

## **Understanding stand-to-sit maneuver: Implications for motor system neuroprostheses after paralysis**

Sarah R. Chang, BS, et al.

People with spinal cord injury (SCI) can use electrical stimulation to contract their paralyzed trunk and leg muscles to stand and walk. This study examined forces and acceleration of the stand-to-sit maneuver in nondisabled subjects and in subjects with SCI using an implanted electrical stimulation system. Subjects with SCI needed much higher arm support forces on a walker, had higher vertical accelerations at the impact, and had impact forces on the seat that were twice body weight. This research indicates that an appropriate cushion to prevent injury at the impact is needed until the stand-to-sit maneuver is better controlled.

<http://dx.doi.org/10.1682/JRRD.2013.12.0264>

## **Role of balance ability and confidence in prosthetic use for mobility of people with lower-limb loss**

Christopher Kevin Wong, PT, PhD, et al.

More than 1,700 individuals have lost limbs during military operations in Afghanistan and Iraq. Even more people lose their limbs because of diabetes and peripheral vascular disease; vascular disease is the leading cause of amputation among the 43,000 people receiving care annually from the Veterans Health Administration. For people with lower-limb loss, impaired balance is common and limits the ability to access and function with a prosthesis within the community. This study defined the relationship among lower-limb prosthetic use for mobility, balance ability, and confidence and suggested a method to identify those who may benefit from additional rehabilitation.

<http://dx.doi.org/10.1682/JRRD.2013.11.0235>

## **Effect of interpolation on parameters extracted from seating interface pressure arrays**

Michael Wininger, PhD; Barbara Crane, PhD, PT

Pressure ulcers are a major concern for wheelchair users, affecting veterans with diagnoses such as spinal cord injury or multiple sclerosis. Pressure mapping has become an important healthcare tool to help prevent pressure ulcers. While this tool has become more available, there is little agreement among researchers about the best methods for data processing. Additionally, healthcare providers frequently struggle with which pressure-mapping system will meet their needs and be cost effective. We aim to help healthcare providers and researchers understand more about how data from these pressure-mapping systems might be a more effective tool in pressure ulcer prevention.

<http://dx.doi.org/10.1682/JRRD.2014.04.0101>

## **Multidisciplinary approach to converting power chair into motorized prone cart**

Steven W. Brose, DO; Eisha Wali, BS

People with spinal cord injury are prone to developing pressure ulcers, which can cause problems with quality of life and medical health. Managing these ulcers usually involves minimizing pressure on the area with the ulcer. One option to promote healing and allow people to continue being mobile is use of prone carts. However, manual prone carts are sometimes difficult to use, while specialized motorized prone carts are not always available. This report describes an intervention that converted a veteran's power wheelchair into a motorized prone cart, allowing him to move around and interact socially without sitting.

<http://dx.doi.org/10.1682/JRRD.2014.01.0027>

### **Development of telerehabilitation application with designated consultation categories**

Kok Kiong Tan, PhD, et al.

This work focuses on the development of a telerehabilitation application with predefined consultation categories to choose from. The tailor-made consultation categories have different settings for features such as frame rate, resolution, color, and spatial information, and each one focuses on a specific type of motion. All the categories are designed to work well in a low-bandwidth environment, so that the application can be used even in network-scarce situations, such as in developing countries. Novel algorithms are introduced to reduce the huge data payload caused by video frames. The initial test of the system by therapists showed encouraging results. Successful use of this application may solve current healthcare issues such as the inability of rural populations to access proper medical care and the uneven distribution of medical resources across these areas.

<http://dx.doi.org/10.1682/JRRD.2014.02.0052>

### **Alcohol use and craving among Veterans with mental health disorders and mild traumatic brain injury**

Amy A. Herrold, PhD, et al.

This study suggests that Iraq and Afghanistan Veterans with co-occurring mental health disorders, mild traumatic brain injury, and alcohol use disorder may have higher levels of alcohol craving than Veterans without mild traumatic brain injury or mental health disorder symptoms. This information is important because alcohol craving is known to be associated with relapse to drinking.

<http://dx.doi.org/10.1682/JRRD.2013.07.0170>

### **Design and development of solar power-assisted manual/electric wheelchair**

Chi-Sheng Chien, MD, et al.

A solar powered electric wheelchair having the functions of both a manual wheelchair and an electric wheelchair is proposed. The design uses a manual wheelchair as the main frame and incorporates additional solar power and electric propulsion systems as auxiliary components. Moreover, the chair is fitted with a simple clutch mechanism to enable the user to switch at will between the manual and electric driving modes. Importantly, the chair is designed on a modular basis such that it can be rapidly disassembled and collapsed for transportation or storage purposes. The preliminary results showed that the travel range of the prototype wheelchair is extended by 26% compared with that of a conventional electric-powered chair.

<http://dx.doi.org/10.1682/JRRD.2013.11.0250>

### **Reduced bone mass accrual in mouse model of repetitive mild traumatic brain injury**

Hongrun Yu, PhD, et al.

Traumatic brain injury (TBI) is a major injury of combat operations. It is associated with serious mortality and morbidity for veterans. Its complications also include increased risk for osteoporosis and bone fractures. Since the majority of TBIs are mild cases, we evaluated the impact of mild TBI using a mouse model. This study revealed that TBI even in a mild form exerted significant negative effects on bone mass, bone structure, and bone strength. These results are instructive to clinicians who devise rehabilitation plans for veterans who have experienced TBI, indicating that these plans should also include the skeletal system.

<http://dx.doi.org/10.1682/JRRD.2014.04.0095>

**Comparative study of state-of-the-art myoelectric controllers for multigrasp prosthetic hands**

Jacob L. Segil, MS, et al.

This article compares three myoelectric control systems used with state-of-the-art prosthetic hands. The three myoelectric control systems that were tested required the users to produce different muscular activity in order to perform the same function. The preference of the users was compared and discussed. This article will hopefully provide insight for engineers, prosthetists, and users of prosthetic hands. The likely benefits of this work include a broader understanding of the benefits and pitfalls of myoelectric control systems and a resource for prosthetists and users when deciding upon a type of myoelectric control system.

<http://dx.doi.org/10.1682/JRRD.2014.01.0014>

**Effect of adjusting pulse durations of functional electrical stimulation cycling on energy expenditure and fatigue after spinal cord injury**

Ashraf S. Gorgey, MPT, PhD, FACSM, et al.

Veterans with spinal cord injury are at a high risk of developing secondary chronic disorders. Functional electrical stimulation (FES) is an important tool in the rehabilitation and prevention of these secondary complications. Knowledge about adjusting the stimulation parameters may allow clinicians the opportunity to optimize exercise capacity during FES. The study showed that adjusting pulse duration to 350  $\mu$ s helps to increase the exercise energy expenditure and recovery oxygen consumption following exercise compared with pulse duration of 200  $\mu$ s. An acute bout of FES cycling results in a significant decline in knee extensor torque, which remains declined for 48 to 72 h.

<http://dx.doi.org/10.1682/JRRD.2014.02.0054>

