JRRD at a Glance

Validity of activity monitors in wheelchair users: A systematic review

KaLai Tsang, BS, et al.

Portable physical activity monitors have become popular for measuring daily activity among the general public. Devices have been evaluated in the ambulatory population, and they show fair accuracy. However, the performance of these monitors in manual wheelchair users remains unknown. There are many manual wheelchair users in the United States who do not engage in regular physical activity because of their physical limitations and, as a result, are more likely to develop secondary health problems, such as obesity and diabetes. Accurate measurement of physical activity in manual wheelchair users could help providers and users evaluate the effectiveness of physical activity programs. Therefore, the validity of the portable physical activity monitors in tracking wheelchair-related activities needs to be examined.

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Iraq/Afghanistan-era Veterans with back pain: Characteristics and predictors of compensation and pension award

Carine J. Sakr, MD, MPH, et al.

Back conditions are common among younger Veterans, and many receive disability compensation for them. In this study, we reviewed the medical records of Veterans applying for compensation for back conditions at the Department of Veterans Affairs Connecticut Healthcare System. Approximately 74 percent of Veterans were awarded compensation, and 62 percent had backs that did not function properly. Receiving service connection was associated with having an impaired back and not with depression or substance use or whether the Veteran worked for pay. These Veterans had considerable pain and other conditions that might benefit from treatment, and the service-connection evaluation may be an opportunity to engage these Veterans in needed services.

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Caring for our wounded warriors: A qualitative examination of health-related quality of life in caregivers of individuals with military-related traumatic brain injury

Noelle E. Carlozzi, PhD, et al.

Caring for wounded warriors with traumatic brain injury is a complex experience and can both positively and negatively affect caregiver health-related quality of life (HRQOL). Focus groups were conducted to identify the diverse aspects of HRQOL that are most relevant to these caregivers. Areas of discussion that were somewhat unique to this population (relative to other caregiving populations) included anger regarding barriers to physical and mental health services (for caregivers and servicemembers), emotional suppression (putting on a brave face for others, even when things are not going well), and hypervigilance (controlling one's behavior/environment to prevent upsetting the servicemember). Future work is needed to address the complicated issues that face these caregivers and the servicemembers for whom they provide care.

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Perceived health, caregiver burden, and quality of life in women partners providing care to Veterans with traumatic brain injury

Karen L. Saban, PhD, APRN, RN, CNRN, FAHA, et al.

Females providing informal care to Veteran partners/spouses with traumatic brain injury (TBI) reported moderately low levels of quality of life (QOL) as well as symptoms associated with stress, such as

fatigue and sleep disturbances. The most commonly reported health problems were low back pain and high blood pressure. Stress related to financial problems contributed to lower QOL. However, women who placed greater value on their roles as caregivers reported higher levels of QOL. These findings have implications for development of family-centered interventions to enhance the QOL of informal caregivers of Veterans with TBI.

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A conceptual model for vision rehabilitation

Pamela S. Roberts, PhD, OTR/L, SCFES, FAOTA, CPHQ, FNAP, et al.

Vision impairments can occur after various degrees of stroke and/or brain injury. Many stroke patients will have some form of vision dysfunction. While the negative effects can be extensive and potentially disabling, the clinical presentation can be subtle and take time to diagnose correctly. Additionally, the functional implications of visual deficits may limit recovery during standard rehabilitation and decrease overall quality of life. A conceptual model to guide clinicians and rehabilitation professionals in vision assessment and treatment could help in generating accurate diagnoses, making appropriate referrals, and providing timely care to Veterans.

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Chronic effects of exposure to high-intensity blasts: Results of tests of central auditory processing

Frederick J. Gallun, PhD, et al.

Recently blast-exposed patients have been found to perform abnormally on tests of central auditory processing. This report extends these results to Veterans who have been exposed to high-intensity blasts at least 4 yr prior to testing. Results indicated that this blast-exposed group, like those tested previously, was significantly more likely to perform in the abnormal range than was an age- and hearing-matched control group. This pattern of results suggests that auditory processing dysfunction may be a chronic effect of blast exposure even in the absence of significant peripheral hearing loss.

http://dx.doi.org/10.1682/JRRD.2014.12.0313

Prosthesis management of residual-limb perspiration with subatmospheric vacuum pressure

Glenn K. Klute, PhD, et al.

