The award winning Marianjoy Rehabilitation Hospital is located on a 60 acre wooded campus in Wheaton, Illinois.
Marianjoy Rehabilitation Hospital

Since 1972, Marianjoy Rehabilitation Hospital has set the standard for compassionate rehabilitative healthcare at local, regional, and national levels. Located in the western suburbs of Chicago, Marianjoy provides highly specialized treatment, quality research, and rehabilitation solutions that enable adults and children with brain injury, spinal cord injury, stroke, neuromuscular, orthopedic and musculoskeletal conditions, amputations, and neurological disorders to live an optimal life.

In 2006, Marianjoy opened its new flagship facility that houses 120 private patient rooms and offers inpatient, subacute, and outpatient rehabilitation. A wholly-owned subsidiary of Marianjoy, the Marianjoy Medical Group is a network of 23 board-certified physiatrists who manage 200 inpatient rehabilitation beds, 500 subacute skilled nursing facility beds, and eight outpatient clinics in greater Chicagoland.

Marianjoy firmly believes in the development of scholarly and applied research to improve medical rehabilitative healthcare protocols for the future. Our clinicians collaborate with leaders from renowned hospitals, universities, and professional organizations to test new forms of treatment, develop practical standards, and embrace opportunities to broaden the field of physical medicine and rehabilitation while improving patient quality of life. In honor of the Marianjoy value of stewardship, we openly share what we have learned.

Marianjoy is a not-for-profit hospital and is accredited by the Joint Commission and the Center for Accreditation for Rehabilitation Facilities. Marianjoy is part of Wheaton Franciscan Healthcare, located in Wheaton, Illinois. Sponsored by the Wheaton Franciscan Sisters, Wheaton Franciscan Healthcare owns and operates more than 100 health and shelter service organizations in Colorado, Illinois, Iowa, and Wisconsin.
Dear Colleague,

On behalf of Marianjoy Rehabilitation Hospital, I am pleased to present this compendium of our research activity from 2008 – 2010. For more than 30 years, researchers at Marianjoy have been working to advance our understanding of physical medicine and rehabilitation (PM&R). The purpose of this report is to highlight the research efforts of our clinicians and administrators, and share our findings with the PM&R community in order to further advance quality rehabilitative care, improve overall patient satisfaction, and demonstrate optimal treatment outcomes.

Designed for the physician reader, this comprehensive report is a reflection of our commitment to delivering the best care possible to patients and families while measuring functional improvements and results. Researchers at Marianjoy collaborate with internal clinicians as well as leading experts from a number of renowned institutions to test and refine best practices. As a not-for-profit, free-standing rehabilitation facility located in Wheaton, Illinois, it is part of Marianjoy's mission to work with other clinicians to reach common goals and open doors to more advanced and innovative patient care.

Many associates at Marianjoy invest their own time and skill to find new treatment methods and enhanced rehabilitation protocols through practical research, behavioral studies, and presentations at annual conferences. I speak for the entire leadership of Marianjoy and Wheaton Franciscan Healthcare in expressing gratitude for the dedication and commitment of our researchers. As Vice President of Medical Affairs and Director of Marianjoy’s Residency Program, I am especially proud of the enthusiasm for research shown by our medical residents. Since 1994, Marianjoy's resident physicians have gained valuable exposure to physical medicine and rehabilitation medicine through the academic leadership of nationally recognized teaching faculty at Marianjoy Rehabilitation Hospital.

On behalf of all the physicians, residents, nurses, and clinical staff involved in research at Marianjoy, we hope you find the content informative and of great use as you work toward our common mission of providing the best rehabilitation care for the patients we serve.

Kind Regards,

Dr. Noel Rao
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Marianjoy’s three year PM&R training program is fully accredited by the Accreditation Council for Graduate Medical Education, and provides clinical experience, educational opportunities and research activities.
INTRODUCTION

As the Vice President of Quality and Research, I am proud to share this compendium of Marianjoy research initiatives from our published, publicly presented, and scholarly works between 2008 and 2010. This compendium provides a snapshot of the diversity of work in which our clinical and non-clinical research professionals engage. At Marianjoy we are committed to systematic inquiry and investigations designed to develop and contribute to applied knowledge within the scientific community. These intentions and this report are specifically aligned with Marianjoy’s values of Integrity, Development, and Excellence.

The physical medicine and rehabilitation field serves a diverse array of patients across various levels of care. Research areas of interest for Marianjoy investigators are likewise diverse. The Marianjoy research projects described herein can be large or small in scope, retrospective or prospective, individual institution focused or multi-centered, externally funded or internally sponsored, and developed using experimental research designs or non-experimental action based research methods. All of this work is valuable and contributes important knowledge that will ultimately benefit patients at Marianjoy and beyond.

As a free-standing academic, rehabilitation hospital, Marianjoy is not directly affiliated with any specific university; rather, we have relationships with approximately 100 universities and colleges that bring students to our campus and network sites. Marianjoy researchers serve as mentors and supervise undergraduate, graduate, doctoral level students, and medical residents as part of these academic agreements. The primary goal of this mentoring activity is to embrace the importance of applying research knowledge to evidence-based practice.

Core to Marianjoy’s research agenda is our Institutional Review Board (IRB) that reviews and approves research applications. The Marianjoy IRB is registered with the Federal Office of Human Subjects Research Protection and functions in accordance with the requirements of the Department of Health and Human Services (HHS) Protection of Human Subjects regulations. Our IRB is committed to insuring all research projects meet an appropriate level of scientific rigor before they are undertaken. As a demonstration of the success of this process, all the materials covered in this compendium were either reviewed by the full board or approved by a Marianjoy IRB official.

At Marianjoy our research mission is to facilitate an agenda in physical medicine and rehabilitation comprised of traditional and alternative medical models. We see this as complimentary to our overall institutional mission of being “committed to living out the healing ministry of Jesus, by providing exceptional and compassionate healthcare services that promotes the dignity and well being of the people we serve.” Our goal is to be recognized as a national leader in the field of physical medicine and rehabilitation, where evidence-based best practices are integrated into a culture of quality and excellence at all levels of the organizational structure. We hope you enjoy this collection of published and ongoing research from Marianjoy.
Kevin Masters
Former Patient, Brain Injury

The Marianjoy Brain Injury Program is CARF accredited.
Feasibility of Instrumental Swallowing Assessments in Patients with Prolonged Disordered Consciousness while Undergoing Inpatient Rehabilitation


This study supported by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

Researchers evaluated the feasibility, safety, and potential benefit of instrumental swallowing assessments for patients with prolonged disordered consciousness participating in rehabilitation. In this retrospective, case-controlled study, 35 participants were divided into 2 cohorts according to cognitive level at the time of baseline instrumental swallowing assessment. Group 1 participants (n = 17) were at Rancho Los Amigo (RLA) level II/III or RLA level III, while Group 2 participants (n = 18) were rated better than RLA level III. Aspiration and laryngeal penetration rates for both groups were similar (aspiration rate Group 1 = 41%, Group 2 = 39%; laryngeal penetration rate Group 1 = 59%, Group 2 = 61%). Overall, 76% (13/17) of Group 1 and 72% (13/18) of Group 2 were able to receive some type of oral feedings following baseline videofluoroscopic swallow study (VFSS) or endoscopic exam of the swallow (FEES). The majority of participants who underwent an instrumental swallowing exam while still functioning at RLA level II/III or RLA level III were able to return to some form of oral feedings immediately following their baseline examination. Swallowing as a treatment modality can be considered a part of the overall plan to facilitate neurobehavioral recovery for patients with prolonged disordered consciousness participating in rehabilitation.
Predictive Value of the Disorders of Consciousness Scale (DOCS)


This study supported by grants from Health Service Research & Development Service and Rehabilitation Research & Development Service

The goal of this study was to examine the predictive validity of measures of neurobehavioral change derived from the Disorders of Consciousness Scale (DOCS) for predicting return to consciousness 4, 8, and 12 months after severe brain injury (BI). This prospective, observational predictive validity study took place in inpatient rehabilitation hospitals and post-rehabilitation residence. Participants included a total of 113 persons with a mean age of 38 +/- 17.8 years who were unconscious for >28 days consecutively after severe BI; 73% (83/113) with traumatic BI and 27% (30/113) with other BI. Independent variables included baseline DOCS, DOCS average, change from baseline DOCS to subsequent DOCS (DOCS2, DOCS3, DOCS4, DOCS5, DOCS6), and injury type (traumatic BI vs. other BI). The main outcome measure included time to consciousness at 4, 8, and 12 months after injury. The results of this study show when controlling for injury type, the DOCS average as well as DOCS change between the first and second DOCS (DOCS1-2), first and fifth DOCS (DOCS1-5) and first and last DOCS (DOCSTotalchg) significantly (P < or = .05) contributed to predicting recovery and lack of recovery of consciousness at 4, 8, and/or 12 months after injury. DOCS1-5 manifested the most balanced accuracy in predictions, where predicting recovery of consciousness is accurate 87% of the time and predicting lack of recovery of consciousness is accurate 88% of the time. Overall, for persons with prolonged disorders of consciousness, the findings indicate that evidence-based prognostication for individual patients is possible. The implications for research are that the DOCS can be used as a meaningful, reliable, and valid primary outcome to measure treatment effects in clinical trials. The evidence indicates further that DOCS measures merit inclusion in future research that aims to develop multivariate prognostication models.

BRAIN INJURY
POSTERS & PRESENTATIONS

Assessment & Treatment Planning for Individuals with Severe Traumatic Brain Injury

Guernon A, Pape TL, Fith-Costa J.

With the increasing number of individuals surviving severe brain injury in unconscious states, speech pathologists face the challenge of objective assessment and treatment for this population. Provision of prognostic information to caregivers is also limited. This study provided an overview of the levels of disordered consciousness, assessment using the Disorders of Consciousness Scale (DOCS), goal planning and measurement of progress, and prognostic information available based on current research.

Presented at Illinois Speech and Hearing Association Annual Convention, Chicago IL, November 2008

Improved Predictions of Return to Consciousness within Year-1 of Severe Traumatic Brain Injury


This study supported by grants from Health Service Research & Development Service and Rehabilitation Research & Development Service

The objective of this study was to improve the accuracy of outcome predictions for persons surviving severe traumatic brain injury (TBI). The first goal was to identify the neurobehavioral measure that yields a balance between the ability of the test to predict lack of recovery of consciousness when it really does not occur (Specificity) with the ability of the test to predict recovery of consciousness when it really does occur (Sensitivity). This study compared the accuracy of outcome predictions between baseline measures of neurobehavioral functioning with measures reflecting neurobehavioral change. The outcome analyzed was return to consciousness at three time points during the first year of recovery. This project demonstrates the capacity to predict recovery of consciousness will help families respond to and cope with the logistical, financial, personal and ethical issues related to TBI.

Presented at Hines VA Hospital/North Chicago VAMC, Chicago, IL, May 2008
Neural Responses to Familiar and Non-Familiar Voices During Coma Recovery


This study supported by a grant from Rehabilitation Research & Development Service

A pilot study of two unconscious persons’ neural responses to familiar voices and non familiar voices was conducted. The pilot data was used to conceptualize and design a larger study aiming to determine whether a high dose of familiar vocal stimulation improves neurobehavioral outcomes for persons who are unconscious after severe Traumatic Brain Injury (TBI). This larger study, just starting to enroll subjects, is important because medical advances have dramatically improved the odds of surviving a severe TBI, but there are no treatments or interventions known to facilitate and/or shape functional recovery from severe TBI. This larger study aims to help physicians, therapists and families provide an effective and inexpensive bedside treatment during coma recovery.

Presented at Hines VA Hospital/North Chicago VAMC, Chicago, IL, May 2008

Self Reported Satisfaction with Life One Year after Severe Traumatic Brain Injury

Pape TL, Saban K.

This study supported by grants from Health Service Research & Development Service and Rehabilitation Research & Development Service

A sample of persons participating in this ongoing study was abstracted and analyzed to describe self reported satisfaction with life and to examine variables associated with self reported good and poor life satisfaction. Twenty four persons with severe traumatic brain injury (TBI) unconscious for more than 27 days consecutively are included in this sample. Study enrollment occurs at time of inpatient (IP) rehabilitation admission. After IP rehabilitation discharge, each participant is followed monthly up to 12-months after date of injury. The follow-up interview 1-year after injury includes multiple assessments of functional outcome and one measure of life satisfaction. Satisfaction with life is assessed with persons who are able to participate in an interview 1 year after injury. The preliminary results were summarized.

Presented at Hines VA Hospital/North Chicago VAMC, Chicago, IL, May 2008

Pharmacologic Treatment of Urinary Incontinence due to Traumatic Brain Injury Associated Hydrocephalus


This case-controlled, retrospective study examined fourteen subjects in a tertiary acute inpatient rehabilitation hospital over a two year period who met the inclusion criteria, to test hypotheses that urinary incontinence due to traumatic brain injury (TBI) associated hydrocephalus can be treated pharmacologically depending on the type of bladder dysfunction as determined by Cystometrogram (CMG) and to evaluate if pharmacologic treatment can improve bladder incontinence. Overall, results were better in the group of patients with the large bladder capacity than those with small capacities. Early diagnosis of Hydrocephalus and shorter period of dementia gave better results in training patients with incontinence. Medications helped both groups. Early diagnosis of Hydrocephalus and appropriate management (V-P shunts) resulted in the best outcome.

Using Modality Specific Measures for Predicting Outcomes after Severe Brain Injury

Guermon A, Pape TL, Roth H, Lundgren S, Blahnik M.

This study supported by a grant from Rehabilitation Research & Development Service.

This study examined the usefulness of modality specific scores, the average auditory, visual, and tactile measures, derived from the Disorders of Consciousness Scale (DOCS) in predicting functional outcomes 3-years after severe traumatic brain injury (TBI).

Presented at American Congress of Rehabilitation Medicine & American Society of Neurorehabilitation, Toronto, Canada, October 2008
BRAIN INJURY
ACTIVE RESEARCH

Dizziness and Balance Symptoms Following Brain Injury


Traumatic brain injury (TBI) is a significant public health issue in the civilian population and has increased in the number of soldiers and veterans identified with TBI across all levels of injury severity. The symptoms of mild TBI can resolve in 3 to 12 months, but have been reported to persist five years after injury. Three quarters of TBI patients have mild head injuries; resulting in balance problems which impact their quality of life. Veterans who have experienced blast injuries may experience more severe and prolonged symptoms associated with dizziness and balance than a non-blast type of injuries. Information about the duration and severity of their symptoms is necessary to design effective studies of interventions to treat dizziness and balance. It is essential that methods to objectively measure and improve balance and vestibular stability be identified and/or developed with validation for patients with mild TBI. The purpose of this pilot study is to collect data that will provide a foundation for a clinical trial to examine the effectiveness of an intervention to improve treatment of dizziness and balance after TBI.

