of Wearing a Mask on Therapist Communication

Authors:

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Abstract

Purpose: Safety precautions established by the Centers for Disease Control and Prevention in response to the COVID -19 pandemic impacted organizational infection prevention policies.¹ Subsequently, the Shirley Ryan AbilityLab adopted a universal mask wearing policy for all employees. The intention of this study is to address the impact of provider mask wearing on communication during wheelchair education.

Participants: Sixty-six physical and occupational therapists from inpatient, outpatient, and day rehabilitation participated in a voluntary survey.

Methods: The survey contained questions on perceived impact of mask wearing on communication effectiveness, frequency and types of communication strategies used to repair communication breakdowns.

Results: Clinicians identified that mask wearing impacted communication at least some of the time as it relates to clarity (80.3%), efficiency (78%), and ability to establish rapport (60.6%). Clinicians reported a variety of strategies to limit communication breakdowns, at least some of the time repeating statements (84.8%), raising their voice (78.8%), increasing patient proximity (78.8%), using nonverbal cues (75.8%), conducting sessions in an alternative location (68.2%) using pictures or video supports (47.0%), and using written communication (40.9%). Clinicians agree that they would like further training in printed resources (68.2%), ways to integrate communication tools (51.5%), nonverbal communication techniques (31.8%), and vocal hygiene strategies (30.3%).

Conclusion: Results from this study indicate clinicians used a variety of communication strategies to reduce communication breakdowns while wearing a mask. Clinicians reported their communication remained effective for wheelchair education activities, though multiple strategies were utilized to minimize the impact. Staff identified additional training and resources necessary to support effective patient-provider communication while wearing a mask.

Clinical Relevance: Leaders can use this information to ensure staff receive appropriate training and resources for effective communication to comply with mask wearing guidelines in the healthcare setting.

The Red Herring: How Vestibular Testing Led to a Medical Emergency

Authors:

Anna Mangano, PT, DPT
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Paige Stivers, PT, DPT

Abstract

The purpose of this case study is to highlight the importance of recognizing red flags in complex vestibular cases to prevent injury and medical mismanagement.

50 year old male referred to outpatient PT after TBI, SCI, and hypofunction of vestibular system on the left side due to MVA. Gait in the PT clinic presented as ataxic with wide base of support and high guard and furniture walking. Subjective reports of dizziness included: spinning when getting out of bed, spinning when getting out of chair, poor balance while standing and walking. VNG testing confirmed left vestibular hypofunction with right beating nystagmus during positional testing. Referral was made for possible BPPV and Vestibular Hypofunction. Subject reported fracturing C1-C3 in MVA.

Outcomes:

Positional Nystagmus: right beating indicating possible BPPV and repositioning maneuvers. Rotation chair testing: increased lead but decreased time constant indicating unilateral vestibular hypofunction. Modified vertebral artery testing was negative bilaterally indicating for therapist to continue with treatment. Modified roll testing was positive on the left side with symptom provocation and nystagmus indicating the potential for horizontal canal BPPV. Alar ligament, transverse ligament and traction of the upper cervical spine all reproduced symptoms indicating the need to discontinue treatment due to cervical spine instability.

Discussion: During the objective evaluation of BPPV the subject had inconsistencies with usual reports of BPPV including having no symptoms in head down position of treating. Therapist concerned for red flags began testing of upper cervical spine. Symptoms increased with testing, therefore EMS referral made. Follow up with subject; he confirmed poor CSF flow and needing decompression of upper cervical spine.

Clinical Relevance: When patients present to clinic with symptoms suggestive of one pathology, therapists must be comfortable with differential diagnoses to recognize red flags to prevent patient injury.

The Reliability and Validity of the Functional Gait Assessment in People with Peripheral Neuropathy

Authors:

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Lars Oddsson, PhD

Abstract

Purpose: People with peripheral neuropathy (PN) demonstrate significant balance dysfunction and fall risk. The Functional Gait Assessment (FGA) is an outcome measure that quantifies dynamic balance and various gait activities. Reliability and validity of the FGA has been demonstrated in many patient populations but has not been used with people with PN. The purpose of this research is to investigate the reliability and validity of the FGA in people with PN.

