

## Reference

Catherine Widehammar, PhD<sup>1,2</sup>; Ayako Hiyoshi, PhD<sup>3</sup>; Kajsa Lidström Holmqvist, PhD<sup>2,4</sup>; Helen Lindner, PhD<sup>5</sup> and Liselotte Hermansson, PhD<sup>2,6</sup>.

Örebro University, Örebro Sweden: <sup>1</sup>Department of Pediatrics, Faculty of Medicine and Health; <sup>2</sup>University Healthcare Research Center, Faculty of Medicine and Health; <sup>3</sup>Clinical Epidemiology and Biostatistics, School of Medical Sciences; <sup>4</sup>Department of Prosthetics and Orthotics, Faculty of Medicine and Health.

# Effect of multi-grip myoelectric prosthetic hands on daily activities, pain-related disability and prosthesis use compared with single-grip myoelectric prosthesis: a single case study

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## Products

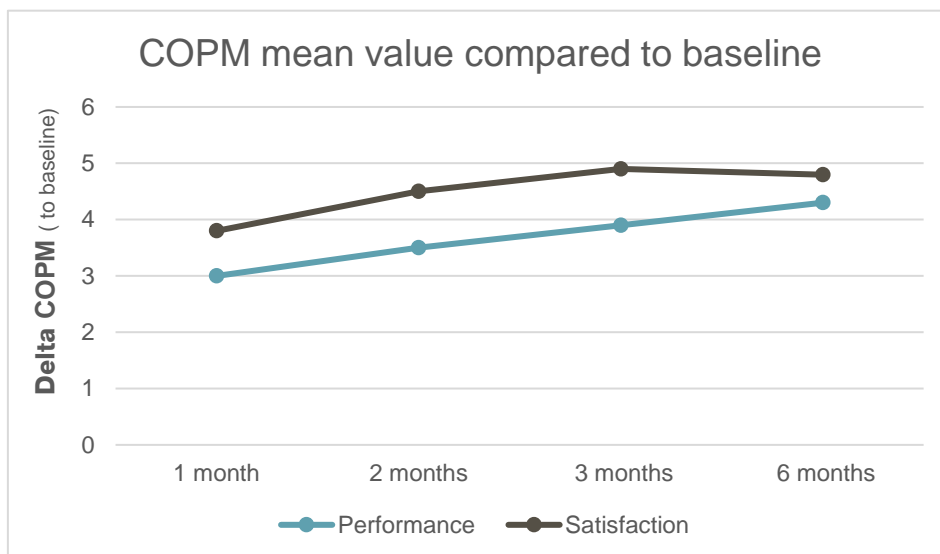
### Bebionic hand

## Major Findings

With bebionic compared to single-grip prosthetic hands:

### → Performance and Satisfaction in COPM\* increased significantly (compared to baseline measurement)

The person-centered COPM (\*Canadian Occupational Performance Measure) scores for performance and satisfaction increased significantly and for all individuals after using the bebionic multi-grip hand.

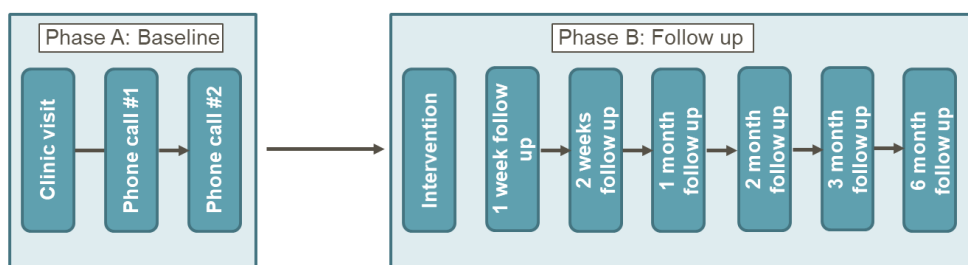


## Population

Subjects: 9 (5 males, 4 females)  
 Previous single-grip hand: 7x Ottobock VariPlus Speed, 1x Ottobock Transcarpal hand, 1x Ottobock Electric hand 2000  
 Amputation causes: 7 congenital, 2 not stated  
 Mean age: 31.8 ± 15.5 years  
 Mean time since amputation: not stated  
 Experience of prosthesis use: 18.7 ± 13.4 years  
 MFCL: n.a.

