

### **JRRD At A Glance Podcast Episode 33**

**Listen to the JRRD At a Glance Podcast Episode 33: Discussing Balance in multiple sclerosis, wheelchair efficiency, robotic gait training, and more from JRRD Volume 50, Number 10, 2013.**

**[Johanna Gribble]:** This is episode 33 of the JRRD podcast for Volume 50, Issue 10, produced by the Journal of Rehabilitation Research and Development (JRRD) and the U.S. Department of Veterans Affairs. Today we're discussing a range of timely research topics with relevance for Veterans and non-Veterans alike. Hello, I'm Johanna Gribble.

**[Ken Frager]:** And I'm Ken Frager. Helping Veterans with traumatic or acquired brain injuries or early-stage dementia follow a plan of care while functioning away from a VA setting is an important step in returning them to independent living. The guest editorial in this issue describes a smart wrist-worn device designed to provide timely prompts and reminders to perform everyday tasks such as taking medications and keeping appointments. The device was developed as part of the Smart Home project underway at the VA hospital in Tampa. You can find more information about this issue and the other topics we are discussing today, along with detailed Power Point presentations on most of these articles, online at the Table of Contents page for issue 50-10 at [www.rehab.research.va.gov](http://www.rehab.research.va.gov).

**[Johanna Gribble]:** We've looked at how rehabilitation research and development has transformed over the last half century in our 50<sup>th</sup> anniversary Then & Now series, and in this issue, we look forward with a commentary by retired Army Col. Dr. Paul Pasquina, chief of the Department of Orthopaedics and Rehabilitation at the Walter Reed National Military Medical Center. Dr. Pasquina discusses what can be expected in the field over the next 20 years, basing

his commentary on his military career and more than a decade of caring for combat-injured servicemembers.

**[Ken Frager]:** We hope you have enjoyed our “Then & Now” contributions, and we would really appreciate your feedback. If you have missed any of these commentaries you can find them, along with the original articles, on the JRRD Web site.

**[Johanna Gribble]:** Veterans of Iraq and Afghanistan report problems driving postdeployment, which affects their everyday life and may increase their crash risk. A pilot study led by Elizabeth Hannold and others used their findings, which are detailed in the article “An exploratory pilot study of driving perceptions among OIF/OEF Veterans with mTBI and PTSD,” to develop a model of driving postdeployment. The authors believe that understanding driving from the Veterans' point of view may help researchers tailor driver interventions to better meet their needs.

**[Ken Frager]:** In the article “Development and evaluation of a prefabricated antipronation foot orthosis,” Dr. Majumder and colleagues formulated a new foot orthosis, based on assessment of foot casts and adjusted to enable individual foot size orthoses. The new design offers high levels of arch support and durability and reduces maximum rearfoot eversion in both walking and running.

**[Johanna Gribble]:** Displays on electronic devices such as blood pressure monitors and cellular telephones are often hard for Veterans with low vision to see. In their article “Evaluating Barten image metric for predicting character recognition in people with low vision,” Kimberly Schoessow and colleagues evaluated a long-standing formula that predicted whether people with low vision could read numbers on a screen. Their findings 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.

**[Ken Frager]:** 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. In their article “Changes in inertia and effect on turning effort across different wheelchair configurations,” Jayme Caspall and colleagues looked at how various wheelchair configurations effect turning resistance, so wheelchair users and their clinicians can be better informed about wheelchair performance as they seek to select wheelchairs that offer the necessary features while also being easier to propel.

**[Johanna Gribble]:** In their study, “Mechanical efficiency of two commercial lever-propulsion mechanisms for manual wheelchair locomotion,” Liu and colleagues tested two commercially available lever-propulsion systems for wheelchairs. 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.

**[Ken Frager]:** Continuing with the topic of wheelchairs, Gebrosky and others examined three different lightweight manual wheelchairs and compared their quality in the article, “Evaluation of lightweight wheelchairs using ANSI/RESNA testing standards.” The results showed that the quality of lightweight wheelchairs has not improved since the last study was conducted in 1997 and that this type of wheelchair is less durable than other types tested. The researchers hope this information will be helpful to the VA as they seek to provide the best wheelchair options for Veterans.

**[Johanna Gribble]:** For upper-limb myoelectric prosthesis users, good prosthetic control may ease the performance of their daily activities. Prosthetic training is usually offered and a clinical assessment tool is needed to follow the user's progress in controlling the prosthesis. Linder and colleagues, in their article, "Influence of standardized activities on validity of assessment of capacity for myoelectric control," evaluated whether this assessment tool provides a valid evaluation of training needs based on six common activities for comparison.

**[Ken Frager]:** The article "Objective and subjective measures reflect different aspects of balance in multiple sclerosis" evaluates the relationships between objective and subjective measures of balance in people with multiple sclerosis. Specifically, Cameron and colleagues assessed the relationship between sway when standing still, as captured by dynamic posturography, and the subjective perception of balance confidence and fall prevention efficacy, based on questionnaire responses. Their findings suggest that when people with multiple sclerosis, including Veterans, have balance problems, both objective physical measures and subjective questionnaires should be used for comprehensive assessment.

**[Johanna Gribble]:** In the study "Effect of robotic gait training on cardiorespiratory system in incomplete spinal cord injury," Hoekstra and others evaluated the benefit of robot-assisted gait training for people with incomplete spinal cord injury. This training, which activates the large muscles of the legs while limiting the contribution of the arms, showed that in spite of the low exercise intensity there was some improvement in cardiorespiratory fitness.

**[Ken Frager]:** Today, it is possible to anchor transfemoral prostheses directly to the bone using osseointegration. Some patients with osseointegrated prostheses have reported improved sensations through the prostheses. In their study “Vibrotactile evaluation: Osseointegrated versus sock-suspended transfemoral prostheses,” patients with osseointegrated prostheses had an improved ability to detect vibrations in higher frequencies than those with socket-suspended prostheses. Eva Häggström and colleagues believe that improved vibratory feedback from the surroundings through the prosthetic components might lead to advantages in gait control.

**[Johanna Gribble]:** In their article “Asymmetrical loading demands associated with vertical jump landings in people with unilateral transtibial amputation,” Marlene Schoeman and her research team show 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. Their findings suggest the need 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 sports.

**[Ken Frager]:** Finally, 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, provide a slow and exhausting gait compared with that of nondisabled persons. In their article “Modeling effects of sagittal-plane hip joint stiffness on reciprocating gait orthosis-assisted gait,” William Brett Johnson and colleagues found that increasing the stiffness of the ambulatory orthoses’ hip joints may improve the efficiency of walking with these devices.

**[Johanna Gribble]:** Today's discussion focused on articles in JRRD volume 50, issue 10. These articles and many others can be read online at [www.rehab.research.va.gov/jrrd](http://www.rehab.research.va.gov/jrrd). Just a reminder that the *JRRD At a Glance* section is available online in English, Spanish, and Traditional and Simplified Chinese! You can submit your comments on this podcast or request articles for us to highlight at [vhajrrdinfo@va.gov](mailto:vhajrrdinfo@va.gov).

**[Ken Frager]:** Our thanks to JRRD's David Bartlinski for his audio engineering, recording, and editing to make this podcast possible. We would also like to thank all of our listeners for your support. We'd love to hear from you. For JRRD, thanks for listening. Don't forget to "Get Social" with JRRD by "friending" us on Facebook at JRRDJournal and following us on Twitter at JRRDEditor.