
Reference

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A retrospective multidimensional comparison of microprocessor and mechanical knee users: Analysis of quality of life and satisfaction with the prosthesis

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Products

C-Leg, 3R60

Major Findings

With the microprocessor-controlled knee (MPK) C-Leg compared to the non-MPKs 3R60, Total Knee 2000 and Total Knee 2100 (parallel groups):

→ **Users of C-Leg reported significantly higher quality of life and a tendency towards higher satisfaction compared to NMPK users. Quality of life was:**

- positively driven by MPK use
- positively driven by patients' experience with a prosthesis in years
- negatively affected by the age at the time of the first prosthesis

→ **6 individual factors were significant predictors of quality of life and satisfaction in the univariate regression analysis**

- Knee type, experience with a prosthesis, age at the first prosthesis, BMI, education, employment status

→ **3 factors remained significant predictors of quality of life and satisfaction in the multivariate analysis:**

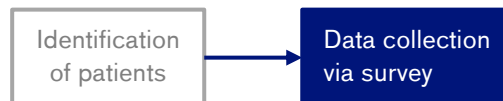
- **Type of knee** and **age at the first prosthesis** significantly predicted QoL scores: explaining 12% of EuroQoL Five Dimensions and 25% of EuroQoL Visual Analog Scale variances
 - Age at the first prosthesis (<40 or ≥41 y) and **experience with prosthesis** in years predicted Satisfaction with Prosthesis scores in the multivariate model: explaining 25% of the variance
-

Population

Subjects:	75 C-Leg users (4% female, 96% male; 48% right side), 60 NMPK users (100% male; 50% right side)
Amputation level:	unilateral transfemoral
Current prosthesis:	Knee: C-Leg, 3R60, Total Knee 2000, Total Knee 2100 Foot: Össur Variflex foot
Amputation causes:	C-Leg users: car accident (17.3%), work accident (72%), other (4%), n.a. (6.7%) NMPK-users: car accident (10%), work accident (83.3%), n.a. (6.7%)
Mean age:	C-Leg: 56.7 years, MPK: 58.5 years
Mean age at 1 st prosthesis:	C-Leg: 31.5 years, NMPK: 34.2 years
Experience with current prosthesis:	7.6 years for both groups
MFCL:	n.a.

Study Design

Retrospective study:



A total of 242 eligible participants received the study survey. Of these, 75 C-Leg users and 60 NMPK users returned the questionnaire. Five responses were excluded due to missing data. Eight participants were excluded from the analysis of the EQ-5D-3L and EQ-VAS instruments. Because not all participants completed every section of the survey, the sample size varies across survey components. In total, valid quality-of-life data was available for 127 participants.

Results

Functions and Activities								Participation	Environment
Level walking	Stairs	Ramps, Hills	Uneven ground, Obstacles	Cognitive demand	Metabolic Energy Consumption	Safety	Activity, Mobility, ADLs	Preference, Satisfaction, QoL	Health Economics

Category	Outcomes	Results for C-Leg vs. NMPK	Sig. ^{a,b,c}
Preference, Satisfaction, Quality of Life (QoL)	Demographics	No significant differences between the 2 groups regarding demographics and amputation-related variables. (but: C-Leg users had a significantly lower BMI than NMPK users by 2 kg/m ²)	0
		>60% of the samples were unemployed or retired. If employed, C-Leg users had a full-time job more frequently (89% C-Leg vs. 56% NMPK)	0
		Less frequent chronic back pain in C-Leg users, i.e. "always" answers (p=0.03)	++
		- C-Leg users wore their prosthesis for more hours a day than NMPK users (13.4 h/d vs. 12.1 h/d, p = 0.005)	++
		Higher percentage of proactive C-Leg users – 49% of C-Leg vs. 62% NMPK users needed encouragement by relatives to use their prostheses (p=0.034).	++
	Quality of life (EQ-5D-3L, EQ-VAS)	Significantly higher values for C-Leg than NMPK users: - EQ-5D-3L: 0.768 ± 0.183 vs. 0.677 ± 0.208 (p = 0.006) - EQ-VAS: 74.6 ± 15.5 vs. 66.3 ± 18.8 (p = 0.008)	++ ++
		Significantly fewer problems reported with C-Leg compared to NMPKs in 2 EQ-5D-3L dimensions: - "Physical mobility" 66% patients without problems for C-Leg vs. 37% for NMPK, p = 0.002 - "Usual activities" 71% patients without problems for C-Leg vs. 47% for NMPK, p = 0.008	++ ++
	Trends for better outcome (fewer problems) of C-Leg patients were observed for: "self-care," "pain/discomfort," and "anxiety/depression" dimensions	(+) ^d	
Satisfaction with prosthesis (SAT-PRO)	Tendency towards higher satisfaction with C-Leg compared to NMPK patients: - SAT-PRO scores: 79.0 ± 12.4 with C-Leg vs. 74.9 ± 13.0 with NMPKs (p = 0.073)	+	