Sweat can pool in the bottom of lower-limb prostheses when the users are out in hot weather or performing vigorous activities. When this happens, the prosthesis may become loose and insecure. We demonstrate the use of a novel prosthesis that can expel sweat but otherwise works like a currently available prosthesis.

http://dx.doi.org/10.1682/JRRD.2015.06.0121

Coping with tinnitus

Erin Martz, PhD, CRC; James A. Henry, PhD

Tinnitus (ringing or hissing in the ears not produced by external sound) has been the top service-connected disability in the Department of Veterans Affairs for the past 8 years. In this article, we focused on coping with tinnitus. Fundamentally, coping can be regarded as a person's efforts to manage stress. Multiple research studies and interventions have been created to help individuals with tinnitus. However, these studies are flawed in several important ways. We suggest ways to improve research on coping with tinnitus in order to develop better interventions for Veterans with tinnitus. Coping is an important aspect of tinnitus research because most types of tinnitus are not curable, and helping individuals learn how to better cope with it may bring relief to those who experience significant distress because of their tinnitus.

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Relationship between symptoms and family relationships in Veterans with serious mental illness

Morgan Haselden, BA, et al.

Veterans with serious mental illnesses (SMI) can benefit from family support; families can also be a source of stress. This study asked how different types of mental health symptoms correlate with how well Veterans report getting along with their families. Among 226 Veterans with SMI, those with more depression reported greater family distress and conflict and poorer family communication and problem solving. Psychotic symptoms such as hearing voices or having unusual thoughts did not uniquely contribute to the Veterans' perceptions of family. Depression may be especially important in understanding family relationships and requires that clinicians, Veterans, and families anticipate its effect.

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Functional performance differences between the Genium and C-Leg prosthetic knees and intact knees

CPT M. Jason Highsmith, PhD, DPT, CP(USAR), et al.

Persons with transfemoral amputation (TFA) have impaired function that can potentially be improved with interventions including microprocessor knees (MPKs). The Genium offers an advanced sensory array and processing algorithms but has not been tested in functional activities. This study tested 20 persons with TFA using the Genium and C-Leg and compared them with 5 nondisabled control subjects using the Continuously Scaled Physical Functional Performance-10 assessment. The performance of persons with TFA improved with the Genium versus C-Leg and did not differ significantly from nondisabled control subjects. Nonetheless, regardless of knee, persons with TFA did not equal or surpass nondisabled control subjects in any functional domain, suggesting room for improvements in MPK functional performance.

http://dx.doi.org/10.1682/JRRD.2014.06.0149

The Veterans Health Administration's traumatic brain injury screen and evaluation: Practice patterns

Heather G. Belanger, PhD, et al.

The Veterans Health Administration instituted a traumatic brain injury (TBI) screening and evaluation process in 2007. Studies are just beginning to emerge on its psychometric properties and performance. This study examined practice patterns associated with its use (e.g., what occurs during the evaluation) and subsequent treatments rendered. Findings suggest fairly consistent timeliness (in terms of TBI screening and evaluation) across different Department of Veterans Affairs settings; 79 percent of patients in this national sample were screened within 1 d of their initial healthcare visit and 65 percent were evaluated via Comprehensive Traumatic Brain Injury Evaluation within 30 d of screening. Some variation in implementation processes was found.

http://dx.doi.org/10.1682/JRRD.2015.09.0187

The influence of physical and mental health symptoms on Veterans' functional health status

Tong Sheng, PhD, et al.

We studied a sample of 120 Veterans, most having been deployed to combat. Many had some combination of traumatic brain injury, probable depression, posttraumatic stress disorder, and problems in chronic multisymptom illness clusters. Depression and posttraumatic stress symptoms were strongly associated with impairments across all areas of daily functioning. In contrast, severity of traumatic brain injury and the number of chronic multisymptom illness clusters were only associated with limitations related to bodily pain and low energy. These findings suggest that mental health problems play a more pervasive role than physical/bodily medical problems in influencing daily functioning and quality of life.

http://dx.doi.org/10.1682/JRRD.2015.07.0146

Psychometric evaluation of self-report outcome measures for prosthetic applications

Brian J. Hafner, PhD, et al.