This study is a retrospective medical record review of outpatients who have incurred a mild TBI and were evaluated at either Marianjoy Rehabilitation Hospital or the Hines Veteran's Administration. Extracted medical information will be analyzed to describe the prevalence of balance and dizziness symptoms, examine the potential association between these symptoms and the nature of the injury and compare symptoms of OEF/OIF veterans and civilians with mild TBI. Results and conclusions are pending completion of data analyses.

Measurement, Treatment Effectiveness, and Outcomes Post Severe Brain Injury


The absence of a reliable and valid measure of neurobehavioral functioning in unconscious persons limits researchers and clinicians’ ability to identify the important indicators of neurological recovery following severe brain injury. Current measures of neurobehavioral functioning are not sufficiently sensitive for detecting subtle indices of and changes in neurobehavioral functioning.

Health care providers need better tests to effectively measure brain functioning for patients who have experienced a severe brain injury. Significant progress has advanced the measurement of neurobehavioral functioning with the development of the Disorders of Consciousness Scale (DOCS) that produces a reliable and valid static (one moment in time) measure of cerebral functioning in unconscious persons. The purpose of the research is to enhance neurobehavioral measurement and prognostication after severe traumatic brain injury (TBI). Specifically, the research objectives are to: (1) enhance and shorten the DOCS scale, (2) Examine the performance characteristics of the finalized DOCS, and (3) Explore associations between the DOCS and other variables known or thought to be important to outcome prediction.

This is a prospective measurement and outcomes study of persons with severe TBI. It is in the third phase and builds upon previous research. Enrolled subjects in the study have been unconscious for at least 28 days consecutively and are within 180 days of injury. Data collection procedures include in-hospital activities and post-discharge activities. Participants are followed up to one year after injury. The primary outcome is time to recovery of consciousness and the secondary outcome is functional outcome at one year after injury. A total of 200 subjects are required for desired statistical power.
Pilot Study of Acupuncture Efficacy with Traumatic Brain Injury

The purpose of this pilot study is to examine the safety and efficacy of acupuncture for non-agitated persons with traumatic brain injury (TBI). Acupuncture, as a medical intervention, is based on the premise that there are patterns of energy flow (Qi; pronounced “Chee”) through the body and these energy flow patterns are essential for health. Disruptions of this flow are believed to be responsible for disease and acupuncture is a treatment theorized to correct imbalances of energy flow. It is hypothesized that persons who are at least one year after injury prior to study enrollment will demonstrate improved orientation, quality of life, short term memory, attention and executive functioning following acupuncture and cognitive therapy. It is also hypothesized that persons receiving acupuncture will demonstrate greater activation in the bilateral temporal areas, anterior cingulated and/or the right pre-frontal dorso-lateral area as measured with functional MRI. According to contemporary research standards, there is a paucity of high-quality research assessing efficacy of acupuncture compared with placebo or sham acupuncture.

This pilot study is a double blinded parallel group, randomized, cross-over design where the control group participants receive cognitive therapy and sham acupuncture and the experimental group receives acupuncture plus cognitive therapy for eight weeks. Following the initial eight weeks of intervention, participants will cross over and receive an additional eight weeks of real/sham acupuncture and cognitive therapy. Participants will be randomly assigned to the order in which they receive each type of acupuncture. A battery of baseline standardized tests and functional MRI will be conducted at baseline and repeated following the first eight weeks of intervention and then again at completion of the entire 16 weeks. Results and conclusions are pending subject enrollment, data collection and analyses.

Predictors to Deep Vein Thrombosis Following a Traumatic Brain Injury during Inpatient Rehabilitation
Rao N, Fetter T, McQuillan C.

Complications of a deep vein thrombosis (DVT) can be life-threatening for patients in acute inpatient rehabilitation; however, it is a preventable and treatable condition. Although the incidence of DVT following a traumatic brain injury (TBI) is reported to range from 3.9% to 7.8%, these individuals are at risk to develop a DVT because of concomitant risk factors of trauma to the extremities and prolonged periods of immobilization. Prior research has identified risk factors for the development of a DVT with individuals following a TBI who were participating in inpatient rehabilitation to include: being over 40 years of age, a history of DVT at acute care, obesity, gross varicose veins, immobility, hormone replacement therapy, surgery, and paralysis of a lower limb. Often the medical team is reluctant to start thromboprophylaxis to prevent a DVT, because of the increased risk of intracranial bleeding sustained during TBI and concurrent co-morbid conditions.

The purpose of this study is to identify the incidence, predictive variables, and potential impact a DVT may have upon patients admitted to inpatient rehabilitation following a TBI. Currently, limited information is available comparing the rehabilitation outcomes of those patients who developed a DVT following a TBI versus those who did not. The information derived from this study will be used to develop an evidenced based clinical guideline to focus on appropriate medical intervention for prevention and earlier identification of a DVT following a TBI event.

This study involves a retrospective medical chart review of all patients admitted to Marianjoy Rehabilitation Hospital over the previous 24 months with a pre-admission impairment group code verifying a TBI primary diagnosis. Based upon review of the medical chart during the inpatient rehabilitation stay, subjects will be divided into two groups: Group 1 will include subjects who did develop a DVT and Group 2 will include subjects who did not develop a DVT. Logistic regression analysis will be used on the binary dependent variable “presence of a new DVT” using the following predictors: Age, gender, length of stay at acute care, weight / BMI, admit FIM mobility score, admit cognitive FIM score, presence of a fracture (location by extremity, pelvis, or spine), presence of paralysis of lower limbs, and history of DVT at acute care. Results and conclusions are pending completion of statistical analyses.
HEALTHCARE POLICY
PUBLISHED RESEARCH

Screening for Heart Disease in Athletes by Athletic Trainers and Sports Physical Therapists


Sudden cardiac death in athletes may be preventable if healthcare providers perform a thorough screening of the cardiovascular system during routine athlete evaluations. The objective of this study was to determine the adequacy of routine screening of athletes for heart disease by athletic trainers (ATs) and physical therapists (PTs). National Athletic Trainers Association and Sports Physical Therapy Section members were surveyed using a stratified sampling technique via e-mail and postal mail. The results of this study showed that ATs performed significantly higher than PTs on the composite screening score (CSS; mean of 13 items) as well as on 9 of 13 individual items. Logistic regression analysis revealed that "involvement in pre-participation screenings for sports (PPSS)" was most closely related to CSS (P < .01) and controlling for this factor in the ANOVA eliminated differences between the professions. Overall, clinicians working with athletes who are not involved in PPSS may not adequately screen these patients for heart disease.

Joshua Doty,
Cross Country and Track
Athletic Performance Rehabilitation
CoACH Care Center – A Unique Economical Approach for Care of Children Who are Medically Fragile

Keen M, Grisko D.

This study demonstrated an economical model of quality care for children who are medically fragile, and although stable, are unable to return directly home from the hospital due to ongoing complex health care needs. The CoACH Care Center (renamed Almost Home Kids), was designed to be a “home away from home” for children with complex needs, where loving, short-term respite care could be provided by nurses with specialized training. A second 120 day care program successfully transitions children from hospital intensive care units to home. CoACH Care offers an array of services to children and families at a cost substantially less than hospital rates. Having respite available to all families enables them to maintain healthy family relationships and prevents them from being involved in costly government programs such as DCFS, court systems, foster care, and the mental health system.

Presented at American Academy of Pediatrics, Colorado Springs, CO - February 2009

Impact of Unresolved Acute Care Medical Conditions and Co-morbidities on Early Emergency Discharges from Acute Rehabilitation

Rao N, Ruroede K.

This study examined a single inpatient rehabilitation facility’s (IRF) experience with emergency discharges within three days of admission, due to unresolved acute care medical conditions beyond known co-morbidities (ICD-9 codes). Medicare healthcare reimbursement policy changes related to acute care readmission within 30 days and the impact of increased clinical severity of patients were considered. Patients discharged from acute care and admitted to an IRF over the past year demonstrated increases in medical severity and decreasing stability prior to IRF admission.

Presented at Association of Academic Psychiatrists, Bonita Springs, FL, April 2009

Reasons and Factors Contributing to Early Emergency Discharges from Acute Rehabilitation

Rao N, Ruroede K, Kulcsar D, Lueder A.

This study examined a single inpatient rehabilitation facility’s (IRF) experience with emergency discharges within three days of admission. Changes to Medicare policies and enforcement of admission criteria for Medicare reimbursement have influenced the types of admission diagnoses and increased clinical severity of patients. Patients discharged from acute care and admitted to an IRF over the past year demonstrated increases in medical severity and decreasing stability prior to IRF admission, leading to an increase in unanticipated emergency discharges to acute care and a reduction of financial reimbursement to the IRF.

Presented at American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, October 2009; Presented at Association of Academic Psychiatrists, Bonita Springs, FL, April 2010

Panel Discussion: Experiences from Study Site Participation in the Post-Acute Care Payment Reform Demonstration and Continuity Assessment Record and Evaluation

Ruroede K, Gage B, Miller N, Howard E.

Implemented to restructure Medicare reimbursement for all post-acute settings, the Post-Acute Care Payment Reform Demonstration is a major Medicare initiative mandated by Congress as part of the Deficit Reduction Act of 2005. A major focus of this healthcare policy research was for Medicare to develop the Continuity Assessment Record and Evaluation (CARE) tool that will be consistently used across all five levels of care (acute, inpatient rehabilitation, skilled nursing, long term acute care, and home health care). The CARE tool will help Medicare identify the medical issues, impairments and functional status of patients, and reimbursement resources. This demonstration research contract was awarded to Research Triangle Institute, who selected 150 representative facilities from all five levels of care to test the CARE tool. As one of the selected facilities, Marianjoy, along with other panelists, shared lessons learned and experiences from the demonstration research and CARE tool development.

Presented at American Medical Rehabilitation Providers Association 7th Annual Medical Rehabilitation Educational Conference, San Antonio, TX, October 2009
Rehabilitation Medical Necessity Appeals: Financial Impacts & Lessons Learned

Ruroede K.

In December 2006, a single inpatient rehabilitation facility experienced a Part A Medicare post-payment audit by their fiscal intermediary. Of the 20 claims and medical records reviewed for conditional and medical necessity compliance under Medicare rules, 16 claims were denied for lack of medical necessity criteria evidence. The denied claims were then appealed through the Medicare claims appeals process up to the Administrative Law Judge level with favorable outcomes, but at great costs to the organization. After 16 months, the medical necessity appeals continue as of this abstract submission in April 2008. The resources expended throughout the appeals' process are costly and similar to other rehabilitation facilities across the country that have endured post-payment audits by Medicare's Fiscal Intermediaries. This presentation summarized these lessons learned, the financial impact to facilities, and the level of appeals completed with the respective outcomes.

Presented at American Medical Providers Association, Amelia Island, FL, September 2008

HEALTHCARE POLICY

ACTIVE RESEARCH

An Investigation of Cardiac and Pulmonary Patient Discharge Trends from Acute Care Facilities


This study supported by a grant from the American Medical Rehabilitation Providers Association

Under the 60% Rule (formerly called the 75% Rule), the Center for Medicaid and Medicare Services (CMS) considers the admission of patients with a Cardiac or Pulmonary diagnoses as inappropriate for an Inpatient Rehabilitation Facility (IRF) level of care for rehabilitation; these diagnoses are considered “Non-Qualifying” admissions under this CMS Rule. Because of this Medicare policy, IRFs may not always be able to admit the referred patients from the acute care facilities. In general, Discharge Planners within acute care refer (with physician approval) Cardiac or Pulmonary patients to appropriate post-acute care facilities; however, the patients are not always admitted to the recommended setting, but denied due to various reasons. It is posited that acute care referral hospitals’ Discharge Planners are often impacted and puzzled by the reasons why IRFs accept the Cardiac and Pulmonary patients sometimes yet other times not, thus impeding efficient discharge planning.

Due to the CMS 60% rule constraints on IRFs and the acute care facilities’ application of these policies, many patients, such as cardiac and pulmonary patients, who were “referred, but not admitted” to an IRF, will eventually be discharged to other post-acute levels of care for rehabilitation. As a result, patients with complex Cardiac and Pulmonary diagnosis who are cared for at alternative post-acute facilities with limited resources often re-admit to acute care within the same episode of care. Restricted IRFs admission criteria coupled with acute care hospital’s own CMS regulatory reimbursement criteria influence referral facility practices and confuse the relationships between referral partners managing the patient care continuum. Consequential effects from CMS policy are realized by the patients who move across the healthcare continuum. This study is important for the benefit of future patients who are the recipients of healthcare services from acute care facilities and all post-acute care levels of care. The primary purpose of this study is to explore and trend a purposive sample of local acute care hospitals’ discharge destination decisions and readmission trends for their Cardiac and Pulmonary patients across a three year study.

This is a multi-center, exploratory study that utilizes a mixed method with (1) pre-existing, retrospective medical record data from acute care facilities to explore cardiac and pulmonary discharge and readmission trends, (2) IRF’s referred but not admitted retrospective medical record data on Cardiac and Pulmonary patients to trend changes over the study period, and (3) prospective survey data for qualitative analysis on acute care Discharge Planners’ reported changes in their discharge practices.
In 2010, Marianjoy ranked in the 98th percentile for associate satisfaction as measured by Press Ganey.
Acupuncture Treatment for a Teenage Girl with Chronic Fatigue Syndrome: Case Report


Acupuncture treatment was used for a fourteen year old girl for insomnia, depression, and severe fatigue. This case is unique as the literature search did not reveal cases of chronic fatigue syndrome (CFS) in a young person of 14 years of age treated with acupuncture. She had suffered from an upper respiratory tract infection at age 11, due to Epstein-Barr infection. After the diagnosis of mononucleosis, she suffered chronic insomnia and extreme fatigue for three years. After six treatments of weekly acupuncture, her signs and symptoms completely resolved. She was able to sleep well at night, go back to school, and graduate. Overall, her quality of life and her parents’ lives improved significantly with the help of acupuncture treatments for chronic fatigue syndrome.