## Study Design

Single-case AB design:



**Clinic visit:** Study specific questionnaire, Baseline data: self-reported assessment of COPM, PDI\* and prosthesis wearing time

**Phone call:** Baseline data: self-reported assessment of COPM, PDI\* and prosthesis wearing time

**Intervention:** Fitting of multi-grip hand and 2 days of intensive (STAIR\*)-training; modified SHAP\* test, filming ACMC\* activities (set table and mixing pudding)

**1 week follow up:** phone call for follow up of home training

**2 weeks follow up:** self-reported assessment of PDI and prosthesis wearing time; modified SHAP test, filming ACMC activities

**1, 2, and 3 month follow up:** self-reported assessment of COPM, PDI and prosthesis wearing time, modified SHAP test, filming ACMC activities

**6 month follow up:** self-reported assessment of COPM, PDI and prosthesis wearing time, usefulness and actual use of the 11 grip types; modified SHAP test, filming ACMC activities

\*) **ACMC:** Assessment of Capacity of Myoelectric Control; **PDI:** Pain Disability Index; **SHAP:** Southampton Hand Assessment Procedure; **STAIR:** Stepwise Training for an Advanced and Integrated Prosthetic Routine

## Results

Body Function		Activity			Participation	Others	
Mechanics	Pain	Grip patterns / force	Manual dexterity	Activities of daily living (ADL)	Satisfaction and Quality of life (QoL)	Training	Technical aspect

Category	Outcomes	Results for bebionic (6 months to baseline) Mean (95% CI)	Sig.*
Pain	PDI	Pain reduction of -7.7 (-14.0 to -1.3) points	--
	PDI (n=5)**	Pain reduction of -13.8 (-21.8 to -5.8) points	--
Grip patterns/ force	Use of grip types [% of users]	<b>Used to the maximum:</b> Tripod pinch 78% Power grip 67% Lateral pinch 33% Column grip, relaxed hand, finger point 22% Open palm 11%	n.a.
	Usefulness of grip types [% of users]	<b>Rated as extremely useful:</b> Tripod pinch 67% Power grip 33% Lateral pinch 44% Column grip, relaxed hand 22% Finger point, open palm, computer mouse grip 11%	n.a.
Manual dexterity	Modified SHAP (light objects) [s]	Faster trial: 6.5 (-5.2 to 18.1)	0
	Modified SHAP (heavy objects) [s]	Faster trial: -3.7 (-13.4 to 6.0)	0
	ACMC	Decrease of prosthetic control: -2.5 (-7.8 to 2.8)	0
Activities of daily living (ADL)	Prosthesis wearing time [h/day]	1.9	n.a.
	COPM Performance	Improvement of: <u>1 month:</u> 3.0 (2.1 to 3.8) points <u>2 months:</u> 3.5 (2.9 to 4.0) points <u>3 months:</u> 3.9 (3.2 to 4.6) points <u>6 months:</u> 4.3 (3.6 to 4.9) points	++
Satisfaction and Quality of life (QoL)	COPM Satisfaction	Improvement of: <u>1 month:</u> 3.8 (2.7 to 4.9) points <u>2 months:</u> 4.5 (3.6 to 5.4) points <u>3 months:</u> 4.9 (4.0 to 5.7) points <u>6 months:</u> 4.8 (3.9 to 5.7) points	++

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

\*\* includes only the 5 patients who reported pain-related disability in the PDI at the baseline measurements

### Author's Conclusion

"In conclusion, a multi-grip myoelectric hand prosthesis can be more useful than a single-grip model for performance of specific, individually chosen activities. Use of the multi-grip functions may reduce pain-related disability. Multi-grip prosthetic hands may thus fill a gap in prosthetic rehabilitation, but a durable single-grip hand may still be needed for heavier physical activities. With structured training a standard 2-site electrode control system can be used to operate a multi-grip hand." (Widehammar,2022)

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