Health surveys are well suited to measuring outcomes in people with lower limb loss. Surveys allow patients to provide their views on their health and the care they receive. Information obtained from health surveys must be reliable so that it can guide clinical decisions. Results of this research can help clinicians select surveys best suited to prosthesis users and can aid clinicians in understanding information that surveys provide about prosthesis users' health and function.

http://dx.doi.org/10.1682/JRRD.2015.12.0228

Language treatment prior to anterior temporal lobe surgery: Can naming skills be preserved?

Diane L. Kendall, PhD, et al.

Epilepsy is a condition of recurrent, unprovoked seizures that affects 1% of the general population. That said, there is a high prevalence of epilepsy in U.S. Veterans who served in Operation Iraqi Freedom, Operation Enduring Freedom, and Operation New Dawn. In medically intractable epilepsy with unilateral temporal lobe onset, surgical removal of the anterior temporal lobe (ATL) is a highly effective treatment, with class I clinical evidence supporting its use in specific circumstances. One significant consequence of ATL treatment is difficulty recalling names of people and places. The purpose of this neurorehabilitation protocol is to remediate such linguistic deficits.

http://dx.doi.org/10.1682/JRRD.2014.12.0310

Preliminary findings of a novel measure of driving behaviors in Veterans with comorbid TBI and PTSD

Elizabeth K. Whipple, MS, et al.

Driving difficulties are commonly reported by service members after returning home from combat. Traumatic brain injury (TBI), posttraumatic stress disorder (PTSD), military driver training, risk-seeking, and warzone experiences are all theorized to play a role in these driving difficulties. We surveyed 33 Operation Iraqi Freedom/Operation Enduring Freedom/Operation New Dawn combat Veterans (10 nondisabled, 23 with TBI/PTSD) to better understand Veterans' driving experiences following military separation. We found that despite similarities in combat experience and training, drivers with TBI and PTSD reported higher levels of anxiety in response to specific roadside triggers than nondisabled combat Veterans. These data can help focus future Veteran driving rehabilitation efforts.

http://dx.doi.org/10.1682/JRRD.2015.09.0172

The effects of prosthetic ankle stiffness on stability of gait in people with transtibial amputation

Matthew J. Major, PhD, et al.

Persons with lower-limb amputation are at increased fall risk compared to nondisabled persons. This study observed the influence of prosthetic ankle stiffness on walking stability as measured by symmetry and variability. Five men walked uphill, downhill, and on a level treadmill surface while prosthetic ankle stiffness was altered between low and high stiffness. Low rearfoot stiffness reduced time to foot-flat, which was perceived as more stable by the subjects, and produced walking patterns that suggested improved stability. Clinicians may enhance gait safety of Veteran below-knee prosthesis users who are at risk of falls by recommending prosthetic feet with low ankle stiffness.

http://dx.doi.org/10.1682/JRRD.2015.08.0148

Implementation of a prediabetes identification algorithm for overweight and obese Veterans

Tannaz Moin, MD, MBA, MSHS, et al.

Type 2 diabetes prevention is an important national goal, particularly for the Veterans Health Administration in which one in four Veterans has diabetes. However, most Americans do not know if they have prediabetes. When designing and implementing a prediabetes screening program in a health system, decisions related to logistical factors such as who to screen, when to screen, and how to screen may have a significant impact on screening program reach as well as on rates of detected prediabetes.

http://dx.doi.org/10.1682/JRRD.2015.06.0104

Cognitive reserve and executive function: Effect on judgment of health and safety

Kristin H. Hinrichs, PhD, et al.

