

Benefits of microprocessor-controlled prosthetic knees to limited community ambulators: Systematic review

Andreas Kannenberg, MD, PhD, et al.

Benefits of microprocessor-controlled prosthetic knees (MPKs), such as significant reductions in falls and other important safety-related parameters, function, and mobility, have been well established in community ambulators (Medicare Functional Classification Level [MFCL]-3) with a transfemoral amputation (TFA). Little is known whether lower-functioning individuals (MFCL-2) with a TFA, who make up a big share in the elderly and thus veteran population with amputation, may also benefit from using MPKs. Therefore, the purpose of this systematic review was to analyze the scientific literature for proven effects of the use of MPKs in the MFCL-2 population.

<http://dx.doi.org/10.1682/JRRD.2014.05.0118>

Kinematic analysis of males with transtibial amputation carrying military loads

Barri L. Schnall, MPT, et al.

Load carriage tasks are common to many professions, including military personnel. Yet, the biomechanical adaptations to loads carried on the body in persons with lower-limb amputations are not fully understood. This study characterized temporal-spatial and kinematic gait parameters in servicemembers with and without a unilateral transtibial amputation (TTA) during several military-relevant loaded walking tasks. Although the results suggest biomechanical adaptations to carried loads in persons with TTA are similar to nondisabled individuals, the extent of these changes was larger among persons with TTA. Such evidence is important for optimizing rehabilitation/mobility strategies and minimizing risk for overuse injuries.

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Spinal cord injury combined with felony history: Effect on supported employment for Veterans

James LePage, PhD, et al.

One purpose of this study was to see how frequent legal problems were for a group of Veterans with spinal cord injury who were seeking employment. There was a high rate of arrests and convictions: more than 47% reported at least one past arrest and more than 25% reported at least one felony conviction. A second purpose of the study was to see whether legal history negatively affected employment in this group of Veterans. The findings suggest that Veterans with a higher rate of felony conviction do have a lower rate of employment.

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Wheelchair ergonomic hand drive mechanism use improves wrist mechanics associated with carpal tunnel syndrome

Lisa A. Zukowski, MA, et al.

This study provides evidence that using a novel lever-propelled wheelchair design (ergonomic hand drive mechanism attached to a conventional manual wheelchair) may reduce the likelihood of developing carpal tunnel syndrome, which is common in wheelchair users. Use of this ergonomic hand drive mechanism reduces wrist orientations that compress the median nerve. The findings of this study will benefit veterans who spend a significant amount of time in a manual wheelchair as well as all other manual wheelchair users.

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Experimental and computational analysis of composite ankle-foot orthosis

Dequan Zou, DSc, et al.

In this study, we developed finite element analysis (FEA) models for two carbon fiber and thermo-plastic ankle-foot orthosis (AFO) and mechanically tested the AFOs to produce force-displacement data. The load-displacement results for the FEA models were compared with the mechanical testing results to evaluate the accuracy of the FEA models. The simulation results demonstrated that FEA models can produce accurate predictions for both types of AFOs.

<http://dx.doi.org/10.1682/JRRD.2014.02.0046>

Lower-limb performance disparities: Implications for exercise prescription in multiple sclerosis

Rebecca D. Larson, PhD, et al.

This study showed that each leg can function differently at a submaximal level in people with mild multiple sclerosis. Currently, there is only limited information on how leg differences affect function and exercise prescription. This study strongly suggests that limb differences can affect overall aerobic function and subsequently affect physical activity and exercise recommendations.

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Cosmetic effect of knee joint in a knee disarticulation prosthesis

Fred A. de Laat, MD, PhD, et al.

Patients with a knee disarticulation have a lengthened thigh and subsequent shortened lower leg due to the knee device built at the end of the upper leg. We show that the amount of thigh lengthening varies between 23 and 92 mm, depending on the knee device used, while lower leg shortening varies between 3 and 50 mm. The most favorable knee devices are

polycentric, whereas microprocessor-controlled knees show less favorable characteristics because of their extended lengthening of the thigh.

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Response to Goal Management Training in Veterans with blast-related mild traumatic brain injury

J. Kay Waid-Ebbs, PhD, BCBA-D, et al.

Treatment of concussions (mild traumatic brain injuries) as a result of exposure to blast injury is of significant importance to the Veterans who have served in the recent wars. Over 287,861 servicemembers have been diagnosed with mild traumatic brain injury. An estimated 44% have persistent symptoms that interfere with thinking skills. Effective interventions for thinking skills are needed for Veterans. Goal Management Training is a treatment that has shown improvement in a small number of Veterans with blast-related mild traumatic brain injury. Further research is needed to support these results.

<http://dx.doi.org/10.1682/JRRD.2013.12.0266>

Rehabilitation following total hip arthroplasty evaluation over a short follow-up time: Randomized clinical trial

Carolina Sant'anna Umpierres, MSc, et al.

In patients with osteoarthritis disease, total hip arthroplasty surgery is a delicate procedure and, at the same time, an important event in the patient's life. It has a relevant mission: to bring pain relief and allow the patient to resume his or her daily life. These improvements do not occur without the assistance of a physiotherapist or suitable exercises. This randomized study demonstrates the importance of physiotherapy and shows how an applied rehabilitation protocol promotes improved functional capacity and quality of life over a short follow-up period.

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Differentiation between solid-ankle cushioned heel and energy storage and return prosthetic foot based on step-to-step transition cost

Daphne Wezenberg, PhD, et al.

We compared the effect of two often-prescribed prosthetic feet on the energy lost during the transition from one step to the next. Results showed that the so-called energy storage and return prosthetic feet lost less energy during this transition than solid-ankle cushioned heel prosthetic feet. These results contribute to our understanding of the difference in mechanical properties of both feet. Moreover, they provide important information that helps to optimize the development of new and more efficient prostheses.

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