Anticipatory Postural Adjustments in Children with Typical Motor Development


This study supported in part by a grant from the Neuro-Development Treatment Association

Anticipatory postural adjustments (APAs) play an important role in the performance of many activities requiring the maintenance of vertical posture. However, little is known about how children utilize APAs during self-induced postural perturbations. A group of children,
aged 7-16 years, with typical motor development, performed various arm movements while standing on a force platform. APAs were measured by recording the electromyographic activity of six trunk and leg muscles on both sides of the body and displacement of center of pressure (COP). Anticipatory bursts of activity in the dorsal muscle groups of the trunk and legs and suppression in the ventral muscle groups as well as posterior COP displacement were found during the performance of bilateral shoulder flexion. Conversely, during bilateral shoulder extension, the COP displacement was anterior, and APAs were reversed showing bursts of activity in the ventral muscle groups and suppression in the dorsal muscles. During right and left reciprocal arm movements, COP displacement was minimal and APAs were generated in the dorsal muscle groups on the side of the forward moving arm and in the ventral muscle groups on the side of the arm moving into extension. However this pattern reversed for lower leg muscles, where APAs were generated in the ventral muscles on the side of forward moving arm and in the dorsal muscle on the side of the arm moving into extension. The results of this study indicated that children with typical motor development are able to generate APAs, produce task-specific sequencing of muscle activity and differentiate between perturbations in the sagittal and transverse planes. The results of this study indicated that by at least age 7, children who are typically developing demonstrate the ability to generate patterns of anticipatory muscle activation and suppression, along with center of pressure changes, similar to those reported in healthy adults.

**Anticipatory Postural Adjustments in Conditions of Simulated Reduced Gravity**


This study investigated the role of decreased gravity on anticipatory postural adjustments (APAs). Subjects performed fast bilateral arm-raising movements and load releases while in conditions of normal and reduced gravity. Reduced gravity conditions were simulated by changing the ratio between the body weight and mass. Electromyographic (EMG) activity of dorsal and ventral trunk and leg muscles, as well as ground reaction forces, were recorded and quantified within the time intervals typical of APAs. Anticipatory postural adjustments were seen in normal gravity conditions as well as in simulated reduced gravity conditions. However, in decreased gravity conditions, the magnitudes of the anticipatory integrals of electromyography muscle activity (EMG) were smaller compared to normal gravity. Moreover, there was a linear relation between EMG and simulated decreased gravity and between the displacement of the center of pressure (COP) and simulated gravity. The study provided new data on the effect of gravity in feedforward postural control and stresses the importance of taking into consideration its role in the control of upright posture.

**Anticipatory Postural Control Following Fatigue of Postural and Focal Muscles**


This study supported in part by grants from National Institutes of Health and National Institute of Disability and Rehabilitation Research

This study investigated the effect of fatigue of postural and focal muscles on anticipatory postural adjustments (APAs). Nine healthy adults performed rapid bilateral arm raising movements before and after isometric hamstring (postural) and deltoid (focal/prime mover) muscle fatigue. Muscle force and peak acceleration of the arm movements were recorded to assess the presence of fatigue. Ground reaction forces, EMG activity of trunk and leg muscles and center of pressure (COP) displacements were recorded and quantified within the time intervals typical of APAs. Early APA onset was seen in erector spinae and semitendinosus muscles post-deltoid fatigue. Anticipatory EMG integrals were reduced in the semitendinosus muscle post-hamstring fatigue, and were increased in the gastrocnemius muscle post-deltoid fatigue. No changes in COP displacement were observed following fatigue of both muscle groups. A common pattern of APA adaptations seen following fatigue of either muscle groups along with no changes observed in COP displacements emphasizes the efficiency of the CNS in maintaining dynamic postural stability in the presence of fatigue. The outcome of the study is important for better understanding of the effect of muscular fatigue on feedforward mechanisms of postural control with possible implications for the elderly and individuals with neurological disorders.
Auxiliary Sensory Cues Improve Automatic Postural Responses in Individuals with Diabetic Neuropathy

Rao N, Aruin AS. Neurorehabil Neural Repair. 2010 Sep 9. [Epub ahead of print]

This study supported in part by a grant from National Institutes of Health

A loss of sensation in the lower limbs, observed in individuals with diabetes as well as the elderly, contributes to postural instability, altered gait patterns, increased risk of falling, and decreased quality of life. Twelve individuals with sensory neuropathy due to diabetes participated in static and dynamic balance tests with and without auxiliary sensory cues provided to the lower limbs without stabilizing the ankle joints. During the tests the subjects were required to stand on a fixed or moving computer-controlled platform with their eyes open or closed. Equilibrium scores and response latency were obtained. For all tests, equilibrium scores were significantly larger in experiments with auxiliary sensory cues in comparison to conditions without cues (p < 0.05). Smaller latency scores were recorded in conditions with available auxiliary sensory information. The results indicate that auxiliary sensory cues provided to the intact tissues of the lower extremities could improve automatic postural responses in individuals with diabetic peripheral neuropathy. The observed enhancement of automatic postural responses has clinical implications that aid in the understanding of postural control in individuals with peripheral neuropathy.

Carrying Loads and Postural Sway in Standing: The Effect of Load Placement and Magnitude


This study supported in part by grants from National Institutes of Health

This study investigated the effect that load magnitude, load location, and the dimensions that the base of support have on postural sway in standing while wearing a backpack, single strapped bag, briefcase, or purse. Subjects were instructed to carry a load of 10% or 20% of their body weight with either their feet spaced shoulder width apart or together for a period of 45 seconds. Medial/lateral and anterior/posterior center of pressure (COP) displacement and COP velocity were calculated. Overall, it was found that an increase in load magnitude produced an increase in postural sway and velocity of COP. In addition, a large increase in the medial/lateral COP velocity was observed when subjects carried a briefcase, single strapped bag, or purse. Additionally, a larger COP sway was recorded in conditions of standing with decreased base of support (feet together). These findings suggest the importance of considering the way we carry loads in order to not only place less strain on the body and minimize our efforts, but to optimize postural control as well.

Effect of Contralateral Finger Touch on Grip Force Control in Individuals with Multiple Sclerosis


This study supported in part by grants from the National Multiple Sclerosis Society and National Institutes of Health

It was recently shown that the magnitude of grip force utilized to lift and transport a hand-held object decreased if a light touch from the contralateral finger is provided [Aruin AS. Support-specific modulation of grip force in individuals with hemiparesis. Arch Phys Med Rehabil 2005;86:768-75]. The rationale of the study is to find out whether or not the individuals with multiple sclerosis (MS) have the same behavior as control subjects. The study included eight patients with MS and eight control subjects performing the task of lifting and transporting an instrumented object with provision of light touch of the contralateral index finger to the wrist of the target arm and without it. The tasks of placing the object on a shelf and a simulation of a drinking maneuver were studied. Peak grip force, force ratio, latency, and time lag were recorded and analyzed. Results of the study revealed that the mean peak grip force decreased in conditions with application of light finger touch in patients and control subjects while performing both the experimental tasks. The force ratio also improved with application of light finger. Overall, individuals with MS apply smaller grip force if they utilize a finger touch. Findings provided better understanding of how patients with MS control grip force and suggested that a light touch approach could be considered as a valuable modality in the rehabilitation of these patients.
Effects of Lateral Perturbations and Changing Stance Conditions on Anticipatory Postural Adjustment


This study supported in part by grants from National Institutes of Health and National Institute of Disability and Rehabilitation Research

The study investigated the role of lateral muscles and changing stance conditions in anticipatory postural adjustments (APAs). Subjects stood laterally to an aluminum pendulum released by an experimenter and were required to stop it with their right or left hand. Stance conditions were manipulated by having the subjects stand in the following positions: on a single limb (SS), with feet together (narrow base of support, NB), and with feet shoulder width apart (regular base of support, RB). Bilateral EMG activity of dorsal, ventral, and lateral trunk and leg muscles and ground reaction forces were recorded and quantified within the time intervals typical of APAs. Anticipatory postural adjustments were seen in all experimental conditions, and their magnitudes depended on the stance and the side of perturbation. Accordingly, APAs in lateral muscles increased on the side of perturbation in SS condition, while simultaneous activation of dorsal muscles occurred on the contralateral side. Smaller APAs were seen in lateral muscles in conditions with a wider base of support (NB, RB) and APAs in dorsal muscles were smaller in NB - in comparison to RB - stance. The results of the study provided new data on the role of lateral, ventral, and dorsal muscles in anticipatory postural control when dealing with lateral perturbations in conditions of postural instability.

The Effect of Short-term Changes in Body Mass Distribution on Feedforward Postural Control


This study supported in part by grants from National Institutes of Health

It was recently shown that short-term changes in the whole body mass and associated changes in the vertical position of the center of mass (COM) modify anticipatory postural adjustments (APAs) [Li X, Aruin AS. The effect of short-term changes in the body mass on anticipatory postural adjustments. Exp Brain Res 2007;181:333-46]. In this study, changes in the body mass distribution and related changes in the anterior-posterior COM position affect APA generation were investigated. Fourteen subjects were instructed to catch a 2.2 kg load with their arms extended while standing with no additional weight or while carrying a 9.08 kg weight. Adding weight to a backpack, front pack or belly pocket was associated with an increase of the whole body mass, but it also involved changes in the anterior-posterior (A/P) and vertical positions of the COM. Electromyographic activity of leg and trunk muscles, body kinematics, and ground reaction forces were recorded and quantified within the typical time intervals of APAs. APAs were modified in conditions with changed body mass distribution: increased magnitude of anticipatory EMG activity in leg and trunk muscles, as well as co-activation of leg muscles and decreased anticipatory displacement of the COM in the vertical direction, were seen in conditions with increased body mass. Changes in the COM position induced in both A/P and vertical directions were associated with increased anticipatory EMG activity. In addition, they were linked to a co-activation of muscles at the ankle joints and significant changes in the center of pressure (COP) position. Modifications of the COM position induced in the A/P direction were related to increased anticipatory EMG activity in the leg and trunk muscles. At the same time, no significant differences in anticipatory EMG activity or displacement of COP were observed when changes of COM position were induced in the vertical direction. The study outcome suggested that the CNS uses different strategies while generating APAs in conditions with changes in the COM position induced in the anterior-posterior and vertical directions.

Grip Force Control in Individuals with Multiple Sclerosis


This study was supported in part by a grant from the National Multiple Sclerosis Society

Appropriate regulation of grip force is essential in performance of various activities of daily living such as drinking, eating, buttoning a shirt, etc. The extent to which individuals with multiple sclerosis (MS) are able to regulate grip forces while performing elements of the activities of daily living is largely unknown. This study investigated how individuals with MS control grip force during performance of functional tasks. This study
evaluated the grip force control in selected individuals with MS (n = 9) and healthy control subjects (n = 9) while they performed the task of lifting and placing an instrumented object on a shelf and the task of lifting the object and bringing it close to the mouth to mimic drinking. The grip forces, object acceleration, force ratio, and time lag were recorded and analyzed. Results showed the individuals with MS used significantly larger peak grip force and force ratio than control subjects while performing both tasks and for both hands. In addition, the time lag between the peaks of grip and load forces was significantly longer in individuals with MS. Overall, the application of excessive grip force could predispose individuals with MS to additional fatigue and musculoskeletal overuse trauma. Rehabilitation protocols for the MS population may need to account for increased levels of grip force applied during the performance of functional tasks.

The Role of Anticipatory Postural Adjustments in Compensatory Control of Posture: 1. Electromyographic Analysis

This study supported in part by grants from National Institutes of Health and National Institute of Disability and Rehabilitation Research

Anticipatory (APAs) and compensatory (CPAs) postural adjustments are the two principal mechanisms that the central nervous system uses to maintain equilibrium while standing. Researchers studied the role of APAs in compensatory postural adjustments. Eight subjects were exposed to external predictable and unpredictable perturbations induced at the shoulder level, while standing with eyes open and closed. Electrical activity of leg and trunk muscles was recorded and analyzed during four epochs representing the time duration typical for anticipatory and compensatory postural control. No anticipatory activity of the trunk and leg muscles was seen in the case of unpredictable perturbations; instead, significant compensatory activation of muscles was observed. When the perturbations were predictable, strong anticipatory activation was seen in all the muscles: such APAs were associated with significantly smaller compensatory activity of muscles and COP displacements after the perturbations. The outcome of the study highlights the importance of APAs in control of posture and points out the existence of a relationship between the anticipatory and the compensatory components of postural control. It also suggested a possibility to enhance balance control by improving the APAs responses during external perturbations.

The Role of Anticipatory Postural Adjustments in Compensatory Control of Posture: 2. Biomechanical Analysis

This study supported in part by grants from National Institutes of Health and National Institute of Disability and Rehabilitation Research

The central nervous system (CNS) utilizes anticipatory (APAs) and compensatory (CPAs) postural adjustments to maintain equilibrium while standing. It is known that these postural adjustments involve displacements of the center of mass (COM) and center of pressure (COP). The purpose of the study was to investigate the relationship between APAs and CPAs from a kinetic and kinematic perspective. Eight subjects were exposed to external predictable and unpredictable perturbations induced at the shoulder level while standing. Kinematic and kinetic data were recorded and analyzed during the time duration typical for anticipatory and compensatory postural adjustments. When the perturbations were unpredictable, the COM and COP displacements were larger compared to predictable conditions with APAs. Thus, the peak of COM displacement, after the pendulum impact, in the posterior direction reached 28+/−9.6mm in the unpredictable conditions with no APAs whereas it was 1.6 times smaller, reaching 17+/−5.5mm during predictable perturbations. Similarly, after the impact, the peak of COP displacement in the posterior direction was 60+/−14 mm for unpredictable conditions and 28+/−3.6mm for predictable conditions. Finally, the times of the peak COM and COP displacements were similar in the predictable and unpredictable conditions. This outcome provides additional knowledge about how body balance is controlled in presence and in absence of information about the forthcoming perturbation. Moreover, it suggests that control of posture could be enhanced by better utilization of APAs and such an approach could be considered as a valuable modality in the rehabilitation of individuals with balance impairment.
Role of Lateral Muscles and Body Orientation in Feedforward Postural Control


This study supported in part by grants from National Institutes of Health

The study investigated the role of lateral muscles and body orientation in anticipatory postural adjustments (APAs). Subjects stood in front of an aluminum pendulum and were required to stop it with their right or left hand. An experimenter released the pendulum inducing similar body perturbations in all experimental series. The perturbation directions were manipulated by having the subjects standing on the force platform with different body orientations in relation to the pendulum movements. Consequently, perturbations were induced in sagittal, oblique, and frontal planes. Ground reaction forces and bilateral EMG activity of dorsal, ventral, and lateral trunk and leg muscles were recorded and quantified within the time intervals typical of APAs. Anticipatory postural adjustments were seen in all experimental conditions; their magnitudes depended on the body orientation in relation to the direction of perturbation. When the perturbation was produced in the lateral and oblique planes, APAs in the gluteus medius muscles were greater on the side opposite to the side of perturbation. Conversely, simultaneous anticipatory activation of the external obliques, rectus abdominis, and erector spinae muscles was observed on the side of perturbation when it was induced in the lateral plane. The results of the study provided additional information on the directional specificity of anticipatory activation of ventral and dorsal muscles. The findings provided new data on the role of lateral muscles in feedforward postural control and stress the importance of taking into consideration their role in the control of upright posture.

