JRRD at a Glance

Considerations for development of sensing and monitoring tools to facilitate treatment and care of persons with lower-limb loss: A review

Brian J. Hafner, PhD; Joan E. Sanders, PhD

A new conceptual way for enhancing prosthetic rehabilitation is described. The new model integrates sensors and remote monitoring methods into routine clinical practice for amputee care. The authors describe specific applications and discuss how collecting and using objective data can facilitate clinical decision making.

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User ratings of prosthetic usability and satisfaction in VA study to optimize DEKA Arm

Linda Resnik, PT, PhD; Matthew Borgia, AM

This article summarizes subject and clinician recommendations to improve a prototype multifunction upper-limb prosthesis, the DEKA Arm, and reports on subjects' satisfaction and usability ratings for two DEKA Arm prototypes (second-generation [gen 2] and third-generation [gen 3]). Subjects completed surveys on prosthetic satisfaction and usability. Compared with gen 2 users, gen 3 users were more satisfied with appearance, grips, and ease of removing prosthesis and rated overall usability higher. Features of gen 3, including weight, external cables and wires, hand covering, and fingernails, would benefit from further optimization. Many people with upper-limb amputation are dissatisfied with the state of the art of available prostheses. The DEKA Arm has the potential to improve prosthetic satisfaction and prosthetic usage and ultimately lead to improved quality of life for Veterans with upper-limb amputation.

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User and clinician perspectives on DEKA Arm: Results of VA study to optimize DEKA Arm

Linda Resnik, PT, PhD, et al.

This article summarizes feedback from Department of Veterans Affairs (VA) subjects and clinicians gathered during the VA optimization study of a new advanced upper-limb prosthesis, the DEKA Arm. VA subjects and clinicians tested two successive DEKA Arm prototypes, the second-generation (gen 2) and the third-generation (gen 3). Features of the prototypes for users with three levels of arm amputation (transradial, transhumeral, and shoulder disarticulation) are described. Feedback was analyzed on weight, appearance, hand grips, powered joints (wrist, elbow, shoulder, and end-point control), foot controls, battery systems, user notifications systems, and socket features. Final feedback about the refined gen 3 prototype was generally positive, particularly regarding improvements in wrist design, visual notifications, foot controls, end-point control, and appearance. Additional refinements to make the device lighter in weight and eliminate external wires and cables and the external battery may further enhance its perceived usability and acceptability.

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Prediction of responders for outcome measures of Locomotor Experience Applied Post Stroke trial

Bruce H. K. Dobkin, MD, et al.

Recovery of the ability to walk is a major goal after stroke. The Locomotor Experience Applied Post Stroke trial randomized 408 participants 2 months after a debilitating stroke to two interventions, treadmill training with body-weight support plus overground practice or home-based physical therapies

that did not emphasize walking. The therapies produced equal results for walking ability. We report that baseline measures used as predictors of who will respond did not differ between interventions or in definable subgroups of participants. Younger age (below 60 years) and better balance at onset had the most positive predictive value. The study offers new insights into rehabilitation outcome measurements.

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Muscle activation during body weight-supported locomotion while using the ZeroG

Alyssa M. Fenuta, HBSc; Audrey L. Hicks, PhD

Locomotor training with body weight support has created enthusiasm in the rehabilitation field to improve ambulation in people with mobility impairments. The new ZeroG system provides dynamic body weight support using a harness during overground walking. This study in nondisabled adults has shown that body weight support decreases the amount of leg muscle activation while walking overground, but the pattern of activation during gait remains relatively the same. These results can now be compared with data from mobility-impaired populations using this device to assist in the development of more effective and functional rehabilitation programs.

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Cognitive Symptom Management and Rehabilitation Therapy (CogSMART) for Veterans with traumatic brain injury: Pilot randomized controlled trial

Elizabeth W. Twamley, PhD, et al.

Traumatic brain injuries (TBIs) can result in cognitive impairments and postconcussive symptoms that limit functional recovery, including return to work, for Veterans. We developed and evaluated a 12-week intervention (Cognitive Symptom Management and Rehabilitation Therapy [CogSMART]) in the context of a supported employment program to help Veterans with mild to moderate TBI return to the workforce. CogSMART sessions included education regarding TBI; strategies to improve sleep, fatigue, headaches, and tension; and compensatory cognitive strategies. Results suggested that adding CogSMART to supported employment can improve postconcussive symptoms and prospective memory performance and may also improve psychiatric symptoms and ability to return to work.

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Chronic visual dysfunction after blast-induced mild traumatic brain injury

M. Teresa Magone, MD, et al.

Mild traumatic brain injury (TBI) from an explosive blast is the most common TBI among servicemembers deployed to Iraq and Afghanistan. It is different from a sports concussion, where a localized injury occurs and quickly resolves within weeks. Veterans who were exposed to a blast and experienced mild TBI were shown to have visual symptoms up to 5.8 years after the injury despite excellent vision. The most common symptoms were light sensitivity and difficulty aligning the eyes to read. We recommend screening and eye examinations in these young veterans to diagnose and treat visual problems.