This study explored the relationships between intellectual ability, problem-solving skills, and judgment of health and safety issues among a sample of older Veterans with chronic medical conditions. Results of our tests showed that Veterans with high intellect made healthy and safe decisions, even with impaired problem-solving skills. However, among Veterans with low intellect, intact problem-solving skills were necessary to make appropriate health and safety decisions. These results will help Veterans, families, and doctors create individualized discharge plans for older Veterans that could increase the likelihood of safe and healthy living with conservation of independence when possible.

http://dx.doi.org/10.1682/JRRD.2015.04.0073

Reliability and factor structure of the Hospital Anxiety and Depression Scale in a polytrauma clinic

Laura Boxley, PhD, et al.

This paper is intended for mental health clinicians who work with Veterans. Our research shows that the Hospital Anxiety and Depression Scale is a short, reliable measure of symptoms of anxiety and depression in Veterans who are referred to polytrauma clinics.

http://dx.doi.org/10.1682/JRRD.2015.05.0088

Sociotechnical probabilistic risk modeling to predict injurious falls in community living centers

Gail Powell-Cope, PhD, ARNP, FAAN, et al.

Researchers used a sophisticated engineering risk modeling technology called sociotechnical probabilistic risk assessment to model serious injurious fall risks in nursing home patients. The injurious fall-risk models included several staff-identified high fall-risk patient transfer situations. Six fall-risk clinical situations involved patient transfers, wheelchairs, alarm technologies, and patient and staff behaviors. The analyses showed that a 26% reduction in injurious falls could be achieved by simultaneously addressing staff response time to alarms identifying unassisted patient transfer attempts, installing wheelchair brake locks, improving wheelchair maintenance, and enhancing proper patient transfer techniques.

http://dx.doi.org/10.1682/JRRD.2015.08.0165

The effect of caster wheel diameter and mass distribution on drag forces in manual wheelchairs

Rene Zepeda, BEng, et al.

Wheelchair mobility requires large amounts of energy in relation to the movement produced. This happens as a result of energy loses during wheelchair propulsion, which in turn may cause discomforts and injuries in wheelchair users. Front caster wheels, which help rotate the wheelchair, generate a big part of these energy loses as rolling friction forces. This study presents ways of improving energy efficiency during wheelchair propulsion by changing the size of the caster wheels and advising the user to sit closer to the back end of the wheelchair.

http://dx.doi.org/10.1682/JRRD.2015.05.0074

Reliability and validity of the Microsoft Kinect for assessment of manual wheelchair propulsion

Rachel Milgrom, BS OTD/S, et al.

Individuals with physical disabilities often rely on the use of manual wheelchairs for mobility. Unfortunately, these individuals experience a greater prevalence of upper-limb injuries that may be due to everyday propulsion, affecting daily activities and quality of life. This study presents the Microsoft Kinect as a cost-effective, time-efficient, and portable tool for earlier and more frequent propulsion assessment to address the needs of this population and prevent further injury. The Kinect was compared with two other commonly used systems, and while results varied, they are promising when applied in the implementation of similar technology.

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Accelerometer-based step initiation control for gait-assist neuroprostheses

Kevin M. Foglyano, BS, et al.

Many devices rely on accurate detection of gait events in order to function properly. One example of this is electrical stimulation, which is where small electrical currents are applied to paralyzed muscles and can generate contractions in individuals who have lost control of those muscles. Coordinating the actions of these muscles can generate useful motions, including standing and walking in individuals with stroke or spinal cord injury. One challenge is coordinating the user's own movements with the stimulation. This study analyzed three different ways to automatically detect the user's intent and control the stimulation based off that intent.

http://dx.doi.org/10.1682/JRRD.2015.09.0188

Foot clearance and variability in mono- and multifocal intraocular lens users during stair navigation

Erik Renz, BS, et al.

With tens of thousands of Veterans undergoing intraocular lens (IOL) implantation every year, and the surgery becoming more common for older adults having cataracts surgery, it is important to understand the risks associated with everyday activities. This article compares two standard methods of implantation (monofocal and multifocal) with vision and mobility measures to make a recommendation for the more favorable method, with respect to falls risk. Overall, there was no significant difference between monofocal and multifocal IOLs, which could give clinicians confidence in prescribing either lens for patients. Adults that undergo IOL implantation should be assured that either lens is likely appropriate for everyday navigation.

http://dx.doi.org/10.1682/JRRD.2015.02.0030

Sensor-based balance training with motion feedback in people with mild cognitive impairment

Michael Schwenk, PhD, et al.