Participants: Twenty-three adults (75 ± 5 years) with PN who participated in Walk2Wellness study on Walkasins. Their baseline FGA scores were 14.87 ± 4.04 , TUG 12.7 ± 2.7 , and Gait speed $0.84 \pm .17$ m/sec.

Methods: Participants completed the FGA (scored by the same rater) at baseline and approximately 1 hour later before being tested with Walkasins. Subject completed the Activities-specific Balance Confidence Scale (ABC), normal gait speed, fast gait speed, Timed "Up& Go" (TUG), Vestibular Activities of Daily Living Scale (VADL mean and VADL median), and 4-stage balance test. Prospective falls in the following 10 weeks were measured.

Results: The intra-rater reliability of the FGA was 0.879 (ICC 2,1). Convergent validity of the FGA using the Spearman Correlation Coefficient was 0.646 with normal gait speed, 0.681 with fast gait speed, and 0.774 with the TUG. Discriminant validity was 0.416 with the ABC, -0.394 with the mean VADL, -0.406 with the median VADL, and 0.371 with the 4-stage balance test. Using a cutoff of 9/30, the FGA had a sensitivity of 1 and a specificity of .75, with a positive likelihood ratio of 4 and a negative likelihood ratio of 0 to detect 2 falls in the following 10 weeks.

Conclusions/Clinical Relevance: The FGA is reliable and valid for use in people with peripheral neuropathy. Scores of $< 9/30$ predict future falls.

The use of Blood Flow Restriction Training following Incomplete Spinal Cord Injury: A Case Report

Authors:

Matthew Martin, PT, DPT

Abstract

Background & Purpose: While the benefits of blood flow restriction training (BFRT) are detailed in both healthy and orthopedic populations, there is a paucity of evidence regarding the addition of BFRT in neurologic populations. The purpose of this case report is to describe the use of BFRT in a patient with an incomplete spinal cord injury (iSCI).

Case Description: The patient was a 54-year-old male presenting to outpatient physical therapy following resection of a T3-T9 ependymoma resulting in an iSCI approximately 1 month prior. BFRT was initiated six months after initial evaluation following traditional PT interventions. The individual participated in seven sessions of BFRT over one month. BFRT involved isometric gluteal, hamstring, and quadriceps contractions and supine dorsiflexion with a set and repetition scheme of 30/15/15/15, as well as aerobic training of 10-15 minutes on a recumbent stepper while maintaining $\geq 14/20$ on the Borg Perceived Exertion Scale.

Outcomes: Timed Up and Go decreased by 20.88 sec (MDC: 10.8 sec), 6 Minute Walk Test increased by 59% (MDC: 22%), Walking Index for Spinal Cord Injury II increased by 4 levels (MDC: 1 level), and the physical health and social relationships subscales of the WHO Quality of Life-BREF increased by 7 and 25 points, respectively (MDC: 5.37 points). The Activities-Specific Balance Confidence Scale-16 improved by 13.75% (MDC: 14.87%) and the 10 Meter Walk Test improved by 0.05 m/s (MDC: 0.13 m/s; MCID: 0.06 m/s).

Discussion: In conclusion, while this case report describes the safe and effective application of BFRT for a patient with iSCI, further research is warranted to support the efficacy of these interventions.

Clinical Relevance: The role of intensity in promoting neuroplasticity has been widely documented. BFRT can maximize exercise intensity in individuals with neurologic dysfunction when high-level aerobic training and high-load resistance training may not be tolerated.

Transdisciplinary Approach to Vestibular Rehabilitation Decreases Cost and Improves Recovery Time.

Authors:

Anna Mangano, PT, DPT
Andrew Senchak, DO
Paige Stivers, PT, DPT

Abstract

Purpose/Hypothesis: The purpose of this study was to determine if a transdisciplinary approach to vestibular rehabilitation improves recovery and cost. The initial hypothesis was that there was no difference between groups in cost or recovery time.

Participants: All patients with vestibular disorders referred to BSW Rehab in the final quarter of 2021.