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Proposed comprehensive ototoxicity monitoring program for VA healthcare (COMP-VA)

Dawn Konrad-Martin, PhD, et al.

An effective treatment for some cancer is cisplatin chemotherapy; however, a potential side effect of cisplatin is hearing loss. This article describes a new, comprehensive Department of Veterans Affairs program for ototoxicity monitoring done while the Veteran receives treatment, with the goal of preventing or minimizing hearing loss when possible. When appropriate, treatment changes that might minimize hearing damage include dose reduction, omission, or

substitution to a less toxic chemotherapy drug. The approach is patient centered, with audiology and oncology services working together to improve communication and coordination of care between them for the benefit of Veterans and their families.
http://dx.doi.org/10.1682/JRRD.2013.04.0092

Pressure casting technique for transtibial prosthetic socket fit in developing countries

Peter Vee Sin Lee, PhD, et al.

This study aimed to provide comfortable artificial limbs to people with lower-limb amputation. Currently, the success of an artificial limb's socket fit depends on the skill and experience of the prosthetist. The process is a lot of work, expensive, and based on artisan techniques. This project tested a pressure cast technique for producing and fitting sockets in a developing country. The method reduces skill dependency and may significantly reduce fitting errors and patient visits, leading to a dramatic improvement in the care and outcomes for people with lower-limb amputation.
http://dx.doi.org/10.1682/JRRD.2012.10.0191

Biomechanical study of upper-limb exoskeleton for resistance training with three-dimensional motion analysis system

Tzong-Ming Wu, PhD; Dar-Zen Chen, PhD

Healthcare services and home-based rehabilitation are in high demand, and the demand for professional physical therapy is imposing an increasing burden on the healthcare system. This article presents an experimental study of a novel home-based spring-loaded upper-limb exoskeleton meant to enable a patient or an elderly individual to move a limb at multiple joints in different planes for resistance training in a free and unconstrained environment with less inertia effect. To assess the functionality of the design, we measured its kinematic data while performing designated movements and adopted a motion capture system to verify the function of our mechanism.
http://dx.doi.org/10.1682/JRRD.2012.12.0227

Comparison of mental health between individuals with spinal cord injury and able-bodied controls in Neiva, Colombia

Leia A. Harper, BS, et al.

The Department of Veterans Affairs (VA) reported in 2009 that over 42,000 veterans had a spinal cord injury (SCI). There are 24 SCI centers as well as additional SCI primary care teams in the United States. Although a vital part of rehabilitation includes assessing various components of an individual's physical health, SCIs also affect an individual's mental health. This study compares the mental health of a group of Colombian individuals with SCI with able-bodied controls. The results illustrate the importance of considering mental health in individuals with SCI during the rehabilitation process, especially among the VA's growing Latino population.
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Effects of a flat prosthetic foot rocker section on balance and mobility

Andrew Hansen, PhD, et al.

The human foot and ankle conform to a rolling rocker shape for walking and a flat rocker shape for standing. During use, many prosthetic foot designs bend to a rocker shape that is a compromise: a rolling rocker with a flat region. This study examined the effect of the flat region length on standing balance and mobility. The length of this flat region did not affect the balance and mobility outcomes of 12 veterans with below-knee amputations. However, the veterans in the study tended to dislike the foot with the longest flat region.
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Comparison of Veteran experiences of low-cost, home-based diet and exercise interventions

Bree Holtz, PhD, et al.

Veterans readjusting to civilian life often struggle to manage their weight without the structure of military Active Duty. Home-based diet and exercise programs may help Veterans avoid weight gain, prevent future obesity-related chronic diseases, and manage mental health problems. In this pilot study, Veterans recently returned from Iraq and Afghanistan tested three home-based exercise programs that differ in the approach to weight loss support. Results will be used to guide future research and clinical program development to support Veterans struggling to maintain a healthy lifestyle postdeployment.

http://dx.doi.org/10.1682/JRRD.2013.04.0088

Health and well-being of homeless veterans participating in transitional and supported employment: Six-month outcomes

Meaghan Leddy, PhD, et al.

This article evaluates the outcomes of various employment patterns: (1) never worked, (2) transitional work experience only, (3) transitional work experience followed by competitive employment, (4) competitive employment without individualized placement and support, and (5) competitive employment with individualized placement and support referral. Both supported employment and transitional work experiences are currently offered by the Department of Veterans Affairs. This observational study is the first to directly compare these two programs, particularly with regard to non-vocational outcomes, such as quality of life and self-esteem. Clarifying the benefits of each program can help tailor employment services such that Veteran outcomes are improved.

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