Role of Movement Velocity on the Magnitude of Grip Force while Lifting an Object with Touch from the Contralateral Finger


This study supported in part by grants from the National Multiple Sclerosis Society and National Institutes of Health

This study investigated whether slower velocity of arm movement affects grip-force generation in conditions with the finger touch provided to the wrist of the target arm. Nine subjects performed the task of lifting and transporting an object at slow, intermediate, and fast velocities with a light finger touch from the contralateral arm and without it. There was an effect of velocity of arm movement on grip-force generation in both conditions. However, when the no touch and touch trials performed with similar velocity were matched, the effect of touch on grip-force reduction was statistically significant ($p < .001$). The observed decrease in grip force could not be explained by slower movement execution in the touch conditions and underlines the importance of using a contralateral touch in the performance of activities of daily living. It also points to a possibility of the development of therapeutic advances for the enhancement of grip-force control in patients with neurological impairments.

NEUROLOGICAL & NEUROMUSCULAR DISORDERS POSTERS & PRESENTATIONS

Adult Onset Neurogenic Stuttering Following Development of Complicated Migraine: Case Study

Krieger R, Steffen E.

This presentation described a unique case of transient adult-onset neurogenic stuttering of the apraxic type following onset of a “complicated migraine” within an African-American female. An MRI did not reveal any focal/generalized abnormalities of the brain. Dysfluencies were accompanied by secondary physical concomitants such as eye blinks, head movements, knee twitches, and excessive tension of the facial/laryngeal region musculature. Patient received speech language pathology services within a comprehensive day rehabilitation setting for five months in conjunction with occupational and physical therapy.

Presented at American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, October 2009
Benign Case of Multiple Sclerosis Presenting with Back Pain and Lower Extremity Spasticity: A Case Report

Medina-Sanchez JM, Oken J, Boodin N.

This presentation described a unique case of relapsing remitting multiple sclerosis presented with cerebellar symptoms, which is associated with a worse prognosis. Multiple sclerosis is the most common cause of non-traumatic disability affecting young adults in the northern hemisphere, with the highest prevalence in the highest latitudes. Approximately 400,000 persons in the USA have MS, with a prevalence ranging from 40 to 220 per 100,000. An estimated 85% of patients have either the R-R or secondary progressive (SP) forms. SP MS typically develops after many years of the disease state. Untreated, the average R-R patient will transition into SP by 10 years. Ten to fifteen percent of patients with MS have a progressive disease from the onset, known as primary progressive (PP) MS. The fourth type of MS is the progressive-relapsing (P-R) which is less common, and is characterized by a steady progression of clinical neurological damage with superimposed relapses and remissions. There is significant recovery immediately following a relapse but between relapses there is a gradual worsening of symptoms. The pathologic hallmark of MS is the presence of multifocal demyelinated plaques scattered throughout the central nervous system, with prominent involvement of the periventricular white matter, optic nerves, brain stem, cerebellum, and spinal cord.

Presented at American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, October 2009

Dorsiflexor Strength and its Relationship to Ambulation Outcome in Patients with Guillain Barré Syndrome

Terry A, Stambolis V.

This study examined the relationship between dorsiflexor (DF) strength and time of initial ambulation as well as time to reach independent status in patients with Guillain Barré. This study found a negative relationship between DF strength and length of stay, and a positive relationship between FIM Walk/Wheelchair at admission and days to initial ambulation.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

Metronidazole Induced Neuropathy: Case Report

Bharara A, Oken J.

Metronidazole-induced neuropathy is a very rare cause of neuropathy that is usually self-resolving by six months. Metronidazole is a commonly prescribed antibiotic for the treatment of anaerobic and protozoal infections of the gastrointestinal and genitourinary tracts. It is associated with numerous neurologic complications, including peripheral neuropathy. This case study examined a patient presented to the emergency room (ER) due to abdominal pain and watery diarrhea where she was diagnosed with lymphocytic colitis and placed on a 1 month course of metronidazole along with prednisone and sulfaroxilizone. After three weeks (approximately 21 grams of metronidazole) the patient began to have progressive constant burning bilateral lower extremity pain that was worse in the afternoon and also began to experience some weakness in bilateral lower extremity. Patient attempted treatment initially with PT, modalities, and medications (gabapentin, duloxetine, hydromorphone), which did not decrease her pain, but instead caused nausea. 18 months thereafter patient presented to pain rehabilitation clinic with bilateral lower extremity burning pain. Physical exam demonstrated significant mild weakness of bilateral lower extremity hip flexors, but severe alldynia of bilateral lower extremities diffusely. The patient also developed a significant loss of function of activities of daily life.

Presented at Association of Academic Physiatrists, Anaheim, CA, February 2008

Multidisciplinary Management of Chronic Pain Following Multiple Sclerosis Exacerbation

Patel A, Oken J.

Research over the past few years has shown that, contrary to prior beliefs, chronic pain is a common condition in persons with Multiple Sclerosis (MS) and can be severe at times. Pain itself is known as one of the more difficult symptoms to alleviate and the compounding factor of a patient's diagnosis of MS complicates treatment options. A 25 year old female with chronic central pain associated with her Multiple Sclerosis and Myofascial Pain Syndrome was treated at a comprehensive pain rehabilitation program. Following treatment, patient showed clear improvement in her symptoms and ability to perform exercises, which correlated with her decreased amount of pain. Central
Pain Syndrome associated with MS exacerbation can be treated with a multidisciplinary pain program to break the cycle of pain. The ability to provide patients with the necessary tools and strategies to cope with pain, can lead to significant improvement in pain intensity, duration, and allows the patient to return to full participation in their activities of daily living.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

Orthotic Fitting for a Patient with Mitochondrial Disease with Falls

Allamneni S, Rao N, Keen M.

This study examined a thirty-two year old female with history of frequent falls seen in an outpatient clinic. Patient presented with complaints of weakness in all extremities, decreased tone, loss of balance, blurred vision, and fatigue. Patient was diagnosed with mitochondrial muscle disease. On physical exam, muscle strength in upper extremities was 4 out of 5. In the lower extremities, strength was as follows: hip flexors 2+, hip abductors 3, hip extensors 4, knee flexors and extensors 4, ankle dorsiflexors and plantar flexors 4, and invertors and evertors 3. Patient rapidly fatigued when given resistance to ankle movements with ankle strength declining to 2+/3-. Tone decreased in all extremities and muscle stretch response was 1+. Gait evaluation revealed bilateral Trendelenburg gait with pelvic drop on both sides and hyperextension of the knee to maintain balance. Foot drag was noted with fatigue. When gait was evaluated with bilateral flexible ankle foot orthoses (AFO), patient found it difficult to hyperextend her knees which normally helped her maintain balance. Gait was also evaluated with bilateral articulating AFOs with plantar flexion stops allowing her to slightly hyperextend her knees. She did not have to flex her knees excessively for foot clearance, and no foot drag was noted. Her gait was noted to be more stable with the bilateral articulating AFOs with posterior stop. Mitochondrial disease is a common inherited neuromuscular disorder which causes progressive weakness leading to gait impairment and falls. In this case, the patient was provided with an appropriate orthotic for ankle stabilization and prevention of foot drag during gait, resulting in improved balance and fewer falls.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

Rehabilitation Outcomes in Patients after Corpus Callosotomy for Intractable Epilepsy: Case Series

Reddy S, Rao N.

This study analyzed two patients undergoing acute inpatient rehabilitation after corpus callosotomy surgery for intractable epilepsy. Case 1: 48 year old man status-post posterior corpus callosotomy for intractable epilepsy since the age of nine with history of anterior corpus callosotomy six years prior. Case 2: 52 year old woman status post corpus callosotomy with ablation for intractable epilepsy who incurred a cerebrovascular accident after surgery. Both patients were enrolled in an acute inpatient rehabilitation facility.

Presented at American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, April 2010

Severe Neuropsychiatric Manifestations of Systemic Lupus Erythematosus in a Young Iraqi War Combat Veteran: Case Presentation

Barrett PJ, Lee B YW, Tariq A, Harris K, Jantra P.

Neuropsychiatric manifestations of Systemic Lupus Erythematosus (SLE) can occur in up to 80% of patients either early on or during the course of the illness. This case describes a 22-year-old Iraqi combat veteran with severe neuropsychiatric manifestations of SLE. Two weeks after returning from a year of combat duty in Iraq, patient presented to the VA Medical center with symptoms of infection such as fever, malaise, generalized weakness, and gait dysfunction. Instead, patient was found to have SLE with neuropsychiatric disturbances including cognitive dysfunction, cerebritis, and a mood disorder. Two years later, patient presented again after several months of medication noncompliance with respiratory failure. The patient was also found to have a right foot drop and proximal muscle weakness which led him to be admitted to the acute inpatient rehabilitation unit. Ultimately, the patient was transferred to the intensive care unit (ICU) for pneumonia and respiratory failure prior to completing his rehabilitation. While in the ICU, electrodiagnostic testing was performed to evaluate weakness further. Patient had both neuropathic and myopathic involvement either or both of which were caused directly by the SLE, his critical illness, or the steroids treatments.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010
Treating Multiple Sclerosis in Patient with Schizoaffective Disorder: Case Study

D’Souza K, Stambolis V.

This study examined a 31 year old caucasian female with severe schizoaffective disorder, in a group home since her late teenage years. Subject was noted to have balance issues, behavioral changes, and multiple falls over six-month period. MRI of brain and spinal cord revealed findings consistent with demyelinating disease. She was diagnosed with multiple sclerosis and transferred to acute rehabilitation hospital for lower limb strengthening, balance and gait training, improvements in cardiovascular endurance, self-care upgrade, and management of medical issues. At time of admission, subject was noted to have spastic paraplegia and neurogenic bowel and bladder secondary to multiple sclerosis. Subject’s history of balance issues, behavioral changes, and multiple falls over the six-month period were initially attributed to her schizoaffective disorder resulting in delay in diagnosis. Despite low level of functioning at first glance, subject did well at acute rehabilitation hospital. Subject participated in comprehensive physical, occupational, speech, swallow, and recreational therapy, and psychology. She was referred to an ophthalmologist for prescription glasses, with resultant improvement in visual impairment. Patients with schizoaffective disorder or other psychiatric illnesses may have a secondary illness, and changes in behavior should not be attributed to primary psychiatric diagnosis until detailed history, physical examination, and investigations have ruled out all other possibilities.

Presented at Association of Academic Physiatrists, Anaheim, CA, April 2008

Feedforward and Feedback Elements of Postural Control: How Strong is Their Relationship?

Aruin A.

This study supported in part by a grant from National Institutes of Health

Any body perturbation, either external, such as a sudden translation of the support surface or internal, such as a fast arm or leg movement, endangers the body equilibrium. To minimize the risk of losing balance, the central nervous system (CNS) activates the trunk and leg muscles prior to the forthcoming body perturbation: this type of adjustment is called anticipatory postural adjustments (APAs). The second type of adjustment in the activity of postural muscles is observed after the body perturbation has already occurred. This type of adjustment, which is utilized to deal with the actual perturbation of balance, is initiated by the sensory feedback signals, and termed compensatory postural adjustments (CPAs). The individual roles of APAs and CPAs in control of posture were studied extensively in the past. However, much less research has been done to examine their relationship. A set of experiments was conducted to study how APAs affect CPAs and their results were discussed.

Presented at Sixth International Conference “From Basic Motor Control to Functional Recovery,” Varna, Bulgaria, September 2009.

Two Functions of Anticipatory Postural Adjustments

Aruin A, Latash ML.

Researchers discussed a new hypothesis that postural adjustments prior to a predictable postural perturbation (feedforward) represent a superposition of two components. The first component has no or little net mechanical effect. Its function is to attenuate multi-muscle synergies that are expected to be unproductive, i.e. those synergies that stabilize performance variables that will have to be changed quickly to counteract effects of the perturbation. The second
Role of Auxiliary Sensory Cues on Balance in Peripheral Neuropathy

Rao N, Aruin A.

This study supported in part by a grant from National Institutes of Health

Approximately 12 million people are diagnosed with diabetes in the US and the cost associated with treatment is estimated to be $156 billion by 2010. Individuals with diabetic peripheral neuropathy have diminished sensitivity in the lower extremities and as a result, have problems with balance maintenance. Peripheral neuropathy is a significant health problem not only as a result of common syndromes such as diabetes, but also as part of the aging process. Clinical neuropathies could result in ataxia, balance difficulties, and increased risk of falling. The role of sensory cues in the control of posture and balance in the presence of peripheral neuropathy is unclear. The purpose of this study is to investigate the role of sensory information in balance maintenance using a novel approach, in which auxiliary sensory cues are provided to the distal segments of the leg of auxiliary sensory cues on balance in individuals with diabetic neuropathy. It is believed that ankle-foot orthoses (AFOs) could deliver sensory cues to the lower extremity above the ankle joints thus helping in improvement of balance.

Investigators evaluated changes in the postural responses of patients with diabetic peripheral neuropathy with and without auxiliary sensory cues or ankle foot orthoses. This project outcome will lead to the development of a novel rehabilitation technique for improving balance control in patients with peripheral neuropathy and older adults. As such, the outcome of the study could help these individuals achieve maximal independence in mobility and activities of daily living.
The Marianjoy Integrative Pain Treatment Center is the only CARF accredited pain program in the state of Illinois.
ORTHOPEDIC
POSTERS & PRESENTATIONS

Efficacy of Physiatrist as Ultrasonographer Assessing Deep Vein Thrombosis in Inpatient Rehabilitation

Parikh R, Rao N, Ruroede K, Aliga N.

This retrospective, case-controlled study evaluated cost and rehabilitation effectiveness of 35 consecutive patients admitted to acute rehabilitation that later developed signs and symptoms of deep vein thrombosis (DVT), which were assessed ultrasonographically on site by physiatrists. Of the 35 patients, four (three females) were found to have a positive ultrasound for DVT. Physiatrists skilled in Doppler Ultrasonography and thrombolytic therapy interventions performed onsite assessment for diagnostic accuracy of DVT and managed their rehabilitation without any interruption, achieving significant cost/time savings and functional gains. Patient interruption and prolonged length of the rehabilitation program due to DVT medical management is less disruptive to the patient and provides improved continuity of care.