Methods: All patients with vestibular disorders were split into groups based on referring Physician. One Physician was part of the transdisciplinary team model (group 2), all other referring Physicians and their patients, not part of the transdisciplinary team comprised the control group (group 1). The number of visits in each patient case was counted to determine number of visits per patient. Average cost of visit was calculated via billing to insurance. Data were analyzed by an unpaired t-test as groups were not matched. Parametric data met assumptions.

Results:

On average, group one (control) was seen for 6.88 visits while group two (experimental) was seen for 4.7 visits. $p=.032$, $t=2.18$, $df=68$, $CI= .24-5.25$ visits

A cost analysis determined that on average the cost of an episode of care to be \$3036.60 for the control group and \$1814.40 for the experimental group. $p=.03$, $t=2.10$, $df=37$, $CI= \$93.73-\2157.69 .

Conclusions: There is a significant difference in both cost of care and recovery time when a transdisciplinary team model is used to manage vestibular disorders. On average, people are seen 3 times less when their care is managed by a team. Using this model, our local insurance carriers would save approximately \$1221 per episode of care.

Clinical Relevance: Team management and approach saves healthcare expenditures for insurance companies and patients. Care managed by a team significantly improves patient recovery time.

Use of KTA Framework to Improve Physical Therapy Clinical Outcomes in Concussion Management

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Abstract

Purpose/Hypothesis: The Knowledge Translation Action (KTA) Cycle framework can be utilized for implementation science of current evidence into clinical practice. Clinical practice guidelines have been published specific to concussion management and can be used as a guide to improve translational science into clinical practice. The objectives of this study were to utilize the KTA framework to investigate change in clinical outcomes and clinician self-efficacy specific to concussion management in a suburban healthcare system.

Materials and Methods: Rehabilitation professionals were electronically surveyed utilizing Qualtrics™ pre and post educational intervention. Questions were adapted from the General Self-Efficacy questionnaire and tailored specific to confidence in current concussion management practice utilizing a 5-point Likert scale. Areas of low confidence on pre-survey were utilized to identify the know-do-gap. Retrospective chart reviews were also completed pre-post KT educational intervention to examine practice patterns of physical therapists. Statistical analysis was performed utilizing SPSS, Version 27.

Results: Within group differences revealed an increase in confidence with evaluation ($p = .01$), intervention ($p = .01$) and consultation ($p = .01$) in concussion management. When comparing PTs who participated in the intervention to those who did not, there was significantly higher self confidence in all areas ($p \leq .001$) for those who engaged in the educational intervention. Pre-post chart reviews revealed improvement in clinical practice patterns in the following constructs: use of patient reported outcome measures ($p \leq .001$), objective outcome measures ($p = .002$), exertional testing ($p \leq .001$), completion of comprehensive evaluation ($p \leq .001$), and use of evidenced based practice ($p \leq .001$).

Conclusions: Utilizing the KTA framework resulted in improved self-efficacy of clinicians as well as improved clinical practice patterns in concussion management.

Clinical Relevance: Intentional KTA framework specific to concussion management may improve clinician self-efficacy and elevate clinical practice patterns through improved use of validated measurement tools and evidenced based interventional strategies for improved outcomes.

Utilizing a Conceptual Reasoning Activity to Increase Use of CPG Core Outcome Measures

Authors:

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Jill Seale, PT, PhD

Abstract

Purpose:

Facilitating clinical reasoning (CR) skills is the cornerstone of every PT program. Providing opportunities for CR application and practice requires high impact, meaningful activities that are easily implemented. Creating the ideal learning activity through integration of situated cognition, scaffolding and metacognition can result in exposure and utilization of Clinical Practice Guidelines (CPGs). This abstract describes a CR activity to provide practice and improve confidence in appropriate outcome measure (OM) selection emphasizing the core set of OMs for adults with neurologic conditions CPG.

Description:

This activity occurred in the Neuromuscular Practice course for DPT students. This low stakes activity included five primary steps incorporating common themes to improve procedural knowledge and conceptual learning through role modeling by faculty, situated learning and reflection in action.

