

Pain and psychiatric comorbidities among two groups of Iraq- and Afghanistan-era Veterans

Kristin M. Phillips, PhD, et al.

This study aimed to (1) identify the prevalence and severity of pain and psychiatric comorbidities among Veterans who had been deployed during Operations Enduring Freedom (OEF), Iraqi Freedom (OIF), and New Dawn (OND) and (2) assess whether the Department of Veterans Affairs (VA) Polytrauma System of Care and OIF/OEF/OND registry reflect real differences among patients. Results confirmed the high prevalence of pain and concurrent mental health problems among personnel returning from military deployment, signifying the need for elaborate mental health screening and treatment for Veterans registering for VA healthcare.

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Interdisciplinary development of an ergonomic prone mobility cart

Steven W. Brose, DO, et al.

People with spinal cord injuries 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, but traditional manual carts are known to cause strain on the spine and shoulders. This report describes the design of an ergonomic motorized prone cart. Through an iterative and collaborative process, the final motorized prone cart successfully reached goals of motorization, maneuverability, ergonomic fit, and utility. The consistent attention to user needs while creating a cart that can be easily and economically serviced has produced a motorized, ergonomic prone cart that can help improve user quality of life, increase compliance with

pressure ulcer treatment recommendations, and offer more independence and mobility to hospitalized users.

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High-density force myography: A possible alternative for upper-limb prosthetic control

Ashkan Radmand, PhD, et al.

Users have always had high expectations for the function of artificial upper limbs, often because of their portrayal in the popular media and comparisons with nondisabled people. Only a small percentage of patients with an upper-limb amputation regularly use a prosthesis, mainly because many patients perceive a lack of function. Externally powered prostheses can be controlled by muscle signals from the residual limb, but they can still be difficult for users to control. In this study, we investigated the use of novel high-density force sensors that measure pressure from muscle movements as a possible control input for an upper-limb prosthesis, with the goal of developing a more robust prosthetic control method. Our high-density force sensor method showed greater accuracy in recognizing movements of the wrist and hand than currently available control methods. Future work will focus on confirming these results in subjects with amputation and refining the techniques.

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Home-based hand rehabilitation after chronic stroke: Randomized, controlled single-blind trial comparing the MusicGlove with a conventional exercise program

Daniel K. Zondervan, PhD, et al.

This study provides evidence that the MusicGlove, a music-based hand therapy device, is feasible and effective for providing rehabilitation at home. Participants that used the MusicGlove for 3 wk had

significantly greater improvements in self-reported functional use of the impaired hand than those who performed conventional home therapy. Further, participants significantly increased the number of exercise repetitions they performed with the MusicGlove over time, showing that they became increasingly engaged as therapy progressed. The findings of this study will benefit Veterans with hand impairment after stroke. MusicGlove therapy could benefit individuals after spinal cord injury and traumatic brain injury as well.

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Effects of cognitive load and prosthetic liner on volitional response times to vibrotactile feedback

Aman Sharma, MHSc, et al.

Current prosthetic legs used by individuals with lower-limb amputations, including Veterans, do not effectively compensate for the loss of feeling that accompanies limb loss. This sensory deprivation contributes to decreased mobility and balance performance, especially during everyday tasks requiring multitasking. Artificial sensory feedback using vibrations on the residual limb to communicate information about limb position, speed, and contact may help improve both mobility and balance in people with amputation. This article describes work being done to develop such a system, specifically examining the effects of multitasking and prosthetic liners on the reaction times to vibrations on the surface of the thigh.

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Case study: Gluteal compartment syndrome as a cause of lumbosacral radiculoplexopathy and complex regional pain syndrome

Andrew Lederman, MD, et al.