Impairment in cognitive function may result in balance disorders. Its presence can adversely affect activities of daily living because safe mobility requires adequate balance control. This pilot study reports the feasibility, acceptability, and effectiveness of a novel balance training program incorporating wearable sensor feedback during weight shifting and virtual obstacle crossing activities. The training program was found to be a feasible, safe, and enjoyable activity in memory clinic patients with confirmed mild cognitive impairment. Balance improved after only 4 wk of biweekly training. In the future, larger studies may further validate the use of this training.

http://dx.doi.org/10.1682/JRRD.2015.05.0089

Utility of a multimodal neurophysiological assessment tool in distinguishing between individuals with and without a history of mild traumatic brain injury

Martin Baruch, PhD, et al.

Mild traumatic brain injuries have been termed the "signature injury" of the Persian Gulf conflicts. The overall prevalence of concussions is likely higher because of the transient nature of symptoms, the greater attention paid to visible concomitant injuries, and the limited awareness of the cognitive and behavioral deficits manifest in the acute period. Central are the need to make timely, accurate diagnoses and assessments to monitor phases of recovery after injury for informed clearance for a return-to-duty and/or treatment management. The major obstacle is the lack of a standardized, objective, multimodal system that can accurately and consistently assess physiologic functioning after concussion. We conducted a preliminary validation study of a multimodal concussion assessment battery using eye-tracking, balance, and neurocognitive tests. The results of this study are significant in introducing a economical, compact, mobile hardware system to assess concussions.

http://dx.doi.org/10.1682/JRRD.2015.06.0120

Psychosocial effects of competitive Boccia program in persons with severe chronic disability

Sharon Barak, PhD, et al.

People with severe chronic physical disabilities may experience serious psychosocial problems. Competitive sports have been reported to improve pychosocial status. However, outcomes were mostly attributed to athletes with relatively mild impairments. Boccia is a popular competitive sport for athletes with a severe disability. We examined the effects of a competitive Boccia program on quality of life, self-esteem, anxiety and mood, compared with a recreational Boccia program and no physical activity training, in residents of a severe chronic disabilities rehabilitation center. The rehabilitation program had a positive effect on all study groups. However, the competitive groups demonstrated greater number of favorable changes.

http://dx.doi.org/10.1682/JRRD.2015.08.0156

Tongue-controlled robotic rehabilitation: A feasibility study in people with stroke

Sarah Ostadabbas, PhD, et al.

Each year, more than 15,000 Veterans are treated for stroke by the Department of Veterans Affairs, with annual cost in the early months estimated at $274,000,000. There is a great need to develop rehabilitative therapy to optimize motor recovery for individuals with significant loss of voluntary upper limb (UL) movement after stroke. We have combined the Tongue Drive System (TDS) and Hand-Mentor (HM) to create a new paradigm that harnesses tongue motion to control a robotic exoskeleton for UL rehabilitation. We carried out case series on two participants with hemiparesis to evaluate the extent to which TDS-HM improves their function and quality of life.

http://dx.doi.org/10.1682/JRRD.2015.06.0122

Quantitative assessment of hand motor function in cervical spinal disorder patients using target tracking tests

Sunghoon I. Lee, PhD, et al.

Cervical spondylotic myelopathy (CSM) is a spinal cord disorder in the neck region, which is the most common spinal dysfunction in adults over the age of 50. CSM can be caused by factors such as heavy labor and prolonged holding or repetition of uncomfortable neck movement, which many Veterans may experience during their service. This article presents a method for quantifying the level of hand motor deficits, a crucial functionality for daily living, using a handgrip device and machine learning techniques. This research enables an inexpensive, easy-to-use, and frequent means to monitor hand motor function in CSM patients.

http://dx.doi.org/10.1682/JRRD.2014.12.0319

Efficacy of extremely-low-frequency magnetic field in fibromyalgia pain: A pilot study

Teresa Paolucci, MD, PhD, et al.

