JRRD at a Glance

Exploratory pilot study of driving perceptions among OIF/OEF Veterans with mTBI and PTSD

Elizabeth "Lisa" M. Hannold, PhD, et al.

Veterans of Iraq and Afghanistan report problems driving postdeployment that affect their everyday lives and may increase their crash risk. Potential causes include carryover of combat driving skills and symptoms of traumatic brain injury (TBI) and posttraumatic stress disorder (PTSD). We interviewed five combat Veterans with TBI/PTSD. Veterans were insightful about driving and identified triggers for anxious or risky driving. Veterans used strategies to lessen driving anxiety and improve safety. Findings were used to develop a model of driving postdeployment. Understanding driving from the Veteran's point of view may help researchers tailor driver interventions to better meet their needs.

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Development and evaluation of prefabricated antipronation foot orthosis

Rachel Majumdar, BSc (Hons), et al.

The aim of this work was to develop and evaluate a new antipronation foot orthosis. Via interviews, clinicians expressed concern that current prefabricated orthoses often did not offer sufficient support to the foot and orthotic users highlighted issues of durability and hygiene. The geometry of the new orthosis was based on assessment of foot casts and was adjusted to enable individual foot size orthoses. The new orthotic material offered high levels of arch support and durability. The orthosis was tested and found to reduce maximum rearfoot eversion in both walking and running.

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Evaluating Barten image metric for predicting character recognition in people with low vision

Kimberly A. Schoessow, OTD, OTR/L, et al.

Displays on electronic devices such as blood pressure monitors and cellular telephones are often hard for veterans with low vision to see. These devices often have small, low-contrast displays. This study examined a formula (Barten square root integral) that predicted whether people with low vision could read numbers on a screen. The next step is to determine whether the formula carries over to use in actual electronics. This information may help manufacturers make devices that are easier for people with low vision to use. It may also help people with low vision choose appropriate electronic devices.

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Changes in inertia and effect on turning effort across different wheelchair configurations

Jayme J. Caspall, MS, et al.

Manual wheelchair users maneuver their chairs throughout the day and within many different environments. Efficient wheelchair maneuvering is important to reduce fatigue and lessen the strain put on the shoulders during bouts of movement. Turning a wheelchair requires more effort than propelling a wheelchair over a straight path. By understanding the effect of various wheelchair configurations on turning resistance, wheelchair users and their clinicians can be better informed about wheelchair performance. Selecting wheelchairs that offer the necessary features while also being easier to propel can lead to better functioning and lesser likelihood of fatigue and excessive shoulder stress.

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Mechanical efficiency of two commercial lever-propulsion mechanisms for manual wheelchair locomotion

Jordon Lui, BKin, et al.

Veterans with disabilities may rely on manual wheelchairs for mobility. However, conventional wheelchairs that use hand rims for propulsion tend to be energetically wasteful and inefficient. Alternative forms of propulsion that utilize push levers to engage the wheels may increase the efficiency of propulsion. We tested two commercially available lever-propulsion systems. While no difference in efficiency was found between the two lever-propulsion systems tested, both showed increased efficiency compared with hand rim propulsion, especially when slopes were encountered. This suggests that lever propulsion, in general, may be a viable alternative to conventional wheelchairs in order to increase the efficiency of manual wheelchair locomotion.

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Evaluation of lightweight wheelchairs using ANSI/RESNA testing standards

Benjamin Gebrosky, BS, et al.

This study examined three different lightweight manual wheelchair models and compared their quality. The wheelchairs in this study were also compared with previous studies. The results show that lightweight wheelchairs have not improved in quality since the last study in 1997 and are less durable than the other types of wheelchairs tested. This information will hopefully help the Department of Veterans Affairs select the best possible wheelchairs for veterans.

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Influence of standardized activities on validity of Assessment of Capacity for Myoelectric Control

Helen Y. N. Lindner, MSc, et al.

For upper-limb myoelectric prosthesis users, good prosthetic control may make it easier for them to do their daily activities. Prosthetic training is usually offered, but a clinical assessment tool is needed to follow up on the user's progress in controlling the prosthesis. The Assessment of Capacity for Myoelectric Control was developed to meet this need. In this study, we examined whether different two-handed activities would give different assessment results. Six common activities were compared. The results showed that the assessment scores were similar and that the activities could be used for both men and women and both prosthetic sides.

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Objective and subjective measures reflect different aspects of balance in multiple sclerosis

Michelle H. Cameron, MD, PT; Jessie Huisinga, PhD

This article evaluates the relationships between objective and subjective measures of balance in people with multiple sclerosis. Specifically, the study assessed the relationships between sway when standing still (measured by dynamic posturography) and the participants' perception of their balance confidence and ability to prevent falls (measured by questionnaires). The study found a significant but incomplete relationship between these two types of balance measures. This suggests that when people with multiple sclerosis, including veterans, have balance problems, both objective physical measures and subjective questionnaires should be used for a more complete assessment.

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Effect of robotic gait training on cardiorespiratory system in incomplete spinal cord injury

Femke Hoekstra, MSc, et al.

Robot-assisted gait training is a unique exercise modality for people with incomplete spinal cord injury (iSCI) because the large muscles of the legs are activated while the contribution of the arms is limited. The results of this study showed that in spite of the low exercise intensity of the training program, a period of robot-assisted gait training induced some improvement in cardiorespiratory fitness in iSCI. Therefore, robot-assisted gait training can be used as an additional form of exercise in people with iSCI because of potential health benefits associated with this unique exercise modality.

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Vibrotactile evaluation: Osseointegrated versus socket-suspended transfemoral prostheses

Eva Häggström, CPO, et al.

Today, it is possible to anchor transfemoral prostheses directly to the bone using osseointegration. Some patients with osseointegrated (OI) prostheses have reported improved sensations through the prostheses, a phenomenon called osseoperception. The current study investigated how patients with OI prostheses and socket-suspended prostheses could detect vibrations applied under the foot. The results showed that patients with OI prostheses had an improved ability to detect vibrations in higher frequencies than those with socket-suspended prostheses. Improved vibratory feedback from the surroundings through the prosthetic components might lead to advantages in gait control.

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Asymmetrical loading demands associated with vertical jump landings in people with unilateral transtibial amputation

Marlene Schoeman, PhD, et al.

People with amputation engaging in sport are exposed to variations of the vertical jump, which inevitably terminates in landing. This article shows that a variety of prostheses do not adequately assist with shock absorption during landing, which leads to gross-force asymmetries between the intact and prosthetic sides. Poor landing strategies also result in large impact forces to the intact side and high loading rates at the prosthetic side, which may lead to skin breakdown on the residual limb. A foundation is laid for further research to develop rehabilitation guidelines and potential prosthetic design interventions to improve the health and safety of people with amputation engaging in recreational sport.

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Modeling effects of sagittal-plane hip joint stiffness on reciprocating gait orthosis-assisted gait

William Brett Johnson, PhD, et al.

Upright ambulation is believed to promote the well-being of persons with lower-limb paralysis, but ambulatory orthoses for this population, such as the reciprocating gait orthosis (RGO), provide a slow and exhausting gait compared with that of nondisabled persons. Increasing the stiffness of the ambulatory orthoses' hip joints may improve the efficiency of walking with these devices. In this experiment, we modeled the effects of increasing the hip joint stiffness of RGOs on RGO-assisted gait using nondisabled persons ambulating with a lower-limb paralysis simulator. Walking speed was shown to increase with relatively small increases in hip joint stiffness.

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