The students received didactic instruction and then watched a patient video of a person with a CVA performing three functional tasks. After the video, the students spent 10 minutes choosing 3 priority OMs and stating rationales for choices. Next, students accessed a Flipgrid video of faculty discussing their choices and rationale. Students then responded with a short video reflection using Flipgrid. The faculty graded the depth of reflection.

Summary of Use

The goal of the assignment was to provide students with clinical reasoning practice in choosing the appropriate OM for a patient. Student reflection videos revealed listening to the instructor's thought process was very helpful increasing their confidence in CR for OM selection. This activity afforded students an opportunity to reflect on the appropriateness of choices by comparing them to faculty. A post survey showed 100% of students felt the assignment was valuable.

Importance to Neurologic Physical Therapy

This activity was enjoyable, engaging and provided direct faculty feedback to facilitate metacognition. The easy to implement format could be beneficial in any type of clinical development course.

Utilizing the Updated Vestibular Hypofunction Clinical Practice Guidelines: A case series

Authors:

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Abstract

Purpose/Hypothesis: Recent research has shown that early intervention may lead to better outcomes in individuals with vestibular hypofunction. Gaze stability and balance exercises are recommended for this population in the acute/subacute phases of recovery. If vestibular rehabilitation is delayed and central compensation is not achieved, the individuals with vestibular disorders may adopt inappropriate strategies or avoidance behaviors. Preliminary findings of a controlled study showed improvements in balance in patients with acoustic neuromas soon after surgical resection if the subject underwent vestibular rehabilitation prior to surgery. Another controlled study showed better outcomes if gaze stability and gait are initiated in the hospital post operative acoustic neuroma resection.

Participants: Four patients with acoustic neuromas who underwent surgical resection underwent vestibular physical therapy (VPT) following the updated Vestibular Hypofunction Clinical Practice Guidelines (CPG). Two patients were seen prior to surgery for education, assessment, and initiation of gaze stability and balance/gait exercises. They restarted VPT within 2-3 weeks post-surgery. However, the other two patients were not referred for a pre op evaluation prior to surgery and did not begin VPT after resection. These patients were referred to VPT while in the chronic phase since they were still having complaints of dizziness and imbalance.

Methods: All four patients were treated in a vestibular clinic following the exercise dosages suggested in the updated CPG.

Results: Even though more visits were required for the individuals with delayed treatment, outcome measures of all patients receiving VPT improved following the new guidelines.

Conclusions: Individuals s/p acoustic neuroma resection can benefit from VPT, but may require more sessions if therapy is delayed.

Clinical Relevance: This study shows how the updated CPG can be utilized for a specific sub group of individuals with vestibular hypofunction.in both the acute and chronic phase, but faster progress occurs in the acute/subacute time frame.

Vestibular Rehabilitation Treatment Protocol in a Patient with Chemo-Induced Peripheral Neuropathy: A Case Study

Authors:

Lisa Brekke, PT, DPT

Abstract

Background: Patient is a 71 y/o male presenting to outpatient physical therapy for new onset chemo-induced peripheral neuropathy (CIPN). The patient has a history of colon cancer stage III diagnosed 15 months prior to initial evaluation. The patient's past medical history includes coronary artery disease, bilateral hip replacement, and right knee replacement. Patient complains of imbalance with eyes closed and has difficulty with quick rotation.

Case Description: There is no current standard of care for patients who present to physical therapy for CIPN. The purpose of this case study was to demonstrate the effectiveness of a vestibular rehabilitation (VR) protocol on a patient with CIPN. These individuals are at a high risk for falls and require improved postural stability. Vestibular hypofunction guidelines are utilized to improve gaze and postural stability and overall function. Individuals with CIPN could benefit to reduce risk of falls, improve sensory integration and daily functioning.

Outcomes: At four weeks the patient was discharged from outpatient physical therapy at low risk for falls with improved balance, gait speed, vestibular function, and the ability to dual task without a physical or cognitive dual task cost.

Discussion: Chemo-induced peripheral neuropathy is a common condition following chemotherapy. Although this is a common complication it is often not addressed until the patient complains of balance deficits and/or falls. Patients who undergo chemotherapy with agents that commonly cause CIPN should be referred to skilled VR to decrease their risk of falls and provide education prior to deficits becoming obvious to patient and healthcare providers.