Presented at the American Academy of Physical Medicine & Rehabilitation, San Diego, CA, November 2008
Upper Extremity Deep Vein Thrombosis in the Presence of Adhesive Capsulitis Following Abrupt Discontinuation of Self-Prescribed Aspirin Therapy: Case Report

Wilson J, Weiss D.

This case report examined a 53 year old African American female with a history of diabetes, hypertension and coronary artery disease, who was referred to the outpatient clinic for right-sided shoulder pain and edema. Patient reports a two to three week history of severe right-sided shoulder pain and a two day history of right upper extremity edema. Over the previous nine months, she had experienced mild pain and “tightness” in her right shoulder with overhead activities. Three weeks prior to presentation in the clinic, pain increased without an inciting event and she self-prescribed Aspirin 325mg Q4 hours. Then, three days prior to presentation, she abruptly discontinued aspirin therapy and the following day began to experience progressive swelling in her right arm. Physical exam was consistent with adhesive capsulitis and an upper extremity deep vein thrombosis (DVT).

Disuse of the shoulder secondary to pain and stiffness, led to the development of a DVT, however, another factor may have played a part; the patient abruptly discontinued self prescribed high dose aspirin (2g per day) three days prior to presentation.

Aspirin inhibits platelet aggregation by preventing expression of the GP IIb/IIIa receptor, and it is the most widely used oral antiplatelet agent. A possible mechanism for the rebound hypercoagulability seen with receptor inhibition is that after binding to the circulating drug (aspirin), the receptor is reconfigured to the “open” position. After the drug detaches, the receptors stay in this position thereby free to bind fibrinogen and triggering the coagulation cascade. Possible rebound hypercoagulation may have contributed to the DVT formation. There are a few case reports found in the literature detailing thromboembolic events (including CVA’s, TIA’s and DVT’s) following aspirin cessation.

Overall, this patient had many associated factors for developing adhesive capsulitis. In spontaneous cases, it is most commonly seen in women between the ages of 40-60 with a history of diabetes. The disuse or immobility of her right upper extremity secondary to pain may have increased her risk for developing an upper extremity DVT. However, this case may provide evidence of rebound platelet activation. She self-prescribed high dose aspirin therapy not for its antiplatelet activity, but for pain relief; so it is unlikely that an underlying condition was unmasked with its then self-prescribed cessation. It is possible that rebound hypercoagulability was at least partially responsible for the development of an upper extremity DVT, in the presence of upper extremity disuse secondary to adhesive capsulitis. Over the course of several months, the patient improved and progressed to a home exercise program. She shows only mild decrease in external rotation in the right glenohumeral joint.

Presented at Association of Academic Psychiatrist, Anaheim, CA, February 2008
D – Ficiency: A Case Series Evaluation of Vitamin D Hypovitaminosis in Chronic Pain Patients

Parikh R, Ruroede K, Oken J.

This retrospective, case-controlled study examined Vitamin D levels and hypovitaminosis in chronic pain patients in relation to duration of subjective pain, concurrent presenting psychological problems, reported location of pain, and intensity of pain. Results demonstrated the need to consider the Vitamin D levels and potential deficiencies while treating a chronic pain population of patients, particularly the elderly.

Presented at the American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, October 2009

Electrical Injury: Course of Recovery & Chronic Pain Management

Allamneni S, Oken J.

Few case studies have followed the recovery of electrical injury patients over time. This twelve year retrospective case study shows that a combination of physical therapy and routine monitoring of pain and efficacy of medications was successful in improving strength and function and decreasing pain enabling a patient to successfully return to work, re-engage in hobbies, and independently perform ADLs. Electrical injuries can be debilitating in terms of pain and loss of function. An interdisciplinary approach including physical therapy, a work hardening program, and appropriate pain management can facilitate an improvement in overall quality of life and function.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010
Multidisciplinary Management of Neuropathic Pain Following Abdominoplasty: Case Report

D’Souza K, Oken J.

Neuropathic pain, although a rare complication of abdominoplasty, can cause disability. This study examined a 55-year old woman subject who underwent total abdominal hysterectomy with bilateral salpingo-oophorectomy and complete abdominoplasty in June 2005. Following surgery, insidious onset, gradually progressive pain developed in left lower quadrant (LLQ) of abdomen. Subject was admitted to chronic pain clinic where multidisciplinary treatment directed to break pain cycle and teach patient coping strategies. This resulted in significant improvement in pain levels. It is also important to note depression plays an important role in the experience of chronic pain. Overall, the effect a of multi-modality approach to treat and control a previously unidentifiable pain syndrome resulted in significant pain control with improved quality of life.

Presented at Association of Academic Psychiatrists, Anaheim, CA, February 2008

Role of Sign Language Interpreter in Multidisciplinary Pain Management Program: Case Report

D’Souza K, Oken J.

The goal of this study was to determine the effectiveness of an American Sign Language Interpreter (ASLI) in the course of a pain management program. The study examined a 50 year old female subject with congenital deafness who suffered from cervicalgia for over four years with constant pain for over one-and-a-half years. Neuropathic pain results in significant direct and indirect costs to patients and their families in terms of pain, suffering, health care expenditures, and diminished quality of life. Neuropathic pain results in significant costs to society in lost productivity & vocational disability. Despite non-interventional and interventional modalities, pain remained a significant contributor of subject’s poor quality of life and affected her ability to function as a member of society. An ASLI accompanied the subject for all her sessions and was essential for dialogue between subject and program staff. At the end of the program, subject noted significantly decreased average pain level, decreased frequency and duration of maximal intensity pain, improved duration and quality of sleep, and improved ability to function. Subject stated pain program had helped her 7-8 out of 10 in treating, controlling and dealing with the pain (10: Provided maximal help; 0: Did not help at all). She also stated that without the ASLI, she would have benefited 0 out of 10 from the program. Results demonstrated multidisciplinary treatment directed at breaking pain cycle and teaching patient coping strategies results in significant improvement in pain levels. This was the first documented case of an individual with congenital deafness participating in a multidisciplinary pain program through services of an ASLI.

Presented at Association of Academic Psychiatrists, Anaheim, CA, February 2008
Impact of Chaplain Services on Components of Forgiveness and Spirituality in Rehabilitation Patients

Roberts P, Workman G, Ruroede K, Lee M.

Spiritual and religious practices have been identified as possible protective factors for patients coping with disabling medical conditions (Chally & Carlson, 2004; Giaquinto, et al, 2007). Religious involvement is believed to help patients with disabling medical illness cope better and gain psychological growth from their negative health experiences (Koenig, et al, 2001). This pilot study assessed the spiritual well-being and dispositional forgiveness of rehabilitation patients who received spiritual care services from hospital chaplains.

Results indicated a positive association between chaplain services and an increased sense of life meaning and a greater forgiveness of others in rehabilitation patients. While preliminary, findings provide insight into the potential benefits of integrating spiritual and religious interventions into holistic patient care and may be useful in developing additional chaplain spiritual care services to encourage patient recovery in this population. Future research should focus on the relationship between specific spiritual care methods, spiritual well-being, forgiveness, and physical health in adult rehabilitation patients.

Presented at the Association of Professional Chaplains Conference, Schaumburg, IL, April 2010
The Meaning of the Experience of Losing a Limb

Florczak K, Ruroede K, Meneghini L, Wood K.

According to the National Limb Loss Information Center, as of 2009, there were approximately 1.9 individuals living with an amputation in the United States. There is a great amount of literature devoted to the physiologic and psychosocial effects on a patient who experienced an amputation. However, a vital missing piece in the literature is greater understandings of the personal experience the patient faces and exactly what the loss of a limb means to them and its connections to the human experience of loss.

The loss of a limb is a life-altering experience that impacts the quality of life for the patient and their families. Using the “human becoming” (Parse 1981, 1998) theory as a conceptual framework, this descriptive study looks to explore the phenomenon of loss with individuals who are living with the loss of a limb. The major theme was the understanding of the quality of life from the perspective of another person. This theory will benefit clinicians by honoring others’ personal beliefs about health and quality of life, while helping professionals understand the meaning of loss based on research of patients past experiences.

The purpose of this study is to qualitatively describe the significance of losing a limb from the perspective of the patient. A total of 10 Individuals, 18 years of age or older, fluent in English, have lost a limb, and their status is post-loss of limb acute rehabilitation and in physician follow-up phase, were invited to participate in the study. Interviews with participants were facilitated by Investigators and recorded by informed consent. The interviews were transcribed and then annually reviewed by the Investigators for concepts, themes, and trends seen in the text. The interviews' texts were also analyzed using machine learning technology and linguistics within SPSS Text Analysis software. Results and conclusions are pending completion of the data analysis.
**Aggressive Treatment for Spinal Epidural Abscess Caused by Group B Streptococcus**

Yontner SJ, Stambolis V.

This presentation described a 72 year old male patient with a favorable prognosis who was aggressively treated for Spinal Epidural Abscess (SEA) and vertebral osteomyelitis caused by hematogenous spread of urinary tract infection with Group B streptococcus, which is the most common pathogen for diabetic patients. Patient with radiating low back pain and recurrent UTIs presented with increased back pain, intermittent fever, and chills. Septic shock ensued and he was transferred to ICU. Blood cultures were positive for group B streptococcus. Thoracic MRI revealed T10-T11 diskitis/osteomyelitis and ventral T10-T11 epidural abscess with cord edema and mass effect. Patient underwent T10-T11 bilateral laminectomy, diskectomy, and fascietomy and received IV antibiotics. A two-week post-op MRI revealed destructive progression at T10-T11 vertebral bodies from epidural abscess. Patient subsequently developed bilateral lower extremity (LE) weakness and underwent T7-L2 posterior spinal arthrodesis, T9-T12 posterior interbody arthrodesis, placement of T9-T12 anterior interbody expandable Medtronic XVB cage, T7-L2 posterior screw, and rod instrumentation. Osteomyelitis was treated with IV aztreonam and Linezolid for six weeks. After two months in acute care, patient transferred to rehabilitation institution due to deconditioning, and initially had decreased motor strength in proximal muscle groups secondary to disuse myopathy. After three weeks in acute rehabilitation, his transfers and ambulation improved from maximum assist to minimum assist and muscle strength improved from 2/5 to 4/5 for hip flexors and knee extensors.
Overall, SEA outcome is largely influenced by the severity and duration of neurological deficits prior to surgery, stressing the importance of early recognition. Therefore, SEA should be part of differential diagnosis especially in the elderly with back pain and sepsis.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

**Central Cord Syndrome Caused by Neck Hyperextension During Dental Procedure: A Case Report**

Ajluni M, Stambolis V.

This study examined a 79 year old female with a significant history for anterior and posterior cervical osteophytes, cervical spondylosis, and cervical and lumbar spinal stenosis, who underwent dental extraction and implant procedure with neck hyperextension at approximately 60 degrees for 90 minutes. The following morning, she experienced whole body numbness inferior to the neck and bilateral upper extremity weakness. By the afternoon, weakness localized to the right upper extremity and her paresthesias had largely resolved. Patient was transferred to acute inpatient rehabilitation for extensive therapy. At four weeks post-trauma, the patient continued to show lingering weakness in her proximal right upper extremity with good strength recovery in her left upper extremity and bilateral lower extremities with household functional ambulatory capacity, consistent with Central Cord Syndrome. Central Cord Syndrome is classically caused by neck hyperextension in persons with pre-existing cervical spondylosis. The cord may be compressed by osteophytes anteriorly and a buckling ligamentum flavum posteriorly. Recovery in Central Cord Syndrome is usually fair with age being a major predictor. Research to elucidate the dangers of seemingly benign neck positioning is needed. Dental procedures are not nearly the only situation where this may be seen. Further research is needed to provide us with recommendations for limiting the likelihood and possibly preventable spinal cord injuries.

Presented at the American Academy of Physical Medicine & Rehabilitation Annual Assembly & Technical Exhibition, Austin, TX, October 2009

**Neurological Complications Due to Delayed Intervention of Spontaneous Spinal Epidural Hematoma**

Yontor SJ, Shah M, Stambolis V.

This study described the possibility of SSEH occurring in an anti-coagulated patient. SSEH is a rare condition that requires emergency surgical treatment. It has been reported that 25-70% of patients with SSEH are treated with anticoagulants. The clinical presentation is local back pain followed in hours to days by sensory and motor dysfunction. Immediate interruption of anticoagulant therapy and correction of the coagulation is necessary. Magnetic resonance imaging should be the first diagnostic tool. Early diagnosis and surgical treatment are the most important factors for a good result; however, correct diagnosis is usually too late for successful surgical treatment. It should therefore be suspected in any patient receiving anticoagulant agents who complains of acute back pain. Also, the increased use of NSAIDs for falsely diagnosed local back pain has elevated the risk for this complication.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

**Paraplegia with Subsequent Recovery after Spinal Cord Infarct: Case Study**

Charles B, Stambolis V.

Paraplegia with subsequent motor recovery after a spinal cord infarct is uncommon. The causes of spinal cord ischemia after aortic surgery have been linked to prolonged aortic clamping, systemic hypoperfusion, direct interruption of the spinal cord blood supply, and atheroembolism of critical spinal collateral vessels. The study reported a patient with spinal cord infarct following AAA repair having improved lower extremity motor function. The blood supply of spinal cord, incidence, signs and symptoms of spinal cord infarct, management, recovery rate and prognostic indicators for recovery were discussed.

Presented at the American Academy of Physical Medicine & Rehabilitation, San Diego, CA, November 2008
Rehabilitation of Spinal Cord Injury Secondary to Tuberculosis of the Thoracic Spine: Case Report

Charles B, Stambolis V.

This presentation described a unique case of a completely independent 38 year old man who was experiencing progressive lower extremity weakness, night sweats, fever, and weight loss. Subsequently the patient was diagnosed with tuberculosis and placed on antituberculin therapy with medications. Through an MRI, it was discovered the patient had T3 cord compression. He had a neurosurgical evaluation, was managed conservatively, and sent home with home health care. The patient's condition became progressively worse and the patient was admitted to another hospital with paraplegia of bilateral lower extremities and totally bedridden. He also was found to have tuberculosis of multiple sites including the lungs, CNS, the adrenals and the vertebrae with lesions at T3 and T8. While in the hospital, it was also noticed the patient had a pulmonary embolism.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

The Marianjoy TLSO Donning/Doffing Scale: Pilot Results

Burton A, Nelson P.

