C-Leg vs NMPKs

Preference, Satisfaction, Quality of Life (QoL)

**Major Findings**

With C-Leg compared to NMPKs:

- **More positive body image**
  Amputee body image scale (ABIS) score improved by 9.5%.

- **Improved quality of life and satisfaction**
  Prosthesis evaluation questionnaire (PEQ) total score improved by 20%
  - K2: PEQ subscales ambulation, residual limb health, utility and satisfaction of walking improved
  - K2: PEQ mobility score improved by 25%
  - K3: PEQ addendum ‘satisfaction’ improved by 38%
  - K3: PEQ subscales ambulation, sounds and utility improved
  EQ-5D: Physical mobility and usual activity improved significantly

- **Up to 88% of subjects preferred C-Leg over NMPK**

**Clinical Relevance**

Satisfaction and quality of life can be measured to determine the general well-being of a person. They are all very meaningful parameters to investigate, since they have the most direct impact on the amputee’s well-being. They are influenced by other categories and can therefore be seen as a summary of possible activities, independence and perceived safety. A common outcome measure in prosthetic research is the Prosthesis Evaluation Questionnaire (PEQ), a questionnaire with a total of 84 items. Several selected items are further used in 9 subscales. Quality of life can be measured by different questionnaires as the EQ-5D, WHO-QOL, SF-36 etc. Often the so called QALYs (quality-adjusted life years) are calculated. They give information of how many time is spent in “perfect health” within a one or five year time period.

![Graph showing improvement in satisfaction with C-Leg compared to NMPK](image)

The Prosthesis evaluation questionnaire (PEQ) addendum Satisfaction was measured by visual analogue scale (VAS) with a range from 0 to 100, where 100 represents the maximum score. Subjects were divided in mobility grade K2 and K3 (Hafner et al. 2009).
Summary

Five studies investigated the subject’s preference regarding the prosthesis and all of them found clear preference for C-Leg over NMPKs. Orenduff et al. (2006) reported that 88% of subjects preferred to use C-Leg instead of a NMPK. Further results confirmed these findings; 82% of subjects preferred C-Leg and only 6% of subjects preferred NMPCKs, whereas 12% of subjects did not have a preference (Hafner et al. 2007). In another study 74% of subjects reported that they prefer using C-Leg over NMPKs (Kahle et al. 2008). 100% of subjects preferred C-Leg over NMPCKs for descending stairs (Schmalz et al. 2002). Regarding limited community ambulators, 72% of subjects preferred C-Leg, 24% of subjects preferred C-Leg Compact and only 3% of subjects preferred NMPKs (Theeven et al. 2011).

The transition from a NMPK to C-Leg has a positive impact on amputees’ body image measured by decreased amputee body image scale (ABIS) score by 9.5% (Bunce et al. 2007). Applying the SF-36 questionnaire, it was found that the score for quality of life is increased with C-Leg compared to norms of people with a limitation in arm or leg use (Seymour et al. 2007). However, in a later study investigating quality of life with the SF-36 questionnaire, no differences between C-Leg and NMPKs were found (Hafner et al. 2007).

Quality of life was investigated by Cutti et al. 2016. The results show a significant advantage of C-Leg over NMPKs in the subscales Physical mobility and Usual activity. They found that the calculated QALYs (quality-adjusted life years) are nearly 10% higher with C-Leg meaning that 33 days more are spent in “perfect health” a year. In 5 years this results in 6 months more “perfect health time”.

Prosthesis Evaluation Questionnaire (PEQ) total score was improved by 20% with C-Leg compared to NMPK in a study group including mobility grades K2 – K4 (Kahle et al. 2008). Hafner et al. (2009) found an increase of 38% in PEQ satisfaction score as well as improvements in the subscales ambulation, sounds and utility with C-Leg compared to NMPKs in K3 subjects. For K2 subjects, a difference in PEQ subscales ambulation, residual limb health, utility, and satisfaction with walking was found with C-Leg compared to NMPKs. Kaufman et al. (2008) confirmed improvements in quality of life measured by PEQ: PEQ total score as well as 8 out of the 9 PEQ subscales improved with C-Leg compared to NMPKs (Kaufman et al. 2008). With C-Leg Compact differences were found in the subscales residual limb health and utility (Theeven et al. 2012) as well as in the mobility score (25% higher) (Burnfield et al. 2012). A case report about an adolescent C-Leg user, found that in quality of life inventory of the PedsQL the quality of life score improved by 22%. Furthermore in the multidimensional fatigue scale the fatigue score improved by 32% (Tofts et al. 2013).

Regarding satisfaction with C-Leg and ability of C-Leg to meet their expectations, 53% of subjects reported that their expectations were achieved and 38% of subjects reported that parts of their expectations were achieved. Only 9% of subjects reply was disappointment (Drerup et al. 2008). The responses of a survey on the satisfaction showed clear benefits with C-Leg compared to NMPKs. 88% of subjects rated gait and manoeuvrability as improved, 88% rated confidence and security as improved, 66% rated negative attributes as improved, 73% rated socket fit as improved, 66% rated physical attributes as improved, and 62% of subjects rated physical effects of prosthesis as improved. Overall, 60% of all respondents rated C-Leg as better than their former NMPK in all question categories (Berry et al. 2009).

References of summarized studies


Swanson, E. S. J., & Edman, P. (2005). Function and Body Image Levels in Individuals with Transfemoral Amputations Using the C-Leg(R). JPO Journal of Prosthetics and Orthotics, 17(3), 80–84.x