Although illicit drug use is lower amongst U.S. military personnel than among civilians, it is generally on the rise. Here, a Veteran's drug abuse resulted

in prolonged immobilization, gluteal compartment syndrome, and several morbid sequelae. This resulted in a prolonged hospital course requiring surgery and several interventional procedures to save his life, reduce debilitating pain, and facilitate rehabilitation back to the community. This case serves to demonstrate the course of a patient with the rare entity of gluteal compartment syndrome from traumatic presentation through rehabilitation back to the community.

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Capturing nighttime symptoms in Parkinson disease: Technical development and experimental verification of inertial sensors for nocturnal hypokinesia

Roongroj Bhidayasiri, MD, FRCP, FRCPI, et al.

Nocturnal disabilities are very common among patients with Parkinson disease (PD), with up to 96.6 percent of patients reporting at least one nocturnal symptom. These symptoms negatively affect patients' quality of life and increase caregiver burden. As one of the nighttime disturbances in PD, nocturnal hypokinesia contributes to nighttime falls. The majority of falls happened in bedrooms when patients attempt to get out of bed. The aim of our study was to develop a portable ambulatory motion recorder (the NIGHT-Recorder) that can quantify nocturnal hypokinesia in patients with PD. As part of the experimental verification, the device was able to capture the problems of fewer and slower rolling over episodes in patients with PD compared with their spouses. In contrast, PD patients got out of bed more often than their spouses. Therefore, the device helps identify those patients at risk for nighttime disabilities for early intervention that includes rehabilitation. Our study shows that it is technically feasible to develop a portable device to assist physicians in identifying patients who suffer or are at risk of nocturnal hypokinesia. Additional studies are warranted to develop protocols for early treatment and rehabilitation, as well as strategies to prevent nighttime falls or accidents in PD patients.

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An exploratory pilot investigation of neurosteroids and self-reported pain in female Iraq/Afghanistan-era Veterans

Jennifer C. Naylor, PhD, et al.

Safe and effective medications for pain disorders are limited. Males and females may experience pain differently; however, little is known about the biology of pain disorders. Evidence suggests that neurosteroids (naturally occurring substances in the brain and body) may play a role in the biology of pain. Our preliminary findings show that DHEAS (neurosteroid) is lower in women who report higher levels of back pain. This could mean that women with lower DHEAS levels are at greater risk of developing pain than women with higher levels of DHEAS. Therefore, increasing DHEAS levels may prevent or improve pain in female Veterans.

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Validity of the 8-Foot Up and Go, Timed Up and Go, and Activities-Specific Balance Confidence scale in older adults with and without cognitive impairment

Elyse Rolenz, DPT; Jennifer C. Reneker, MSPT, PhD, NCS

Healthcare providers use standardized outcome measures to determine risk for falls in older adults. Research describing the usefulness of outcome measures in people with mild cognitive impairment is lacking. This research describes the usefulness of three outcome measures in identifying risk for falling for people with and those without mild cognitive

impairment. We found that when explained in a standardized manner in people with and without mild cognitive impairment, the 8-Foot Up and Go is more useful than the Timed Up and Go test for identifying people at risk for falling.

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Case study: Head orientation and neck electromyography for cursor control in persons with high cervical tetraplegia

Matthew R. Williams, PhD; Robert F. Kirsch, PhD

High cervical spinal cord injury (SCI), as can occur in combat situations, can result in the inability to operate a computer. To address this, we evaluated the ability of an individual with a high level SCI to control a computer cursor using two different user interfaces: head movements measured with a head-worn orientation sensor and electrical signals from four head and neck muscles. Subject performance with each user interface was evaluated and compared with the performance of a group of nondisabled subjects. Head orientation was more accurate but less responsive than the electrical signals but the electrical signals were more responsive and faster. The impaired subject exhibited similar performance as nondisabled subjects. Although head orientation performed better in some performance measures, electrical signals can be recorded less obtrusively and more reliably and may be the more practical choice as a user interface. The methods developed in this work can be used to quantitatively evaluate the performance of assistive technology used by Veterans.

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