JRRD at a Glance

Prosthetic interventions for people with transtibial amputation: Systematic review and meta-analysis of high-quality prospective literature and systematic reviews

M. Jason Highsmith, PhD, DPT, CP, FAAOP, et al.

This literature review is important to Veterans because war injuries, military training, and service sometimes result in leg amputation. The review reports that many common prosthetic interventions have some scientific evidence to support their use. These include prosthetic alignment interventions, prosthetic feet, certain types of sockets, pylons, and certain post-amputation strategies. However, even the best prosthetic research in these areas need improvement.

http://dx.doi.org/10.1682/JRRD.2015.03.0046

Association between mild traumatic brain injury and mental health problems and self-reported cognitive dysfunction in Iraq and Afghanistan Veterans

Karen H. Seal, MD, MPH, et al.

Cognitive difficulties such as problems with memory are common in returning Veterans. This study examines the process by which combat Veterans are assessed for cognitive problems in the Department of Veterans Affairs traumatic brain injury (TBI) screening program. We found that many Veterans are not asked about cognitive difficulties during initial screening, and of those that later report significant cognitive difficulties during a TBI specialty evaluation, the majority are found to have mental health problems rather than TBI. Targeted care for Veterans might be expedited by screening for cognitive problems in primary care in conjunction with postdeployment mental health screening.

http://dx.doi.org/10.1682/JRRD.2014.12.0301

Prediction of oxygen uptake during walking in ambulatory persons with multiple sclerosis

Stamatis Agiovlasitis, PhD, et al.

This study developed an equation for predicting the energy expenditure during walking in persons with multiple sclerosis (MS). Predictors were walking speed and the 12-item Multiple Sclerosis Walking Scale—an index of walking problems. The prediction equation developed had relatively small error. Rehabilitation professionals and researchers should refrain from using equations that have not been developed in persons with MS. Rehabilitation professionals could cautiously use the presently developed formula when designing exercise programs for persons with MS. Well-designed programs may encourage persons with MS to engage in physical activity and experience its benefits on health.

http://dx.doi.org/10.1682/JRRD.2014.12.0307

Registering a methodology for imaging and analysis of residual-limb shape after transtibial amputation

Alexander S. Dickinson, PhD, et al.

Prosthetic rehabilitation following lower-limb amputation depends upon a safe, comfortable socket-residuum interface, particularly for Veterans attempting early, high-intensity rehabilitation with complex residuums. Current practice predominantly utilizes subjective, iterative prosthetic socket fitting, often requiring several clinic visits. We propose an objective methodology for residuum shape scanning and high-resolution, automated analysis. Accuracy was demonstrated for three scanners using a 3-D printed "analog" residual limb. Repeatability was demonstrated by inter- and intraobserver comparison of scans from 20 residuum casts. This methodology

will allow prosthetists and clinical researchers to establish quantitative, objective, multipatient datasets, enabling long-term follow-up and interpatient outcome comparison for decision support.

http://dx.doi.org/10.1682/JRRD.2014.10.0272

Plantar pressure displacement after anesthetic motor block and tibial nerve neurotomy in spastic equinovarus foot

Nathalie Khalil, MD, et al.

Easy-to-use quantitative tools quantifying the effects of surgical treatment in spastic equinovarus foot are infrequent. The F-Scan in-shoe system can be used to quantify center of pressure (COP) displacements measurements in the equinovarus foot. In this study, the F-Scan system shows objective changes in COP displacements after tibial nerve neurotomy. Changes of COP's length trajectory on the paretic side could be a predictive marker for the effect of surgical treatment. To our knowledge, this is the first study to use the F-scan in-sole system to evaluate the effects of motor nerve block and neurotomy.

http://dx.doi.org/10.1682/JRRD.2014.11.0298

Gait kinematics and kinetics are affected more by peripheral arterial disease than by age

Sara A. Myers, PhD, et al.

Approximately 8 to 12 million people in the United States are affected by peripheral arterial disease (PAD). At the Department of Veterans Affairs (VA) Nebraska-Western Iowa Health Care System, more than 1,000 Veterans are seen annually in our vascular surgery clinics. Vascular procedures to treat these Veterans constitute the third most common group of operations performed in VA hospitals nationwide. This disease is associated with a cardiovascular morbidity and mortality increase of three to six times compared with individuals without PAD. This research investigates the possible underdiagnosis of PAD by using advanced biomechanics techniques to compare the gait of Veterans with PAD and older adults.

http://dx.doi.org/10.1682/JRRD.2015.02.0027

Patient perspectives on virtual reality-based rehabilitation after knee surgery: Importance of level of difficulty

Minyoung Lee, PT, BSc, et al.

Recently, virtual reality (VR)-based games are recruited as a rehabilitation tool for knee surgery patients because of good accessibility and therapeutic effects. However, for VR-based games to be adopted as patients' preferred rehabilitation tool, it is necessary to explore patients' perspectives on VR-based rehabilitation. As a result, we come to know that "level of difficulty" was the most important factor for knee surgery patients to be immersed in VR-based rehabilitation. Therefore, to best meet patient perspectives, it might be useful to use a VR program with varied levels of difficulty, taking into account the severity of physical dysfunction.

http://dx.doi.org/10.1682/JRRD.2014.07.0164

Prediction of Skeletal Medial-Lateral for transfemoral ischial containment sockets

Michael P. Dillon, PhD, et al.

Accurate measurement of the pelvis and residual limb is important for a well-fitting and comfortable transfemoral prosthetic socket. Some pelvic measures are intrusive and unreliable. This research describes a model to predict a key dimension of the pelvis, the Skeletal Medial-Lateral (ML). Using simple and nonintrusive measurements such as sex, weight, and distance between the hip joints, it is possible to predict the Skeletal ML with a high degree of accuracy. Errors with the prediction are small enough that they could be easily fixed during fitting of a test socket.

http://dx.doi.org/10.1682/JRRD.2015.03.0036

Development of network-based multichannel neuromuscular electrical stimulation system for stroke rehabilitation

Hongen Qu, MS, et al.

Neuromuscular electrical stimulation (NMES) is a promising assistive technology for rehabilitation that may benefit a large population of patients post-stroke, including Veterans. Here, we have designed and tested a prototype of a multimuscle NMES system as an emerging therapy for people with paretic stroke. Results showed that synergistic stimulation of multiple muscles in people with stroke improved performance of multijoint movements with more natural velocity profiles at the elbow and shoulder and reduced acromion excursion due to compensatory trunk rotation. The network-based NMES system may provide an innovative solution that allows more physiological activation of multiple muscles in multijoint task training.

http://dx.doi.org/10.1682/JRRD.2014.10.0227

Transfer component skill deficit rates among Veterans who use wheelchairs

Alicia M. Koontz, PhD, et al.

Wheelchair transfers cause excessive loading on the upper limbs and falls when proper techniques are not used. This study examined the quality of transfer skills in detail among 92 Veterans who used wheelchairs full-time and were able to perform transfers independently. Many of the Veterans did not set up their body, wheelchair, and transfer environment appropriately or use proper handgrips during the transfer process. The study results indicate that there is much room for improvement, signaling a need for further education and better training for Veterans to learn how to perform high-quality transfers.

http://dx.doi.org/10.1682/JRRD.2015.02.0023