

Reference

Fuenzalida Squella SA, Kannenberg A, Brandão Benetti A.

Enhancement of a prosthetic knee with a microprocessor-controlled gait phase switch reduces falls, improves balance confidence and gait speed in community ambulators with unilateral transfemoral amputation.

Prosthetics & Orthotics International 2018, Vol.42(2):228-235.
<https://doi.org/10.1177/0309364617716207>

Products

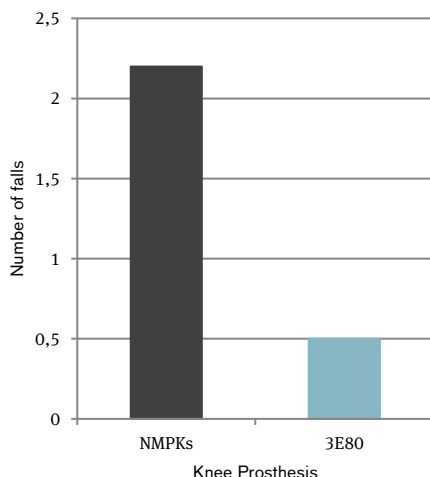
3E80 vs NMPKs

Major Claims

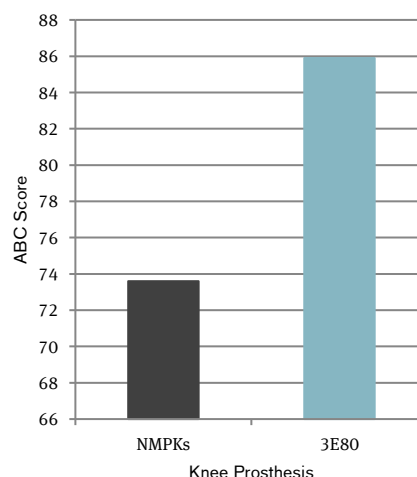
With 3E80 compared to NMPKs, patients:

- reported a significant **77% reduction in falls**
- experienced a significant **17% improvement in balance-confidence**
- demonstrated significant increases in walking distance in the 2-minute walk test (2MWT) of **13% on level ground and 9% on uneven terrain**

Self-reported falls in 4 weeks



Balance-confidence (ABC)



Population

Subjects:	13 unilateral, transfemoral amputees
Previous prosthesis:	11 3R80 (non-MP rotary hydraulic stance and swing control), 1 3R21 (4-bar knee with friction swing control), 1 3R92 (friction-brake knee with pneumatic swing control)
Amputation causes:	not reported
Mean age:	33.1 ± 8.3 years
Previous prosthesis use:	5.6 ± 2.7 years
MFCL:	100% K3

Study Design

Interventional, pre-/post-test design:



After changing from the NMPKs to the 3E80, subjects had 8 weeks of accommodation to familiarize with the intervention knee.

Results

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

Category	Outcomes	Results for 3E80 compared to NMPKs	Sig.*
Safety	Self-reported falls in the past 4 weeks	Significant reduction in falls: NMPK: 2.2 ± 2.5; 3E80: 0.5 ± 1.1	++
	ABC score	Significant improvement in balance-confidence. NMPK: 75.3 ± 10.3; 3E80: 87.6 ± 5.9	++
	Falls-Efficacy Scale (FES-I)	No significant difference in FES-I scores. NMPK: 26.4 ± 11.5; 3E80: 18.8 ± 7.5	-
	Four Square Step Test (FSST) (s)	No significant difference in FSST completion times. NMPK: 9.4 ± 1.9; 3E80: 9.1 ± 1.6	0
Level Walking	2MWT (m)	Significant increase in walking distance and speed. NMPK: 124.4 ± 23.4; 3E80: 144.9 ± 8.6	++
Uneven terrain	2MWT (m)	Significant increase in walking distance and speed. NMPK: 128.0 ± 27.2; 3E80: 149.6 ± 16.4	++
Energy	Borg scale	No difference in perceived exertion on level and uneven terrain.	0
Stairs	Time to ascend/descend a defined flight of stairs (s)	No significant difference in stair ascent/descent. Ascent: NMPK: 4.0 ± 1.3; 3E80: 4.8 ± 1.5 Descent: NMPK: 2.9 ± 1.4; 3E80: 3.0 ± 0.9	0
Ramps	Time to ascend/descend a defined ramp (s)	No significant difference in ramp ascent/descent. Ascent: NMPK: 3.8 ± 0.9; 3E80: 4.4 ± 0.9 Descent: NMPK: 4.0 ± 1.2; 3E80: 4.4 ± 1.0	0
ADLs	OPUS questionnaire	No significant difference in OPUS scores. NMPK: 45.7 ± 8.5; 3E80: 43.4 ± 13.5	0
Satisfaction	PEQ question #1 "over the past 4 weeks, how	Significantly improved satisfaction. NMPK: 63.8 ± 22.3; 3E80: 89.9 ± 8.9	++

Category	Outcomes	Results for 3E80 compared to NMPKs	Sig.*
Satisfaction (cont.)	happy have you been with your prosthesis?"		
	SAT-PRO questionnaire (lower is better)	Significantly improved satisfaction. NMPK: 30.5 ± 6.7; 3E80: 24.6 ± 5.5	++
	Knee preference	100% preference for 3E80.	n/a

Author's Conclusion

"In this study, use of the 3E80 MP-enhanced, default stance hydraulic knee resulted in significantly fewer self-reported falls, improved balance confidence, faster walking speed on level and uneven terrain, and increased satisfaction with the prosthesis compared to the use of traditional non-microprocessor controlled prosthetic knees commonly available." (Squella et al. 2018)

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