# C-Brace

## Satisfaction

### Major Findings

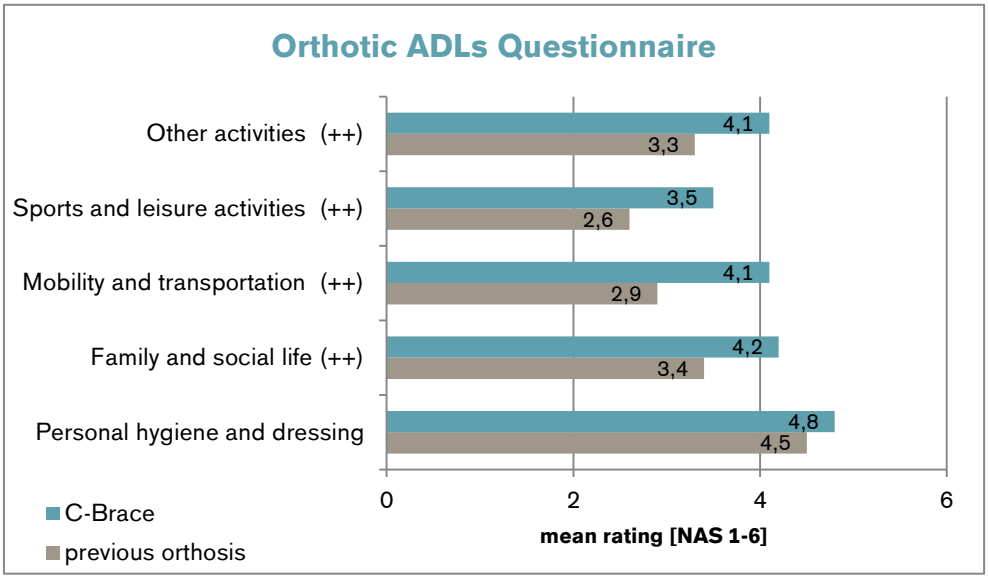
With C-Brace:

**→ Improvement in perceived orthotic function and Quality of life**
Compared to all previous orthoses combined, the results of the OEQ demonstrated significant improvements by C-Brace use in the total score.

**→ ADLs become easier**
With C-Brace the patients rated the activities in four of five domains of the ADL-Q significantly easier than with other KAFOs, namely family and social life (+24%), mobility and transportation (+41%), sports and leisure activities (+35%), and other activities (+24%).

Of the responses for perceived comparative difficulty, 54% showed a greater ease of ADL execution with C-Brace.

**→ ADLs become safer**
Of the responses for perceived comparative safety, 59% demonstrated a safer execution of ADLs with the C-Brace.




Mean ratings of difficulty of the subscales of the Orthotic ADLs Questionnaire (ADL-Q) for all patients. Answer options were given on numeric analog scale (NAS) ranging from 1= *very difficult* to 6= *very easy*. (++) The *p* value is given for all significant ($p<0.05$) differences. (Pröbsting et al. 2017)

### Clinical Relevance

Satisfaction can be measured to determine the general well-being of a person and the fulfillment of his expectations to the medical device. The evaluation of this very meaningful parameter is important to investigate as it has a direct impact on the patients' well-being and compliance. It is influenced by other categories and can therefore be seen as a summary of possible pain reduction and better performance of ADLs. Additionally, the patients' satisfaction is also correlated with the usage of the medical device. Studies on the non-use of devices suggest that, on average, one third of all devices provided are not used (Scherer 2002). Reasons for non-use

involve lack of consumer involvement, inadequate performance of the product, failure of the product to improve function, and difficulty in operating the product (Batavia et al. 1990, Wielandt et al. 2000). Obtaining user perspectives and satisfaction is therefore fundamental.

Common outcome measures in orthotic research are the Orthosis Evaluation Questionnaire (OEQ), and the Orthotic ADLs Questionnaire. Both questionnaires use numeric analog scales for ranking the single items.

## Summary

Patients with paralysis or weakness of knee stabilizing muscles are conventionally fitted with knee ankle foot orthoses (KAFO) with locked or posterior off-set orthotic knee joints. Stance control orthoses (SCOs) are KAFOs which enable the user to freely swing their orthotic leg during swing phase and lock it for stance phase (Bernhardt et al. 2006). SCOs have clear benefits compared to locked KAFOs, but these are mostly limited to walking on level surfaces (Zacharias et al. 2012). A microprocessor stance and swing control orthosis (SSCO), the C-Brace, has been engineered to overcome the technological limitations of traditional KAFOs and SCOs. The biomechanical benefits of this SSCO to patients with weakness of the leg muscles in terms of more physiologic movement patterns on various terrains have been reported recently. (Hobusch et al. 2018, Schmalz et al. 2016)

The results of the OEQ showed a significant improvement for C-Brace compared to the previously used KAFO or SCO in four out of nine items: *Ambulation* improved by 38%, *Paretic Limb Health* by 21%, *Sounds* by 52%, and *Well-Being* by 21%. A trend to improvement is seen in the four items *Appearance*, *Frustration*, *Social Burden*, and *Utility*. (Pröbsting et al. 2016)

The results of the Orthotic ADLs Questionnaire showed a significant improvement for C-Brace compared to the previously used KAFO or SCO in four out of five items: *Family and Social Life*, *Mobility and Transportation*, *Sports and Leisure Activities*, and *Other Activities* improved by 24, 41, 35, and 24%, respectively. The item *Personal Hygiene and Dressing* showed a trend to improvement with 7%. (Pröbsting et al. 2017)

## References of summarized studies

Pröbsting, E., Kannenberg, A., Zacharias, B. (2017). Safety and walking ability of KAFO users with the C-Brace® Orthotronic Mobility System, a new microprocessor stance and swing control orthosis. Prosthetics and Orthotics International, 41(1), 65-77. DOI: 10.1177/0309364616637954

## Other References

Batavia, A. I., & Hammer, G. S. (1990). Toward the development of consumer-based criteria for the evaluation of assistive devices. Journal of rehabilitation research and development, 27(4): 425-436.

Bernhardt, K. A., Irby, S. E., Kaufman, K. R. (2006). Consumer opinions of a stance control knee orthosis. Prosthetics and Orthotics International, 30(3): 246–256.

Hobusch, G. M., Hasenöhrl, K., Pieber, K., Schmalz, T., Dana, S., Ambrozy, C., Pohlig, K., Dietl, H., Crevenna, R., von Skrbensky, G., Hofer, C., Auberger, R., Windhager, R. (2018) A novel mechanotronic orthosis enables symmetrical gait kinematics in a patient with femoral nerve palsy – a case study. Disability and Rehabilitation: Assistive Technology, 13:2, 201-205.

Scherer, M. J. (2002). The change in emphasis from people to person: introduction to the special issue on Assistive Technology. Disability and rehabilitation, 24(13): 1-4.

Schmalz, T., Pröbsting, E., Auberger, R. et al. (2016). A functional comparison of conventional knee-ankle-foot orthoses and a microprocessor-controlled leg orthosis system based on biomechanical parameters. Prosthetics and Orthotics International, 40(2): 277–286.

Wielandt, T., & Strong, J. (2000). Compliance with prescribed adaptive equipment: a literature review. The British Journal of Occupational Therapy, 63(2): 65-75.

Zacharias, B. & Kannenberg, A. (2012). Clinical benefits of stance control orthosis systems: an analysis of the scientific literature. Journal of Prosthetics and Orthotics, 24(1): 2–8.