This study examined what effect, if any, does the placement of the “D-Ring” on a Thoracic-Lumbar-Sacral-Orthotic (TLSO) have upon functional donning and doffing for individuals undergoing inpatient rehabilitation as evaluated by the Marianjoy TLSO Donning/Doffing Scale. The scale was developed internally by consensus in the Occupational Therapy Department. It is considered an ordinal scale in nature and measures the level of assistance and the specific tasks that an individual is able to complete with donning and doffing the TLSO. Inclusion criteria for this study included individuals who were using a TLSO at the time of admission and had the cognitive ability to follow one step directions. Both the anterior and posterior “D” ring groups made significant progress during inpatient rehabilitation as measured by the Marianjoy TLSO Donning/Doffing Scale at admission and discharge. However, the differences made between the two groups were not significant. Given the small sample size, further research is indicated.

Presented at the Illinois Occupational Therapy Association Conference, Springfield, IL, November 2008
Marianjoy Rehabilitation Hospital treats over 496 stroke patients each year.
Acupuncture Treatment for Refractory Hiccups in Stroke Patients


Following a stroke, several patients experienced persistent hiccups for several days that did not resolve with conventional medical treatments. These patients were exhausted from persistent hiccups and also had dysphagia, vomiting, and depression. The objective of this study was to report the effectiveness of acupuncture treatment for unrelenting hiccups following a stroke. A case series of four patients following a stroke with refractory, sustained hiccups that were not responsive to conventional medication treatments was reviewed. According to Traditional Chinese Medicine theory, acupuncture points selected were ST 36, LV 14, LV 13, LV 3, GB 34, and GV 20. The goal of this treatment was to assist in descending of Stomach Qi; smoothing Liver Qi; balancing Liver Yang; normalizing functions of the Liver and Spleen; and calming the mind/spirit.

Results show that all patients had complete resolution of intractable hiccups secondary to stroke within one to two acupuncture treatment sessions. There was no complication associated with acupuncture treatment. Researchers concluded intractable hiccups with associated complications in stroke patients can be treated successfully without complications using acupuncture treatment.
Gait Assessment During the Initial Fitting of an Ankle Foot Orthosis in Individuals with Stroke


This study supported in part by grants from National Institutes of Health

Researchers evaluated if the measurement of gait parameters, examined during the fitting of an Ankle Foot Orthosis (AFO), has a beneficial effect on the gait pattern of individuals who were affected by a stroke. Also, this study sought to provide evidence regarding the use of the portable GaitRite system in a clinical setting. The study was performed as a before-after trial conducted at a stroke outpatient orthotic clinic of a freestanding rehabilitation hospital. Individuals with acute (n=13) and individuals with chronic stroke (n=27) participated in the assessment of gait velocity, cadence, step length, and stance. Overall, AFO use significantly improves gait velocity, cadence, step, and stride length in individuals with hemiparesis due to stroke. The results of the current study indicate that the assessment of temporospatial characteristics of gait can be incorporated into a clinical routine. This will be useful for patient education, justification of medical necessity, monitoring progress, and in the decision-making process of weaning patients off orthoses.

Predictors of Returning to Oral Feedings After Feeding Tube Placement for Patients Post-Stroke During Inpatient Rehabilitation


This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

The objective of this study was to identify the frequency and characteristics of patients admitted to inpatient rehabilitation (IPR) following a stroke who are able to return to oral feedings and have their feeding tube (FT) removed prior to discharge from IPR, the timing of FT removal, and implications for outcomes. Medical records were identified by admission rehabilitation impairment code (RIC) for stroke (RIC 01), and reviews were completed by two physiatrists and two speech language pathologists. At random, 25% of the charts were reviewed by a second rater for data quality control. Measures collected during the chart review included the following: age, gender, onset of stroke, rehabilitation length of stay (LOS), admission and discharge FIM, discharge destination, diet level, and feeding tube status. Results of the study included 143 patients who were identified as subjects for this investigation and who had an FT and were NPO upon IPR admission. Overall, 46.9% (67/143) of the patients returned to three meals daily prior to discharge from IPR. The mean days post-stroke onset until returning to three meals daily was 38.43 days (SD = 26.36). Twenty percent (30/143) of the patients were able to have their FT tube removed prior to discharge from IPR. Factors associated with returning to three meals included gender (ie, female), longer IPR LOS, and higher
admission FIM scores at IPR. Factors associated with removal of the feeding tube included a longer IPR LOS and younger age. Patients who were able to have their FT removed were more likely to be discharged to home. Individuals with longer IPR LOS were more likely to return to three meals daily and have their feeding tubes removed prior to discharge.

**STROKE**

**POSTERS & PRESENTATIONS**

**Apraxia in a 48 Year Old Stroke Patient**
Asokan V, Krieger R.

This study described sign language aphasia with motor limb apraxia in a 48 year old prelingually deaf male, who was fluent in American Sign Language (ASL) and finger-spelled English before suffering a left middle, cerebral artery distribution ischemic cerebrovascular accident. The patient underwent acute inpatient stroke rehabilitation and his language abilities were assessed initially, throughout, and on discharge. Researchers sought to document the patient’s speech disorder to determine whether his deficits would parallel that expected for a hearing person, to associate the site of the lesion as evidenced on the CT Angiogram with the aphasic symptoms. This was important in order to provide information on the neuroanatomical organization of sign language expression and comprehension. Researchers observed whether this patient benefited from speech rehabilitation given the commonality of language production, regardless of modality.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

**Balance Control after Stroke: New Approaches in Assessment & Rehabilitation**
Aruin A.

The presentation discussed new approaches and techniques that became available in assessment and rehabilitation of individuals sustaining a stroke. Special attention was paid to new developments in restoration of base of support, assessment of perception of body verticality, role of auxiliary sensory inputs as well as virtual rehabilitation.

Presented at Neurorehabilitation Symposium, Rush University, Chicago, IL, October 2008

**Biomechanical Aspects of Rehabilitation after a Stroke: Improvement of Stance and Gait**
Aruin A, Rao N, Chaudhuri G.

Rehabilitation of ability to ambulate is an important goal of rehabilitation for individuals sustaining a stroke. Results of a study investigating the role of compelled shift of the body, the technique that involves lift of the nonaffected lower extremity through the use of a shoe insert over a period of several weeks. Biomechanical aspects of the compelled body weight shift were discussed.

Presented at IX All-Russian Conference on Biomechanics, Nignii Novgorod, May 2008

**Functional and Neuromuscular Recovery Following Tetraparesis as a Result of Sjogren’s Syndrome: Case Report**
Reddy A, Stambolis V.

This is a case of a completely independent 57 year old man who was initially admitted to an acute care hospital with profound tetraparesis. The weakness started in his upper right extremity then quickly progressed to the left. Within days, the patient developed extreme weakness in all four extremities. The patient had been evaluated at an outside hospital with tests including MRI, CT scan and lumbar puncture all with inconclusive results. Lab results were within normal limits except for low hemoglobin. He was later transferred to another facility where he underwent muscle biopsy indicating demyelinating tissue and EMG testing revealed demyelinating sensorimotor neuropathy. Final diagnosis was made when lip biopsy was positive for Sjögren’s syndrome. He was started on cyclophosphamide and steroids. Once stabilized, the patient was transferred to the spinal cord unit of the acute inpatient rehabilitation hospital.

Presented at Association of Academic Physiatrist, Anaheim, CA, February 2008
Compelled Body Weight Shift Therapy in Individuals with Acute Stroke: Preliminary Study

Eviota A, Ringquist K, Mohapatra S, Muthukrishnan S, Aruin A.

This study supported in part by a grant from National Institutes of Health

The outcome of a previous study (Aruin et al. J Rehab Res Develop 2000;37:65–72) showed that Compelled Body-Weight Shift (CBWS) therapy, that involves lift of the nonaffected lower extremity through the use of a shoe insert over a period of several weeks, helps individuals with chronic stroke to improve weight bearing symmetry and gait velocity. The effect of CBWS therapy in rehabilitation of acute stroke patients has not been studied. This study was designed to obtain preliminary data on the efficiency of the CBWS therapy in individuals with acute stroke. The results provide evidence of the efficiency of CBWS therapy in treatment of individuals with acute stroke. While researchers plan to enroll more subjects, preliminary results suggested that CBWS treatment might enhance rehabilitation of acute stroke patients.

Presented at Illinois Physical Therapy Fall Conference, Bloomington, IL, September 2009

Visual Assessment and Therapy in Acute Inpatient Stroke Rehabilitation

Rao N, Allen S, Hunt S, Sypherd C.

Individuals with stroke admitted to acute inpatient rehabilitation often have complaints of visual impairment. The objective of this study was to identify the most common causes of visual impairment and appropriate treatment techniques to address patients’ visual complaints.

Presented at Association of Academic Physiatrists, Bonita Springs, FL, April 2010

STROKE
ACTIVE RESEARCH

Common Diagnoses & Treatment Recommendations for Visual Deficits in Stroke Patient in Inpatient Rehabilitation

Hunt S.

Visual deficits are often overlooked symptoms of stroke survivors. Yet, these deficits can negatively impact cognition, mobility, and activities of daily living (ADLs). Stroke survivors who are admitted to inpatient rehabilitation facilities exhibit deficits that may limit them from resuming their previous life roles. Occupational therapists (OTs) in this setting focus on assisting patients to regain independence in activities of daily living (ADLS) which may range from feeding to dressing to meal preparation. Occupational therapists are adept at treating both physical and cognitive disabilities, but visual deficits are often overlooked and less understood. This research is designed to highlight the relationship between occupational therapists’ functional observations of visual deficits in inpatient rehabilitation and optometrists’ diagnoses and recommendations for treatment. Delay in diagnosis and treatment of visual deficits may delay patient progress and lead to an overall poorer rehabilitation outcome.
The primary purpose of this study is to identify what relationship exists, if any, between the common visual symptoms identified by OT visual screening and the subsequent visual diagnoses and treatment recommendations made by an optometrist. The results of this descriptive study will potentially allow visual deficits to be identified earlier and more accurately in treatment. Additionally, it will suggest appropriate treatment methods to maximize efficiency and effectiveness of visual intervention in the inpatient rehabilitation setting and allow for improved patient performance.

This is a retrospective, descriptive, medical record chart review study on a convenience sample of stroke patients admitted for acute inpatient rehabilitation. Patients who underwent both occupational therapy visual screening and visual examination by the hospital’s consulting optometrist between March 2009 and December 2009 were included in the study dataset. Descriptive statistics will be used to analyze the study data. Results and conclusions are pending completion of data collection and analyses.

**Comparison of Berg Balance Scale and PASS Test in Acute Stroke Rehabilitation**

Keller S, Burns M.

Following a stroke, most patients demonstrate some degree of impairment in postural control (American Heart Association). A large portion of therapy services address postural control and balance due to stroke effects. Patients need to demonstrate postural control in both static and dynamic activities to regain independence during acute rehabilitation. It is important for therapists to find an objective measure to evaluate that postural control and the gains made during rehabilitation. The Functional Independence Measure (FIM) is a required measurement that acute inpatient rehabilitation facilities are required to collect, but it is limited with a flooring effect for patients not able to stand. This study is significant due to the need to find objective and quantitative measures that determine patient deficits and improvement during acute inpatient rehabilitation for stroke patients. The primary purpose of this study is to evaluate the feasibility of testing all patients admitted into acute rehabilitation on the stroke unit with objective balance/postural control measures. The secondary purpose is to look at the objective changes in test scores to determine response to therapy interventions with reliable and valid measurement. Overall, the goal of this research is to enhance the therapists’ ability to objectively measure improvements in balance and postural control for the acute stroke rehabilitation patient. The two balance measures chosen for testing are the Berg Balance Scale and Postural Assessment Scale for Stroke patients (PASS).

All patients admitted to the stroke unit of the rehabilitation hospital during the study period February 2010-May 2010 were assessed for appropriateness for the study. Of the 172 patients admitted for acute inpatient stroke rehabilitation, 71 patients were enrolled in the study given the research protocol inclusion and exclusion criteria. Of the 71 patients assessed at admission, six patients were emergently discharged during their rehabilitation stay and are will not be included in the final results. Investigators completed the Berg Balance Test and the PASS test measurements, in addition to the mandated FIM within 72 hours of admission and 72 hours prior to discharge. Final results and conclusions are pending completion of data analyses.

**Compelled Body Weight Shift Therapy In Individuals with Stroke Related Hemiparesis**

Aruni A, Rao N, Chaudhuri G, Sharma A.

*This study supported in part by a grant from National Institutes of Health*

According to the US Centers for Disease Control and Prevention and the Heart Disease and Stroke Statistics, stroke represents a major public health problem with over 700,000 cases annually in the United States. Stroke is also one of the leading causes of disability with 400,000 of these cases resulting with some profound neurological impairment, such as hemiparesis. This becomes problematic given the impact of stroke impairments on activities of daily living (ADLs) and overall independence. Impaired postural control is a key characteristic of the mobility problems in individuals who have sustained a stroke. Asymmetry of stance and weight bearing are also recognized as predictors of a patient’s ability to ambulate. These impairments lead to limitations in motor ability as well as a compromised quality of life for the patients. Therefore, rehabilitating stroke patients’ balance and postural control is essential to progress with their recovery. Determining appropriate care plans that reduce the impact of
hemiparesis remains a top priority and effective low-cost therapeutic interventions are needed to minimize chronic impairment beyond the acute post-stroke rehabilitation period.

Despite the importance of postural control, therapeutic interventions designed to enhance motor function and promote independence following stroke are still limited. At Marianjoy, a new technique was developed that preliminary studies suggest can improve gait pattern, reduce the incapacitating motor deficit of stroke patients, and increase their independence. This technique termed Compelled Body Weight Shift (CBWS) therapy, involves the lift of the non-affected lower extremity through the use of a shoe insert over a period of several weeks. The proposed research is based on findings from a pilot study that demonstrated significant gains in individuals with chronic unilateral stroke following CBWS therapy. The purpose of the study is to test the efficacy and feasibility of this new form of CBWS.

**Evaluating Acute Stroke Patients for Presence of Balance Disorders**

Rao N, Nasher L, Aruin A.

This study supported in part by a grant from NeuroCom International

The ability to maintain balance can be affected by misperception of the body position in space and is common in individuals with a stroke. A number of studies that post-stroke patients with identified balance system problems might also benefit from additional therapeutic interventions focused on balance components of their problem. There is scant information on whether the balance system function is a prognostic indicator of response to treatment in patients with stroke. This is partially due to difficulties in assessing balance in patients with stroke who cannot stand without assistance. Another issue relates to impaired vision in patients suffering from stroke. The purpose of the study was to evaluate whether individuals with recent stroke could participate in assessment of their perceived body position in standing.

