

JRRD At A Glance Podcast Episode 38

Listen to the JRRD At a Glance Podcast Episode 38: Discussing Gait ability, early opioid effect on PTSD, telerehabilitation, and more from JRRD Volume 51, Number 5, 2014.

[Johanna Gribble]: This is episode 38 of the JRRD podcast for volume 51, issue 5, produced by the Journal of Rehabilitation Research and Development (JRRD) and the U.S. Department of Veterans Affairs. Hello, I'm Johanna Gribble.

[Ken Frager]: And I'm Ken Frager. You can find more information about the 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 51-5 at www.rehab.research.va.gov/jrrd.

[Johanna Gribble]: Technological advances in recent years have resulted in a dramatic increase in the possibilities offered by teleaudiology, the ability to deliver audiology services via telecommunications technologies. These advances could improve access for a range of services including diagnostic audiology and remote hearing aid fittings, downloadable hearing aid applications, or even real-time rehabilitation interventions. The guest editorial in this issue addresses how this broader access and new models of service delivery present vast possibilities and new challenges and questions for patients and professionals.

[Ken Frager]: Gait analysis systems provide useful information to the clinician for assessing gait disabilities and evaluating improvements following a rehabilitation program. In the review "Use of Functional Ambulation Performance Score as measurement of gait ability," the authors describe the Functional Ambulation Performance Score, or FAPS, which includes, in a single numerical score, several parameters such as walking speed, step length, and step width. The FAPS is commonly used for clinical evaluations, but its use is sometimes distorted by misunderstandings of composition and calculation, practical and/or conceptual limits, and even the meaning of the score.

[Johanna Gribble]: In their article “Homeless and nonhomeless VA service users likely eligible for Medicaid expansion,” Drs. Jack Tsai and Robert Rosenheck look at the effect the Affordable Care Act might have on medical coverage for Veterans, in particular those who are homeless or otherwise eligible for Medicaid. According to estimates, those who are eligible for the Medicaid expansion have various medical and mental health needs, which may be complicated by cross-system use of VA and Medicaid-funded services. Therefore, the research team believes the VA should carefully inform clinicians and patients about implications of the Affordable Care Act and consider opportunities for coordinating care with outside providers.

[Ken Frager]: In their article “Enhancing the well-being of veterans using extended group-based nature recreation experiences,” Drs. Jason Duvall and Rachel Kaplan from the University of Michigan studied the use of extended group-based nature recreation to help veterans cope with challenging physical and mental health issues. According to the authors, participants reported increased psychological well-being, social functioning, and life outlook one week after the experience, with some improvements persisting over the next month, suggesting that extended nature recreation experiences that bring veterans together can have significant positive effects.

[Johanna Gribble]: In the article “Glasgow Coma Scale scores, early opioids, and 4-year psychological outcomes among combat amputees,” Dr. Ted Melcer and colleagues followed psychological diagnoses in military and Department of Veterans Affairs hospital records for 258 combat amputees for 4 years to ascertain whether loss of consciousness or provision of pain medicine soon after injury might prevent PTSD. Previous research had shown that combat amputees were less likely to develop PTSD than nonamputees.

[Ken Frager]: Artificial limbs made for people who have lost their anatomical arm at or near the shoulder have historically not been able to perform the “three degrees of freedom” motions, greatly limiting their usefulness to people with amputation. In their article “Design and evaluation of prosthetic shoulder controller,” Drs. Joseph Barton and John Sorkin describe a prototype that uses the motion of the sternoclavicular joint to produce signals that can be used to control two of a prosthetic humerus’ degrees of freedom, as well as an evaluation protocol to assess the performance of a prosthetic arm in reaching and pointing tasks, the third degree of freedom.

[Johanna Gribble]: A generic, individualized, patient-centered outcome measure, known as the Canadian Occupational Performance Measure, or COPM, might be of aid to enhance communication about problems in participation and for goal setting in rehabilitation in any population. However, in their article “Canadian Occupational Performance Measure performance scale: Validity and responsiveness in chronic pain,” the authors note that construct validity of the COPM performance scale was not confirmed, and no indication was found that the COPM performance scale can detect changes in occupational performance.

[Ken Frager]: Paralysis of the hip and trunk muscles after spinal cord injury can compromise the ability to maintain an upright sitting posture. In the article “Feasibility of closed-loop controller for righting seated posture after spinal cord injury,” Julie Murphy and colleagues evaluated a system that detected forward trunk tilt and stimulated the hip and trunk extensors to restore erect sitting automatically. According to the researchers, this is important for many paralyzed veterans who would otherwise be unable to reach forward with both hands or who rely on straps or belts to prevent falling forward in their wheelchairs.

