C-Leg vs NMPKs

Cognitive demand

Major Findings

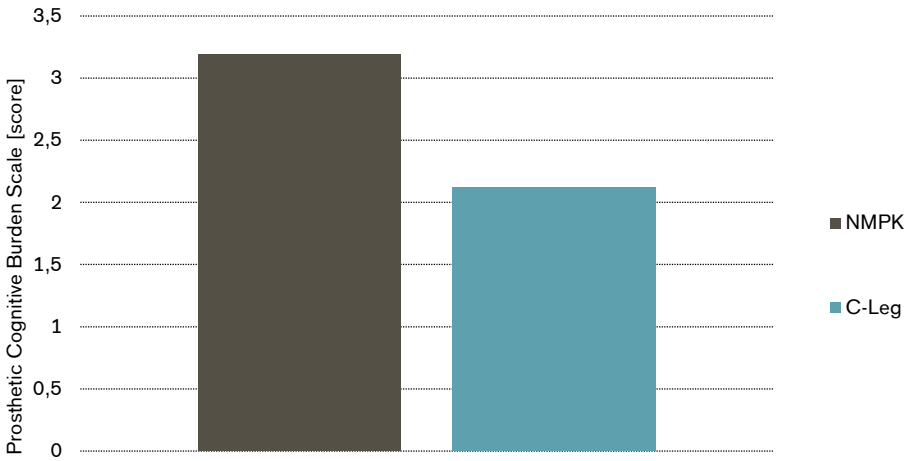
With C-Leg compared to NMPKs:

→ Cognitive burden decreased
PCBS score decreased by 34%

→ Ambulation with cognitive demand Improved
K2 subjects: walking velocity improved by 12%
multitasking while walking improved by 21%
K3 subjects: mental energy expenditure improved by 36%
confidence while walking improved by 23%
multitasking while walking improved by 26%

→ Difficulty of multitasking decreased by 28%

Less Cognitive Burden with C-Leg



Prosthetic Cognitive Burden Scale (PCBS) is a 5-item survey based on amputee´s typical concerns regarding cognitive tasks. Possible scores range from 1 to 7, with higher scores indicating greater subjective burden. (Williams et al 2006)

Clinical Relevance

Cognitive demand of walking is investigated in studies to determine how much attention has to be paid to walking. This is important because many activities in daily life are performed simultaneously (e.g. walking and talking on the phone).

Summary

Prosthetic Cognitive Burden Scale (PCBS) score decreased with C-Leg by 34% compared to NMPKs and therefore subjects experience less cognitive burden when using the prosthesis. Subjects reported to pay less attention to walking during cognitive task (Williams et al 2006). These results were confirmed in a study by Hafner et al. (2007), which found that the difficulty of multitasking while walking decreased by 28% with the transition from NMPKs to C-Leg. Subjects from different mobility levels showed different benefits. K2 subjects increased the walking velocity during ambulation with an attentional demand by 12% with C-Leg compared to NMPKs. Furthermore, multitasking while walking improved by 21% in K2 subjects when using C-Leg compared to NMPKs. In comparison, K3 subjects benefit in mental energy expenditure (36% improvement), confidence while walking (23% improvement) and multitasking while walking (26% improvement) with C-Leg compared to

NMPKs (Hafner et al. 2009). A case report testing the C-Leg use on an adolescent amputee, reported that the subject is able to do multiple tasks with C-Leg and walk and concentrate on a cognitive task while same was not possible with a NMPK (Tofts & Hamblin 2013).

References of summarized studies

Hafner, B. J., & Smith, D. G. (2009). Differences in function and safety between Medicare Functional Classification Level-2 and -3 transfemoral amputees and influence of prosthetic knee joint control. The Journal of Rehabilitation Research and Development, 46(3), 417–433.

Hafner, B. J., Willingham, L. L., Buell, N. C., Allyn, K. J., & Smith, D. G. (2007). Evaluation of function, performance, and preference as transfemoral amputees transition from mechanical to microprocessor control of the prosthetic knee. Archives of physical medicine and rehabilitation, 88(2), 207–217. doi:10.1016/j.apmr.2006.10.030

Tofts, L. J., & Hamblin, N. (2014). C-Leg(R) improves function and quality of life in an adolescent traumatic trans-femoral amputee: A case study. Prosthetics and orthotics international, 38(5), 413–417. doi:10.1177/0309364613502354

Williams, Rhonda M.; Turner, Aaron P.; Orendurff, Michael; Segal, Ava D.; Klute, Glenn K.; Pecoraro, Jan; Czerniecki, Joseph (2006). Does having a computerized prosthetic knee influence cognitive performance during amputee walking? Arch Phys Med Rehabil 87 (7), 989–994. doi: 10.1016/j.apmr.2006.03.006.