Magnetic field therapy has been applied to accelerate bone healing, treat osteoarthritis and inflammatory diseases of the musculoskeletal system, alleviate pain, enhance the healing of ulcers, and reduce spasticity. Extremely low-frequency magnetic fields (ELF-MFs) are effective in decreasing chronic pain and osteoarthritis and reducing fatigue in multiple sclerosis. Although the precise mechanism of ELF-MFs remains unknown, they have unexpected short-term analgesic effects in neuropathic pain, too. There are no studies in the literature regarding the efficacy of ELF-MF in fibromyalgia. The aim of this pilot study was to test whether ELF-MF reduces chronic pain in fibromyalgia patients.

http://dx.doi.org/10.1682/JRRD.2015.04.0061

Explaining modified 2-min walk test outcomes in Veterans with traumatic or nontraumatic lower-limb amputation

Brian J. Loyd, PT, DPT, et al.

This investigation provides important evidence for the care of Veterans with lower-limb amputations by demonstrating that differences in ambulatory mobility exist between Veterans with traumatic and nontraumatic amputation. These differences provide important insight to recovery of mobility and the rehabilitation process following lower-limb amputation. Furthermore, this study identified important changes in gait—associated with decreased ambulatory mobility—that will serve as intervention targets for rehabilitation. These findings also generate hypotheses for future examination of impairments often seen in Veterans with both traumatic and nontraumatic lower-limb amputation.

http://dx.doi.org/10.1682/JRRD.2015.03.0038

Rehabilitation and multiple limb amputations: A clinical report of patients injured in combat

Ted Melcer, PhD, et al.

This report shows results for 29 patients with two or more combat-related amputations who enrolled in the rehabilitation program at the Naval Medical Center San Diego. The patients received care from many specialty clinics, from artificial limbs and walking assistance to counseling and independent living. Questionnaires were used to evaluate each patient's improvement in areas such as mobility, pain, depression, and self-care. The problems of two patients with triple amputations and their solutions are described in detail. The results may help patients with multiple amputations and their doctors better understand and improve rehabilitation and outcomes.

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Barriers to outcome measure administration and completion at discharge from inpatient rehabilitation of people with amputation

Heather M. MacKenzie, MD, et al.

When healthcare professionals take into account the wide range of factors that commonly affect patient mobility after lower-limb amputation, the quality of patient care improves. By increasing knowledge of the methodological aspects and feasibility of activity-based outcome measures in patients with lower-limb amputation, healthcare professionals will be better able to select the most appropriate tools for assessment of patient progress, enabling a greater understanding of their patient's condition. In research, when proper measurement tools are selected, the quality of the resulting data and conclusions is increased.

http://dx.doi.org/10.1682/JRRD.2015.07.0142

Physical activity, ambulation, and comorbidities in people with diabetes and lower-limb amputation

Roger J. Paxton, PhD, et al.

Walking performance is strongly related to quality of life, which is diminished in Veterans with lower-limb amputation. Physical activity is a key indicator of walking performance that may influence quality of life in these Veterans. Physical activity levels and intensity are lower in people with diabetes, and lower still in people with diabetes and lower-limb amputation, when compared with nondisabled adults. Physical activity is also related to functional performance in people with diabetes and people with diabetes and lower-limb amputation. This finding is of great interest because issues with walking may be modifiable by improved physical activity.

http://dx.doi.org/10.1682/JRRD.2015.08.0161

Metabolic effects of using a variable impedance prosthetic knee

Matthew R. Williams, PhD, et al.

Persons with transfemoral amputation incur a higher metabolic cost during walking than persons without amputation and as a result walk slower and for shorter distances before tiring. A novel variable-impedance prosthetic knee was tested with five study participants with unilateral transfemoral amputation at two steady-state walking speeds. While using the new knee, shorter-limbed participants showed a reduction in metabolic cost compared with their conventional C-Leg prosthesis, while those with longer limbs exhibited an increase. The difference in metabolic cost (reduction or increase) was found to correlate significantly with rise in the center of mass.

http://dx.doi.org/10.1682/JRRD.2015.04.0072

The biomechanical response of persons with transfemoral amputation to variations in prosthetic knee alignment during level walking

Sara R. Koehler-McNicholas, PhD, et al.