[Johanna Gribble]: In their article “Stability analysis of electrical powered wheelchair-mounted robotic-assisted transfer device,” Dr. Hongwu Wang and colleagues review an easy-to-use system for assisting with transfers, attachable to electrical powered wheelchairs and readily transportable, that could have a significant positive effect on the quality of life of people with disabilities. The ability of people with disabilities to live in their homes and communities with maximal independence often hinges, at least in part, on their ability to transfer or be transferred by an assistant. According to the researchers, the modeling used in this study accurately predicts the stability of the system and is suitable for developing better control algorithms to enhance the safety of the device.

[Ken Frager]: Veterans with spinal cord injury are at great risk for pressure ulcers because of their prolonged stays in wheelchairs. Wheelchair tilt and recline functions are two of the most desirable features for relieving seating pressure to reduce risk of pressure ulcers. In the methodology and preliminary report “Development of intelligent model for personalized guidance on wheelchair tilt and recline usage for people with spinal cord injury,” the authors demonstrated the feasibility of using machine learning techniques to construct an intelligent model to provide personalized guidance on wheelchair tilt and recline usage for people with spinal cord injuries.

[Johanna Gribble]: The use of a motorized treadmill to assess and train manual wheelchair propulsion has gained great popularity over the past few years. Little is known about the effects of increasing the slope on the force applied at the pushrim. In the article “Pushrim biomechanical changes with progressive increases in slope during motorized treadmill manual wheelchair propulsion in individuals with spinal cord injury,” Dr. Dany Gagnon and colleagues assessed the effects of five different slopes on the force applied with the nondominant hand on

the pushrim during manual wheelchair propulsion on a motorized treadmill at a constant speed in individuals with a spinal cord injury. The authors found that, in general, these individuals grabbed their pushrim faster with their hands between strokes and applied greater forces on the pushrim as the slope of the treadmill increased during manual wheelchair propulsion.

[Ken Frager]: Persons with lower-limb amputation often have difficulty walking on sloped or uneven surfaces. Some microprocessor-controlled prosthetic ankle-foot systems are able to adapt their alignment to a surface slope over several steps, but a better system would be capable of adapting fully on every step without batteries and electronic systems. In the article “Passive prosthetic ankle-foot mechanism for automatic adaptation to sloped surfaces,” Eric Nickel and colleagues describe the development and initial testing of a passive mechanical prosthetic ankle-foot system designed to automatically adjust its alignment on every step of walking.

[Johanna Gribble]: Diabetic foot ulceration is an important complication of diabetes. These ulcers are long-lasting open sores that are hard to heal because of poor blood circulation at the wound site. In the article “Effect of low-intensity direct current on expression of vascular endothelial growth factor and nitric oxide in diabetic foot ulcers,” the authors describe how electrical stimulation affected levels of vascular endothelial growth factor and nitric oxide in the plasma of type 2 diabetic patients with foot ulceration. Their findings show that application of electrical stimulation increases the expression of vascular endothelial growth factor and nitric oxide, which may improve blood flow, tissue temperature, and wound healing in patients with diabetic foot ulceration.

[Ken Frager]: Dr. Kok Kiong Tan and colleagues developed a method for extracting spatial data from a two-dimensional video screen to substitute for three-dimensional requirements in a low-

bandwidth telerehabilitation system. In the article “Extraction of spatial information for lowbandwidth telerehabilitation applications,” the authors discuss how this technology could help whenever spatial resolution is required in a consultation session, because three-dimensional video files are often too large to transmit.

[Johanna Gribble]: Finally, in a study that has clinical implications for patients with weak respiratory muscles and dyspnea, Dr. Barbara Smith and colleagues used a rat model to identify hypertrophy and regeneration in the parasternal intercostal muscles to better understand which respiratory muscle training improves muscle function. These findings, presented in the article “Intrinsic transient tracheal occlusion training and myogenic remodeling of rodent parasternal intercostal fibers,” may help providers prescribe to their patients the best type, frequency, and duration of exercise to improve inspiratory muscle function.

[Ken Frager]: Today’s discussion focused on articles in JRRD volume 51, issue 5. These articles and many others can be read online at 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.

[Johanna Gribble]: 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.