Clinical Relevance: This case presentation describes how a VR protocol for vestibular hypofunction can be utilized to improve balance and gait deficits in individuals with CIPN with good outcomes. In the future, more research should be conducted on the benefits of vestibular rehabilitation for individuals with CIPN.

Virtual Environments vs. Traditional Vestibular Rehabilitation: A Pilot Randomized Controlled Trial

Authors:

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Abstract

Purpose / Hypothesis: Virtual reality programs can simulate real-world environments in an immersive, non-threatening context.(1,2) We created a clinical virtual reality application specifically for vestibular patients to experience complex sensory environments.(3,4) Our app allows for contextual sensory integration (C.S.I.) where patients are immersed in safe, increasingly challenging environments while practicing a variety of tasks (e.g., turning, walking). The purpose of this pilot study was to develop the protocol and establish the feasibility of a randomized controlled trial comparing C.S.I. training to traditional vestibular rehabilitation.

Participants: 30 patients with vestibular dysfunction were recruited and randomized. Six patients had to stop participation due to the covid-19 pandemic, 6 dropped out for other reasons (3 from either group) and 1 is still in the program. Of the 17 patients who completed the study, 9 were in the traditional vestibular rehabilitation group and 8 were in the C.S.I. group.

Methods: Patients completed the Dizziness Handicap Inventory (DHI), Activities-Specific Balance Confidence Scale (ABC), and Visual Vertigo Analog Scale (VVAS) pre- and post- intervention. They also performed the Functional Gait Analysis (FGA), Timed-Up-and-Go (TUG)5, and Four-Square Step Test (FSST). Following initial assessment, the patients were randomized into 8 weeks of traditional vestibular rehabilitation or C.S.I. training (once per week in clinic + home exercise program)

Results: Both groups improved significantly on the DHI (model estimated change over time -26.87 points [-42.5, -11.23], $P < 0.01$) and the FGA (estimated change over time 7.48 points [4.23, 10.74], $P < 0.01$). Trends towards improvement were seen on both ABC and VVAS. No changes were seen on TUG or FSST, but both were initially normal.

Conclusions: Both groups showed clinically important improvements on subjective and objective outcome measures with no differences between groups.

Clinical relevance: C.S.I training can be a viable addition to vestibular rehabilitation. More controlled studies should be performed.

What Gives? An Investigation of Burnout in Neurologic Physical Therapists

Authors:

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Abstract

Burnout, a syndrome of occupational exhaustion (OE), depersonalization (DP), and reduced personal accomplishment (PA), contributes to negative perceptions of self and work. The purpose of this study was to investigate the presence of burnout syndrome in physical therapists and to determine differences in burnout between neurologic physical therapists (PTs) and PTs with other specialties.

Participants: Two hundred and one PTs and physical therapist assistants within northeastern Pennsylvania participated in this study including twenty-five individuals who specialize in neurologic physical therapy.

Methods: Electronic surveys were sent via REDCap to convenience sample within two health systems. Participants were asked to complete the Maslach Burnout Inventory (MBI) and provide demographic information. The MBI consists of three sub-scales: OE, DP, and PA. The scales are separately rated and scored as low, moderate, and high. Ideally, PA is high and OE/DP are low.

Results: PTs are experiencing a moderate degree of burnout on the sub-scales of OE, DP, and PA. Neurologic physical therapists scored an average of 21.55 (SD+/-10.496) on the OE scale, 6.68 (SD+/-5.777) on the DP scale, and 36.14 (SD+/-6.847) on the PA scale. These scores indicate moderate burnout on each scale. No statistically significant differences were found between the burnout experienced by neurologic PTs and PTs with other specialties according to the three sub-scales. Differences in sample size and significant variability within groups may have contributed to potential type II error.

Conclusions: Neurologic PTs are experiencing a moderate degree of burnout as measured by the MBI. Future research will investigate the contributing factors of burnout and potential interventions to address burnout in neurologic PTs.

Clinical Relevance: Despite experiencing a moderate degree of PA, the level of OE and DP experienced by neurologic PTs has the potential to negatively impact their career longevity, quality of life, and quality of care provided.