Prosthetic alignment is an important factor in the overall fit and performance of a lower-limb prosthesis. This study explores the effect of prosthetic knee alignment on the gait of persons with transfemoral amputation. Gait data were collected for three alignment conditions while subjects walked at a self-selected speed on a level walking surface. Based on kinematic and kinetic measurements, subjects appeared most sensitive to alignment conditions that reduced the stability of the knee joint during early stance phase. Overall, these results provide insight into clinical practice of prosthetic alignment for persons with lower-limb amputation.

http://dx.doi.org/10.1682/JRRD.2014.12.0311

Preliminary evaluation of a novel bladder-liner for facilitating residual-limb fluid volume recovery without doffing

Joan E. Sanders, PhD, et al.

People with limb loss walked with a novel elastomeric liner that had liquid-filled bladders placed within the liner. When participants sat down in between periods of activity and bladder liquid was removed, participants' limb fluid volumes increased more than when subjects sat down and liquid was not removed. Retention of the recovered limb fluid during subsequent activity was not significant but might be improved if the liner were made of a less stiff material.

http://dx.doi.org/10.1682/JRRD.2014.12.0316

Elevated vacuum suspension preserves residual-limb skin health in people with lower-limb amputation: Randomized clinical trial

Cameron Rink, PhD, et al.

For Veterans with lower-limb amputation, the use of a prosthesis subjects soft tissues of the residual limb to pressure and load that cause physical trauma. The current article is the first of its kind to find ways to objectively measure how different types of prosthesis suspension affect residual-limb health. Elevated vacuum suspension uses a suction pump to improve prosthetic socket fit. Compared with traditional prosthetic systems that do not use vacuum, elevated vacuum technology benefitted skin health and circulation in the residual limb after 16 wk of use.

http://dx.doi.org/10.1682/JRRD.2015.07.0145

Transtibial amputee gait efficiency: Energy storage and return versus solid ankle cushioned heel prosthetic feet

James Gardiner, PhD, et al.

Currently, there is limited and conflicting evidence from different studies whether "energy storage and return" prosthetic feet (typically glass/carbon fiber blades) improve the energy efficiency of amputee walking compared with traditional feet (solid ankle cushioned heel). Our study collects data from previously published articles and uses a novel meta-analysis technique to show conclusively that energy storage and return feet are more efficient than traditional feet, but only by a small percentage. Therefore, we encourage the development of more advanced prosthetic feet with the aim of reducing the cost of walking for people with amputation back closer to nondisabled levels.

http://dx.doi.org/10.1682/JRRD.2015.04.0066

The perceived functional benefit of dynamic arm supports in daily life

Loek van der Heide; Luc de Witte

For people with neuromuscular disorders, spinal cord injury, stroke, or other conditions affecting the arm function, it is a challenge to eat independently or to brush their teeth. Dynamic arm supports can help people do these activities. The perceived functional benefit of these devices was assessed in this study. Results show that people with limited functional abilities benefited most and that benefits and use differ widely among subjects. It is therefore essential that selection of a dynamic arm support be made on an individual level, considering the functional abilities, needs, and environment of the end-user.

http://dx.doi.org/10.1682/JRRD.2015.06.0099

The effect of common wrist orthoses on the stiffness of wrist rotations

Daniel B. Seegmiller, MS, et al.

Wrist orthoses (also known as splints, braces, or supports) are commonly used to support or restrict the motion of a weak or injured wrist. These orthoses generally function by stiffening the wrist joint. Therefore, choosing the proper orthosis (or improving orthoses) requires that we understand their stiffness properties. In this study, we present a method for measuring the stiffness of wrist orthoses, and we apply this method to 12 of the most common wrist orthoses. We found similarities and differences between these orthoses, indicating that different orthoses have different effects on the wrist joint and, presumably, on wrist behavior.

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