Category	Outcomes	Results for C-Leg vs. NMPK	Sig. ^{a,b,c}
		<ul style="list-style-type: none"> - statistically significant differences in favor of the C-Leg found between 2 items: "I find it easy to move with my prosthesis" (item 7) and "I find it easy to use my prosthesis without a walker" (item 12), (physical mobility) 	++
	Factors affecting EQ-5D-3L, EQ-VAS, SAT-PRO (univariate analysis)	<p>Of 8 analyzed factors, 6 significantly affect EQ-5D-3L, EQ-VAS or SAT-PRO in the univariate analysis</p> <p>Knee type (MPK/C-Leg) was associated with:</p> <ul style="list-style-type: none"> - higher EQ-5D-3L: B [SE] = 0.092 [0.035], p = 0.009 - higher EQ-VAS: B [SE] = 8.248 [3.069], p = .0008 - tendency towards higher SAT-PRO (p=0.073) <p>Experience with prosthesis in years positively affected:</p> <ul style="list-style-type: none"> - higher SAT-PRO: B [SE] = 0.829 [0.318], p = 0.010 - higher EQ-VAS: B [SE] = 0.952 [0.435], p = 0.031 <p>→ More experience is associated with higher quality of life and satisfaction</p> <p>Age at the first prosthesis (≥41 years) negatively affected all outcomes.</p> <ul style="list-style-type: none"> - lower SAT-PRO: B [SE] = -7.606 [2.536], p = 0.003 - lower EQ-5D-3L: B [SE] = -0.146 [0.041], p = 0.001 - lower EQ-VAS: B [SE] = -14.429 [3.450], p < 0.001 <p>→ Patients having their prosthesis at 41 years of age or later in life reported lower quality of life and satisfaction</p> <p>Higher BMI was negatively associated with quality of life</p> <ul style="list-style-type: none"> - lower EQ-5D-3L: B [SE] = -0.016 [0.004], p < 0.001 - lower EQ-VAS: B [SE] = -1.088 [0.326], p = 0.001 <p>→ Higher BMI reduced the quality of life</p> <p>Higher education and being employed were positively associated with:</p> <ul style="list-style-type: none"> - higher EQ-5D-3L: B [SE]_{Education} = 0.143 [0.045], p = 0.002; B [SE]_{Profession} = 0.078 [0.037], p = 0.037 - higher EQ-VAS: B [SE]_{Education} = 14.313 [3.851], p < 0.001; B [SE]_{Profession} = 7.094 [3.238], p = 0.030 <p>→ Higher education and employment are associated with a higher quality of life</p>	++
	Factors affecting EQ-5D-3L, EQ-VAS, SAT-PRO (multivariate analysis)	<p>In the multivariate analysis, significant factors influencing quality of life and satisfaction were reduced to 3: type of knee, age at the first prosthesis, and experience with prosthesis</p> <p>→ potential to increase patient satisfaction.</p> <p>Type of knee and age at the first prosthesis significantly predicted QoL outcomes, explaining 12% of the variance of EQ-5D 3L and 25% EQ-VAS:</p> <ul style="list-style-type: none"> - Patients using C-Leg reported higher quality of life: <ul style="list-style-type: none"> o EQ-5D-3L: B [SE] = 0.079 [0.036], p = 0.031 o EQ-VAS: B [SE] = 6.284 [2.914], p = 0.033 - Having the prosthesis at older ages (≥41 y) predicted lower quality of life: <ul style="list-style-type: none"> o EQ-5D-3L: B [SE] = -0.137 [0.041], p = 0.001 o EQ-VAS: B [SE] = -31.080 [6.982], p < 0.001 <p>With more experience, satisfaction (SAT-PRO scores) was predicted to be higher:</p> <ul style="list-style-type: none"> - Being fit with a prosthesis at young age (<40 y): B [SE] = -6.849 [0.509], p = 0.019 	++

Category	Outcomes	Results for C-Leg vs. NMPK	Sig. ^{a,b,c}
		<ul style="list-style-type: none"> - Having used it for several years: B [SE] = 0.755 [0.319], p = 0.007 → both factors predicted SAT-PRO scores in the multivariate model, explaining 25% of the variance 	

^a no difference (0), positive trend (+), negative trend (-), significant (++/--), not applicable (n.a.)

^b significance set at $p < 0.05$; trends set at $0.1 > p > 0.05$

^c effect sizes classified by authors as small (< 0.3), moderate (> 0.3 and < 0.5) or large (> 0.5)

^d publication mentioned trend, but no p-value was given

Author's Conclusion

"In summary, findings showed that C-Leg affects QoL but not satisfaction, which is positively driven by patients' experience (years) with prosthesis and negatively affected by the age at the time of the first prosthesis. Based on present findings, age at the first prosthesis represents one of the most critical factors to consider when designing prosthetic fitting and rehabilitation guidelines. Specific pathways should be conceived for persons with amputation receiving the first prosthesis over 40 years of age. For example, support in work reintegration could be particularly effective, given its positive psychosocial and economic impacts." (Cutti et al., 2024)

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