A total of 36 patients who have sustained a recent stroke will be recruited for this prospective pilot study. Potential subjects will be screened for eligibility using inclusion and exclusion study criteria. Subjects will be assigned to one of two groups, where Group One will include those who can stand during evaluation and Group Two will include those who cannot stand for evaluation of both static and dynamic balance tests. Conclusions from preliminary analysis indicate this technique may be used for assessment of perceived body position in standing. Objective measurement of perceived body position in standing could help to better understand the stroke-related disability. Final study results are pending completion of analyses of the data and interpretation of findings.

**The Experience of Female Family Caregivers of Stroke Survivors**

Saban K, Keller S.

Stroke is the leading cause of long-term disability in American adults. There are 5.5 million stroke survivors in the United States with over one million suffering from significant, long-term physical disabilities. A large majority of the stroke survivors must rely on family members in the home to assist them. Caregivers save an estimated $257 billion annually in healthcare costs; however, caregivers are at risk for developing depression and other psychological issues that can affect their quality of life. Understanding the experience of family caregivers for stroke survivors is crucial to identify and meet the needs of the patients and their families. The overall purpose of this study is to gather pilot data to assist Investigators with building a program of research that will address the needs of female caregivers for stroke survivors. This study aims to describe and explore the relationships between stress (perceived stress and caregiver burden), coping (coping abilities and benefit-finding), the physiological (diurnal cortisol, inflammatory cytokines (salivary IL-6, TNF-a, IL-1ra, and IL-8), physical (sleep alterations), and psychological (depression, anxiety) responses to stress, and quality of life in female caregivers of stroke survivors, and identify the needs of female caregivers of stroke survivors in order to obtain information for future interventional studies. A cross-sectional, convenience sample of 45 females who met the inclusion criteria of being unpaid family caregivers of persons who experienced a first-time stroke consented to participate in the IRB approved study. All participants completed a self-report questionnaire booklet measuring the study variables described above, and provided saliva samples to diurnal cortisol. Ten of the caregiver participants were also asked to wear a sleep monitor (actigraph) for 72 hours. Descriptive statistics, Pearson correlations, and
regression will be used for analysis. The limitations of this pilot will be considered. The findings of this study will be used to evaluate the feasibility of the proposed measures and provide the foundation for a larger longitudinal study. Results and conclusions pending completion of data analyses.

**Measuring Post-Rehabilitation Community Reintegration Using GPS Technology after Discharge from Acute Inpatient Rehabilitation**

Evans CC, Zielke D, Ruroede K, Hanke T.

The outcome of rehabilitation is of interest to patients, health care providers, and third party payers. Rehabilitation outcome measurements include measures of mobility or functional impairment as well as indices of satisfaction with community reintegration. Factors not included in functional measures, such as cognitive functioning, may influence community reintegration, thereby limiting the use of these measures to predict return to community activities. When considering global indices of functional outcome, no single instrument has been proven to be useful for all levels of patients with neurological injuries or to predict community reintegration. The use of questionnaires as indices of satisfaction with community reintegration has been explored, but not with direct and objective measurement. Tracking movement with Global Positioning System (GPS) technology may offer new insights into community reintegration as well as provide for an objective measure of “outcome” after rehabilitation, overcoming the subjective limitations of surveys. The purpose of this study is to measure community reintegration in patients discharged from a rehabilitation center, as well as to determine the feasibility, reliability and validity of GPS technology as a tool for measuring post-rehabilitation community reintegration.

This is a multi-phase study. Phase I of the study involved 12 healthy subjects at Midwestern University (students, faculty or staff) who wore GPS units to establish an index of internal data consistency, provide indices of instrument reliability and provide an index of the convergent validity of the data. Phase II of the study will compare GPS-generated data on community movement of 12 patients enrolled in the study from the Marianjoy Rehabilitation Hospital. For the subsequent three months, patient participants will wear a GPS unit after discharge from the inpatient hospital. Other data collected will include more traditional outcome measures in patients who have undergone rehabilitation and who are discharged back to their home. The GPS generated data on community movement will be compared with data from more traditional, self report outcome measures. Results and conclusions are pending subject enrollment, data collection, and analyses.

**Randomized Trial of the Innovative Neurotronics WalkAide Compared to Conventional Ankle-Foot Orthosis in Stroke Patients**

Rao N, Mehta S.

*This study supported in part by a grant from Westlake Health Foundation*

According to the US Centers for Disease Control and Prevention, stroke represents a major public health problem, with over 700,000 cases annually in the United States, about 72% of which occur in people 65 years of age or older. Stroke is the third leading cause of death, yet two-thirds of those suffering an event survive. Stroke constitutes one of the largest causes of disability, most often permanent in nature. One common condition of stroke is foot drop on the affected side with hemiparesis. The standard therapy for foot drop is an Ankle-Foot Orthosis (AFO). While providing some improvement, AFO devices do not fully alleviate gait problems in this patient population. An alternative approach to replicate normal gait through Functional Electrical Stimulation (FES) orthoses has recently been developed.

Treatment guidelines for the rehabilitation of stroke patients with foot drop are not clearly defined and uniformly provided in current care pathways. Stroke, whether ischemic or nonischemic, results in some level of disability of motor neuron function. The ability for a patient to regain quality of life post-stroke is dependent on multiple factors. The purpose of this study is to compare the WalkAide, a Functional Electrical Stimulation device, to the current standard of care, an AFO device, in stroke patients with foot drop.

The study is a randomized-control, parallel-group trial, with repeated measures over time and is conducted in multiple centers, including Marianjoy. Enrolled participants by informed consent are randomized 1:1 to receive either the WalkAide or AFO. Evaluation of performed walking tests will compare gait factors including gait velocity. In addition, participants will be asked to complete quality of life forms, stroke impact questionnaires, and activities of daily living measures to compare outcomes between the WalkAide and AFO groups.
Weight-Supported Pre-Gait Balance Rehabilitation in Acute Stroke Patients


This study supported in part by a grant from Retirement Research Foundation

Profoundly impaired motor function is a major consequence of stroke. As a result, a significant portion of the more than 700,000 people in America sustaining a stroke each year has a compromised quality of life due to limitations in motor ability. Therapeutic intervention options designed to enhance motor function and promote independence following a stroke are quite limited, forcing individuals to decrease their level of independence. The limitations of available rehabilitation interventions are especially striking for individuals unable to stand unassisted a few days after the stroke event. The majority of these individuals are unable to participate in gait retraining; most will be wheelchair bound for the rests of their lives.

The overall objective of the proposed research is to test the efficacy of a new form of rehabilitation therapy, namely Weight Supported Pre-Gait Balance Therapy (WSPBT). This innovative rehabilitation approach involves weight support while retraining a patient’s sensory and voluntary motor control of balance utilizing visual biofeedback. The study will compare the performance of standardized laboratory-based tests before and after two weeks for the following two groups: (1) those receiving retraining of the voluntary motor control of balance with visual biofeedback combined with a partial body weight support, and (2) those receiving conventional therapy. This research is of paramount significance because, if successful, the outcomes from this study could be used to refocus conventional rehabilitation strategies aimed at helping individuals with stroke to achieve maximal independence in mobility and activities of daily living. Overall, this would increase opportunities for many individuals to overcome the consequences of stroke.
With support from the Marianjoy Assistive Rehabilitation Technology Institute, therapists use Lite Gait equipment to enhance and evaluate mobility outcomes.
In 2010, the Marianjoy Swallowing and Voice Center acquired a state-of-the-art C-Arm Fluoroscopy System made possible with a $100,000 grant from the Tellabs Foundation.

SWALLOWING
PUBLISHED RESEARCH

Pilot Date on Swallow Function in Nondysphagic Patients Requiring a Tracheotomy Tube


*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Researchers evaluated the effects of occlusion status (i.e., open, finger, capped) of the tracheotomy tube and removal of the tracheotomy tube may have upon bolus flow and durational measurements in nondysphagic persons requiring a tracheotomy tube. The study was designed as a prospective, single subject, repeated measure design. Participants had their swallow evaluated with 5 mL pureed boluses using nasal endoscopy with the tracheotomy tube in place, removed, and under the following occlusion conditions: open, finger, and capped. The order of occlusion condition was randomized. The results showed that aspiration was never observed but laryngeal penetration was a common finding. Durational measurements for swallow initiation and duration of white out were not significantly different by occlusion status or after removal of the tracheotomy tube. This study provided corroborating evidence demonstrating the lack of a relationship between a tracheotomy tube and swallowing dysfunction.
**Advanced Issues in Tracheotomy Management**

Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

This presentation discussed the use of blue dye during clinical swallow examinations, the impact of tracheotomy tube occlusion status on secretions and swallow function, and the overall effect of the tracheotomy tube on swallow function. Clinical examples were presented of unique/unusual tracheotomy tube complications.

Presented at ASHA Healthcare/Business Institute, Seattle, WA, April 2010

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**Clinical Decision Making in Swallowing: Brain Injury, Brain Tumor, and Viral Disease**

Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

This presentation addressed the clinical decision making for swallowing disorders with individuals following a severe traumatic brain injury, brain tumors, and complicating viral illness, and its translation to clinical practice.

Presented at ASHA Healthcare/Business Institute, Seattle, WA, April 2010

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**Clinical Decision Making in Swallowing: Spinal Cord Injury, Cardiovascular Disease**

Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Clinical decision making was examined for swallowing disorders related to cervical spinal cord injury and cardiovascular disease. Results of clinical research were also presented regarding feeding tubes, stroke outcomes, and comparing VFSS to FEES.

Presented at ASHA Healthcare/Business Institute, Seattle, WA, April 2010

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**The Effects of Tracheotomy Tube Occlusion Condition Upon Swallowing in Rehabilitation Patients**

Donzelli J, Rao N, Kaszuba S, Brady S, Wesling M.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

This presentation compared various types of tracheotomy occlusion conditions and the effect they may have upon swallowing during either the videofluoroscopic swallow study (VFSS) or fiberoptic endoscopic exam of the swallow (FEES).

Presented at American Academy of Otolarynology – Head & Neck Surgery Annual Convention, Chicago, IL, September 2008

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**Endoscopy for Evaluation and Treatment Planning: Grand Rounds**

Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

This interactive session presented recent dysphagia research using endoscopy. Participants reviewed endoscopy studies to evaluate swallow function, secretion levels, and possible treatment options including the use of oral care strips and blue ice chips.

Presented at ASHA Healthcare/Business Institute, Seattle, WA, April 2010

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**Evidenced-Based Research Update for Swallowing Research**

Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

This presentation reviewed several dysphagia research projects conducted at Marianjoy Rehabilitation Hospital Swallowing Center. Topics covered include tracheotomy tubes, use of blue dye, accumulated oropharyngeal secretions, comparison of fluoroscopy and endoscopy, oral care, cardiovascular considerations, cervical spinal cord injury, severely disordered consciousness, and electrical stimulation for dysphagia treatment.

Presented at California Speech Language Hearing Association Annual Convention, Sacramento, CA, May 2008
Outcomes of Feeding Tube Placement for Patients with Dysphagia Following a Stroke Undergoing Inpatient Rehabilitation: A Retrospective Study

Brady S, Stewart J, Krieger R, Terry A.

This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

The purpose of this retrospective study was to identify the duration and outcomes of patients with a feeding tube following a stroke admitted to inpatient rehabilitation.

Presented at American Speech Language Hearing Association Annual Convention, Chicago, IL, November 2008

Severely Disordered Level of Consciousness: Returning to Oral Feeding During Inpatient Rehabilitation

Brady S, Pape TL, Gueron A, Escobar N, Rao N, Ruroede K, Darragh M.

This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

This study presented additional evidence from a case-control retrospective study regarding treatment outcomes and factors associated with returning to oral feeding in unconscious patients admitted to inpatient rehabilitation. For the purpose of this investigation, “disordered consciousness” was defined as patients at a Rancho Los Amigos (RLA) Levels of Cognitive Function of I-III and who also received the lowest possible Functional Independence Measure (FIM) cognitive score of a five upon admission to inpatient (IP) rehabilitation.

Presented at American Congress of Rehabilitation Medicine & American Society of Neurorehabilitation, Toronto, Canada, October 2008

Swallowing Frequency & Accumulated Oropharyngeal Secretion Levels

Brady S, Wesling M, Donzelli J, Kaszuba S.

This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

This prospective study was designed to investigate swallowing frequency and accumulated oropharyngeal secretions levels using the 5-point secretion scale. Driving this study is the belief that if individuals with higher accumulated oropharyngeal secretion levels are found to have lower swallowing frequency, then increasing swallowing frequency may become a functional dysphagia treatment objective for improving the efficiency of their swallow. Investigators received approval for this study from an institutional review board, and all subjects were properly consented prior to participation.

Presented at American Speech Language Hearing Association Annual Convention, New Orleans, LA, November 2009

“Wet” Vocal Quality, Secretion Level, & Aspiration during the FEES

Brady S, Wesling M, Kaszuba S, Donzelli J.

This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation

The presence of a “wet” voice following the ingestion of food and/or liquid is a clinical indicator associated with the presence of aspiration. There has not, however, been a great deal of study on the presence of a “wet” voice prior to the presentation of any food and/or liquid. Additionally, the relationship between the presence of a “wet” voice quality and the amount of accumulated oropharyngeal secretions as viewed by nasal endoscopy has not been previously described in the literature. Further research is needed to examine the relationship between the presence of a “wet” voice, secretion levels, and swallowing function because if the perception of a “wet” voice prior to the FEES was associated with both increased accumulated oropharyngeal secretions and silent aspiration, then these results would suggest that presence of a “wet” vocal quality may warrant a referral for an instrumental assessment of the swallow.

Presented at American Speech Language Hearing Association Annual Convention, New Orleans, LA, November 2009
**SWALLOWING**

**ACTIVE RESEARCH**

**Clinic Vocal Fold Injection to Eliminate Aspiration: Case Series**

Kaszuba S, Brady S, Wesling M.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Recent advancements will now allow some patients to have a vocal fold augmentation procedure completed in the office/clinic setting sparing them a trip to the operating room and undergoing any type of sedation. One type of material that is approved for use in the office/clinic setting for vocal fold augmentation is Cymetra®. Even though Cymetra® has been used for vocal cord augmentation procedures to help restore vocal fold closure during voice production, the use of it with rehabilitation patient who also present with dysphagia has not yet been reported in the literature. Patients undergoing inpatient rehabilitation may present with both a vocal fold paralysis and dysphagia from a variety of medical conditions such as stroke, head injury, brain tumors, cervical spinal cord injury, and Parkinson’s disease. Because of the changes in reimbursement and regulations for inpatient rehabilitation stays, some procedures that in the past would have required a trip to the operating room may be considered “elective” and may be delayed until the patient has been discharged to home. Additionally, the Medicare regulations require that all patients undergoing inpatient rehabilitation receive at least three hours of therapy per day. Therefore, any medical procedure that may interfere with the patient receiving their therapy on a given day is closely scrutinized.

