

Patient Reported Outcomes (PROs): A Study on the Use of the Atalante Self-Balancing Exoskeleton in Paraplegic Patients

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Introduction

Powered exoskeletons have opened new perspectives in the rehabilitation of patients with lower limb disabilities. They enable ambulatory functions such as stand-up and walk^[1], offering the physical benefits of upright posture^[2-3] and engagement in regular physical activity^[4] which aligns with the international recommendation of standing times^[5]. Our objective is to collect Patient Reported Outcomes (PROs) from paraplegic patients participating in a rehabilitation program with the powered lower limb Atalante exoskeleton. We aim **to quantify their satisfaction and perceived benefits** regarding the use of this device.

Materials & Methods

Atalante by Wandercraft is a **completely self-balancing walking exoskeleton** for people with mobility disabilities. It is a fully powered hip-knee-ankle lower body exoskeleton with 12 actuated degrees of freedom. The device is FDA-cleared and CE-marked for use in rehabilitation institutions. Paraplegic patients were invited to complete post-market surveys **at the end of their training program with the device**. The survey questions were adapted from a previous study reported in literature involving spinal cord injury patients using a robotic exoskeleton^[6]. Patients were asked to indicate their level of agreement with several statements on satisfaction and motivation related to the training program with the exoskeleton, as well as perceived health benefits. Responses were collected using Likert scales ranging from "strongly disagree" to "strongly agree" (0% to 100%).

References

- [1] Kerdraon, J. et al. Evaluation of safety and performance of the self balancing walking system Atalante in patients with complete motor spinal cord injury (2021).
- [2] Molteni, F. et al. Exoskeleton and End-Effector Robots for Upper and Lower Limbs Rehabilitation: Narrative Review (2018).
- [3] Morone et al. Robot-assisted gait training for stroke patients: current state of the art and perspectives of robotics (2017).
- [4] Miller, L. E., et al. Clinical effectiveness and safety of powered exoskeleton-assisted walking in patients with spinal cord injury: systematic review with meta-analysis (2016).
- [5] ISCoS Textbook on Comprehensive management of Spinal Cord Injuries.
- [6] Dany H. Gagnon, et al. Satisfaction and perceptions of long-term manual wheelchair users with a SCI upon completion of a locomotor training program with an overground robotic exoskeleton (2017).

Participants

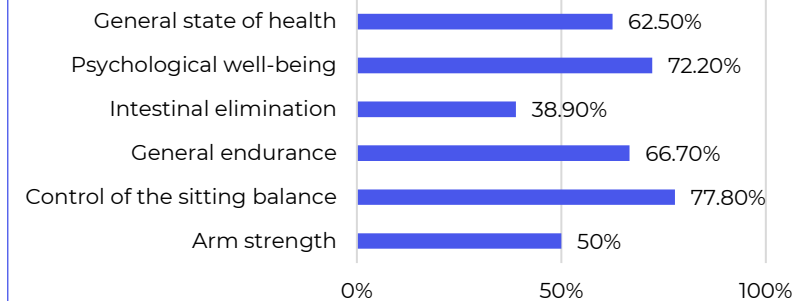
Participants were paraplegic patients, regardless of the cause, who voluntarily completed the post-market surveys. The surveys were sent across 16 European rehabilitation institutions using Atalante in their clinical program. A total of **18 paraplegic patients** responded to the surveys and the results are presented here.



Results

| Statements | MEAN (%) | STD (%) | Mean agreement level |
|--|----------|---------|-----------------------|
| General satisfaction with the program of the exoskeleton | 85.7% | 17.5% | STRONGLY AGREE |
| Motivation to engage in adapted physical activity | 97.4% | 7.1% | STRONGLY AGREE |
| Ease of transfer between wheelchair and exoskeleton | 90.1% | 17.8% | STRONGLY AGREE |
| Comfort of the exoskeleton | 71.8% | 25.7% | AGREE |

Health benefits: % of participants who perceived improvements in ... at the end of the training program with Atalante



Conclusion

The study indicates **high satisfaction and motivation** among paraplegic patients using Atalante for rehabilitation. Reported benefits include improved **sitting balance, psychological well-being, and endurance** suggesting the potential of self-balancing exoskeletons in positively impacting patient's health and encouraging more in-depth quantitative research into long-term health benefits.