Three cases were presented of conducting a vocal cord injection in the clinic setting at an inpatient rehabilitation hospital for patients who presented with both a vocal fold paralysis in the lateral position and aspiration with thin liquids. Clinic/office vocal fold injections may be considered as a cost-effective alternative for some patients who present with vocal fold paralysis and aspiration during inpatient rehabilitation.

**The Effects of Tracheotomy Tube Occlusion upon Swallowing during an Instrumental Assessment of the Swallow & Vocal Fold Closure during Fiberoptic Endoscopic Exam of the Swallow**

Brady S, Kaszuba S, Wesling M, Donzelli J.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

The ability to obtain voluntary laryngeal closure during a breath hold has been reported as an important factor for safe swallowing as it may eliminate aspiration. The purpose of this study is to evaluate what effects, if any, does the tracheotomy tube occlusion condition have upon a person’s ability to obtain laryngeal closure during an effortful breath hold when viewed by endoscopy. A secondary purpose of this study is to evaluate the relationship, if any, between a person’s ability to obtain vocal fold closure and swallowing ability during a subsequent FEES examination.

This is a prospective, single subject, repeated measure design with randomized order of the tracheotomy tube occlusion condition (open versus closed). All subjects underwent flexible nasal endoscopy.

**Incidence of Esophageal Dysphagia in Rehabilitation Patients**

Chaudhuri G, Rao N, Aliga N, Quill A, Brady S.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Dysphagia is defined as difficulty with swallowing solids and or liquids from the mouth to the stomach and involves the oral, pharyngeal, and esophageal phases of swallowing. Nutritional and fluid support one’s body needs are hindered when dysphagia prohibits a normal swallow. The esophagus has often been overlooked for its contributing role to dysphagia in the rehabilitation patient after experiencing a stroke or other type of brain injury. Esophageal dysphagia can often co-exist with oropharyngeal dysphagia or may have been an underlying unknown condition present prior to the current illness, making the diagnosis and management of the dysphagia more of a challenge for the dysphagia care team.

Historically, when evaluating swallowing function, the VFSS protocol did not focus on role of the esophagus, but mainly on the oral and pharyngeal phases of swallowing. Within the last couple of years, the Marianjoy swallowing rehabilitation team began routinely screening...
the esophageal phases of swallowing in order to evaluate its contributing role to swallowing dysfunction. This screening during the VFSS is used to evaluate the role that esophagus plays in dysphagia and to guide appropriate medical management for confirmed esophageal dysphagia. Currently, there are no reported cases or literature of the incidence of identifying esophageal dysphagia during the VFSS when using dysphagia screening for rehabilitation patients. The purpose of this retrospective research project is to identify the incidence of esophageal dysphagia for patients evaluated during a videofluoroscopic swallow study (VFSS). The study objectives are to (1) describe the patient and quality characteristics associated with the presence of esophageal dysphagia, and (2) to describe the treatment strategies/planning used for these patients confirmed with esophageal dysphagia during the VFSS. Analyses continue and results are pending.

**Neuromuscular Electrical Stimulation (NMES) for Dysphagia Treatment Following an Acute Stroke**

Chaudhuri G, Brady S, Caldwell R, Wesling M, Quill A.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

With the introduction of any new technology, specific patient populations need to be evaluated in order to assess both the effectiveness and potential cost implications. Clinicians and healthcare administrators alike strive to provide the most up-to-date technology; however, the evidence in the literature that is used to support these latest techniques must meet a certain level of rigor. The purpose of this study is to compare the effectiveness of neuromuscular electrical stimulation (NMES) to traditional dysphagia treatment (TDT) in patients with dysphagia caused by an acute stroke.

The method is a prospective, randomized, blinded study. The main outcome measures include pre and post-treatment videofluoroscopic swallow study (VFSS) results for Penetration-Aspiration Scale (PAS) score and the American Speech Language Hearing Association (ASHA) National Outcome Measurement System (NOMS) Swallowing Level.

**Patterned Electrical Stimulation for Treatment of Dysphagia: Pilot Study**


*This study is supported by a research grant from Accelerated Care Plus Corporation*

This investigation is designed to explore the benefits of Patterned Electrical Stimulation (PENS) using the Omnistim FX² Pro for the treatment of dysphagia. The underlying mechanism of action is that PENS is being applied to reduce spasticity, combat disuse muscle atrophy, and re-educate neuromuscular timing resulting in improvement of physical function for swallowing function. The purpose of this post-market study is to investigate the benefits of the ACP Omnistim FX² Stimulator for the treatment of neuromuscular dysfunction associated with dysphagia.

The study is a prospective, blinded, randomized clinical trial. The investigators conducting the post-treatment assessments using the main outcome measures are blinded to the patient’s group assignment. The treating clinician and physician are aware of the patient’s assignment for safety monitoring. The two main outcome measures are changes in swallow function as evaluated by the Penetration-Aspiration Scale (PAS) by the instrumental assessment of the swallow and the diet/supervision level (American Speech Language Hearing Association National Outcomes Measure – Swallowing Level Score – ASHA NOMS). Subject recruitment continues.

**Pediatric Phagophobia: Treatment Strategies for the Speech Language Pathologist**

Wesling M, Birutis R.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Phagophobia is a fear of swallowing that is characterized by significant complaints of dysphagia (swallowing impairment). The symptoms of phagophobia include: fear and avoidance of swallowing foods, fluids or pills, throat pressure, constriction or closing of throat, difficulty initiating the swallow, sensation of foreign body in throat (globus pharyngeus), avoidance of eating in public, and weight loss secondary to decreased oral intake. Often times a person may acquire this fear after an episode of choking on food and then the fear of choking may
develop into a preoccupation with choking. There can be numerous causes of phagophobia.

This is a descriptive case series of pediatric patients who presented with phagophobia for rehabilitation. The study is currently underway to evaluate treatment strategies and outcomes with this patient population.

**Use of Electrical Stimulation for Treatment of Chronic Dysphagia in Pediatric Patients**

Birutis R, Keen M, Wesling M, Brady S, Chauhduri G.

*This study supported in part by a grant from the Dr. Ralph and Marian Falk Medical Research Foundation*

Patients requiring dysphagia rehabilitation present with a variety of medical etiologies and span a variety of ages. Pediatric dysphagia may result from organic, developmental or functional disorders all of which require medical intervention and rehabilitation. Electrical stimulation has been used in rehabilitation medicine for a number of years for exercise, strengthening musculature after surgery, to retard disuse atrophy of denervated muscles, relieve peripheral neuropathic pain, and to accelerate wound healing. Recently, electrical stimulation for the treatment of dysphagia has been introduced in the literature. While the research regarding treatment efficacy of electrical stimulation with adults’ remains mixed, there has been limited evidence in the literature that examines the effectiveness of this treatment in the pediatric population. The purpose of the current study is to evaluate the effectiveness of electrical stimulation in pediatric patients with chronic dysphagia (lasting longer than six months) and who have already underwent traditional dysphagia treatment.

A total of 20 patients will be included in this pilot study and will represent a convenience sample of former and current pediatric patients who meet the inclusion and exclusion study criteria. The subjects will be randomly divided into two groups with a cross-over design and the treatment course is as follows: Group One will receive 10 traditional treatment sessions and then cross-over into the 10 Vital Stimulation Treatment sessions; and Group Two will receive 10 Vital Stimulation Treatment sessions and then cross-over into 10 traditional treatment sessions. Video-fluoroscopic examinations will be done at the beginning, after the initial 10 treatments, and then at the end of the second treatment series. Results and conclusions are pending completion of data analysis.


Donzelli J, Brady S, Welshing M. Using Modified Evan’s Blue Dye Test to predict aspiration. Laryngoscope. 2004 Sep;114(9):1680-1; author reply 1681.


Aruin AS, Bernstein NA. The biomechanical foundations of a safe labor environment: Bernstein’s vision in 1930. Motor Control. 2002 Jan;6(1):3-18; discussion 1-3


Study Hypothesis:

1. Individuals who present with a “wet” voice are more likely to demonstrate higher levels of accumulated oropharyngeal secretions compared to individuals who present with a “dry” voice.

2. Individuals who present with a “wet” voice are more likely to demonstrate aspiration compared to individuals who present with a “dry” voice.

3. Individuals who present with a “wet” voice are more likely to demonstrate silent aspiration compared to individuals who present with a “dry” voice.

Results: Study Reports

- The perception of a “wet” voice prior to the FEES was associated with both increased accumulated oropharyngeal secretions and silent aspiration, then these results would suggest that voice quality may warrant a referral for an instrumental assessment.

- All subjects underwent a standard FEES protocol. Two raters independently rated vocal quality prior to the presentation of the voice quality.

- The patient was instructed to demonstrate either “wet” or “dry”. The voice quality was then assessed.

- After the perceptual rating of the voice, the FEES procedure involved an evaluation of the oropharyngeal secretion level using the Kay Advanced Digital Ear Rhinoscope. The voice quality was assessed.

- The Kay Advanced Digital Ear Rhinoscope was used to determine the presence or absence of secretions.

Table 2: Descriptive and Inferential Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (Dry) n=66</th>
<th>Group 2 (Wet) n=16</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>38 males</td>
<td>13 males</td>
<td>X²=3.070, p=0.08</td>
</tr>
<tr>
<td></td>
<td>28 females</td>
<td>3 females</td>
<td>X²=8.43, p=0.001</td>
</tr>
<tr>
<td>Secretion</td>
<td>1.83 (±1.12)</td>
<td>4.31 (±1.01)</td>
<td>X²=7.872, p=0.005</td>
</tr>
<tr>
<td>Aspiration</td>
<td>25.75% (17/66)</td>
<td>62.50% (10/16)</td>
<td>X²=9.796, p=0.002</td>
</tr>
<tr>
<td></td>
<td>18.18% (12/66)</td>
<td>56.25% (9/16)</td>
<td>X²=7.872, p=0.005</td>
</tr>
</tbody>
</table>

Kappa correlation coefficient: κ = .948, p < 0.0001.
LEADERSHIP

INSTITUTIONAL REVIEW BOARD ACTIVITIES 2008 – 2010

Marianjoy’s Institutional Review Board (IRB) convenes monthly to review and act on submitted research proposals. Research proposals reviewed by the IRB are submitted under various categories: As new submissions with full review, as an expedited review, or under an exemption. Figure 1 below provides the types and volume of IRB reviewed projects across the years 2008 – 2010. The Wheaton Franciscan Healthcare (WFH) values demonstrated in the Marianjoy IRB activities are consistent with the values of Integrity, Development, Excellence, and Stewardship.

WFH defines human subject research as any activity that either represents research involving human subjects as those terms are defined by Department of Health and Human Services regulations or Food and Drug Administration regulations. Activities that meet either of the definitions of research, below, are subject to review by the IRB.

The Health and Human Services Common Rule definition for research as written by the Code of Federal Regulations [45 CFR 46.102(d)] is defined as any systematic investigation, including research development, and testing and evaluation, designed to develop or contribute to generalizable knowledge. The 45 CFR 46.102(f) defines a human subject as an individual about whom an investigator conducting research obtains data through intervention or interaction with individual or identifiable private information. Intervention or Interaction includes physical procedures performed on an individual, manipulation, communication or interpersonal contact with an individual or manipulation of an individual’s environment. Private information includes information that an individual can reasonably expect will not be made public, and information about behavior that an individual can reasonably expect will not be observed or recorded. Identifiable means that the identity of the individual is or may be readily ascertained by the investigator or associated with the information.
The Food and Drug Administration (FDA) definition for research as written in the Code of Federal Regulations 21 CFR 50.3(c) defines research as an experiment that involves a test article and one or more human subjects. The 21 CFR 50.3(g) defines human subject as an individual who is or becomes a participant in research, either as a recipient of a test article or as a control. The 21 CFR 50.3(j) defines test article as any drug (including a biological product for human use), medical device for human use, human food additive, color, additive, electronic product, or any other article subject to regulation under the jurisdiction of the FDA.

Figure 1

Research Projects Type and Volume Reviewed by IRB

- New Projects Reviewed
- Annual Projects Reviewed
- Project Closures
- New Case Studies & Expedited Review
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The Board of Directors and Administration of Marianjoy recognizes and supports the active educational/research efforts of our medical and professional staff. We are also grateful for our generous donors, government agencies, private foundations, and individuals, who have understood the value of and have provided support to our research efforts:

- Accelerated Care Plus Corporation
- American Medical Rehabilitation Providers Association
- Community Foundation of the Fox River Valley
- Dr. Ralph and Marian Falk Foundation
- Dr. Scholl Foundation
- National Institutes of Health
- NeuroCom International
- Retirement Research Foundation
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- Tellabs Foundation
- Westlake Heath Foundation

The resources provided by our donors have allowed for Marianjoy’s continued growth as an influential leader in rehabilitation research and practice. In turn, the shared commitment by our donors and staff has helped us to develop a culture of continuous quality improvement. We believe our research efforts create opportunities for advancements in treatment protocols, improved outcomes for patients, and ultimately, help to evolve the field of physical medicine and rehabilitation.

Sincerely,

Kathleen Yosko
Marianjoy Rehabilitation Hospital was established in 1972 by the Wheaton Franciscan Sisters. The new 120 bed replacement hospital opened in October 2006.
MARIANJOY LOCATIONS:

- Marianjoy Rehabilitation Hospital
  Inpatient, Subacute, & Outpatient Services
  26W171 Roosevelt Road
  Wheaton, IL 60187
  630-909-8000

- Marianjoy at Oakbrook Terrace
  Physical Therapy & Outpatient Services,
  & Integrative Pain Treatment Center
  17W682 Butterfield Road
  Oakbrook Terrace, IL 60181
  630-909-6500

- Marianjoy at Providence Health Care
  & Rehabilitation of Downers Grove
  3450 Saratoga Avenue
  Downers Grove, IL 60515
  630-969-9360

- Marianjoy at Providence Health Care
  & Rehabilitation of Palos Heights
  13259 S. Central Avenue
  Palos Heights, IL 60463
  708-239-6060

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  610 South Maple, Suite 3420
  Oak Park, IL 60304

- Marianjoy at Elmhurst Memorial Hospital
  200 Berteau Ave.
  Elmhurst, IL 60126

- Marianjoy at Adventist Hinsdale Hospital
  120 North Oak Street
  Hinsdale, IL 60521