Use of Atalante Self-Balancing Exoskeleton in Neurological Rehabilitation: Insights from Real-World Data across Europe and the United States

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Introduction

Powered exoskeletons enable early rehabilitation and promote physical exercise for non-ambulatory individuals, potentially reducing secondary health conditions associated with sedentariness[1]. Recent studies have demonstrated that lower limb exoskeletons improve mobility in patients with spinal cord injury (SCI)[2], cerebrovascular accident (CVA)[3], and multiple sclerosis (MS)[4]. These findings are supported by standardized functional walk tests in controlled research environments. In this study, we propose to evaluate the performance of such devices in **routine clinical use**. We collected and analyzed real-world session data from patients undergoing rehabilitation with the powered lower limb Atalante exoskeleton to identify patient populations, verticalization and walking performances, and the duration of their rehabilitation programs with the device.

Participants & Methods

The study included **820 patients** across 34 rehabilitation centers in Europe and the United-States, who underwent a rehabilitation program with Atalante from February 2021 until November 2023. **Patients' session data** were automatically and anonymously tracked through a tablet application provided with the device. They include the patient's pathology, the number of sessions, verticalization duration, number of steps, and the types of exercises performed.

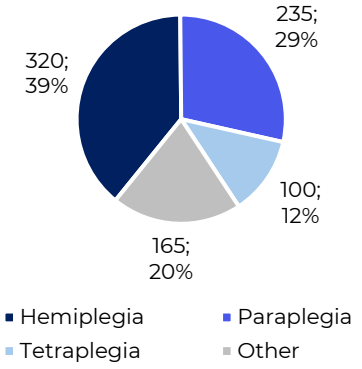
Atalante exoskeleton

Atalante by Wandercraft is a **completely self-balancing walking system** 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. It offers the following use modes:

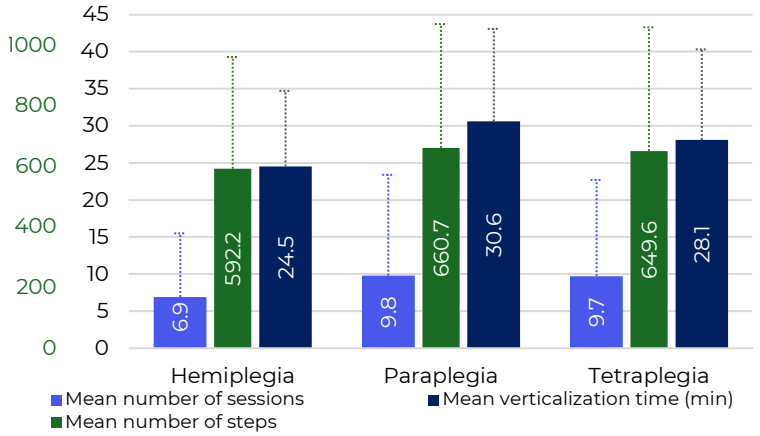
- *PassiveGait*: the device fully assists the patient to walk.
- *ActiveGait*: the assistance level provided by the device can be adjusted. Gait can be resistive (up to -25%), fully supported by the patient (0%), or assisted by the device at a chosen level per leg (up to 100%).
- *ActiveBalance*: in a standing position, the patient can transfer weight sideways or forward to perform a semi-squat.

Results

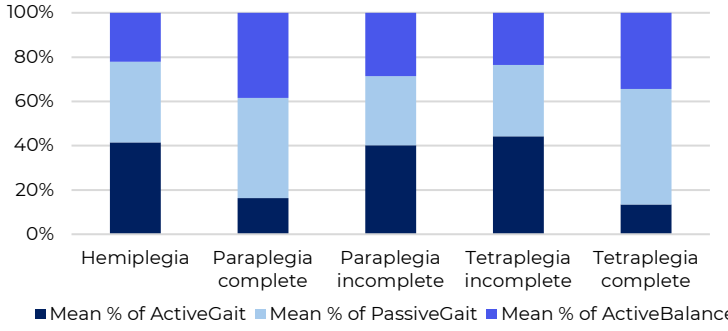
Patient disability distribution



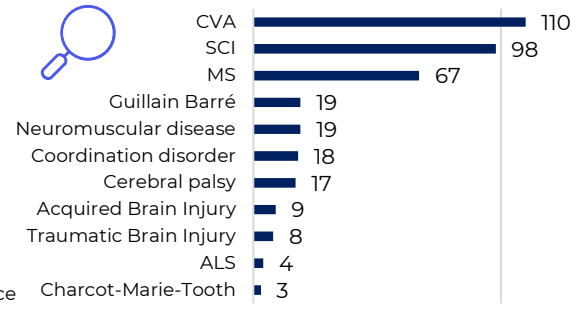
Performance metrics per session



Use mode distribution during a session (%)



Focus on the diagnosis



Conclusion

Real-world data confirm the effectiveness of Atalante in **standing and walking with adjustable assistance** for patients with hemiplegia, paraplegia, and tetraplegia across **various neurological conditions.** Most Atalante users are hemiplegic (39%), followed by paraplegic (29%) and tetraplegic (12%) patients. All patient groups use ActiveGait, PassiveGait, and ActiveBalance modes, with usage varying by condition. Significant use is also observed among patients with MS, Guillain Barré, Cerebral Palsy, and other neuromuscular diseases and coordination disorders.

References

[1] Rodríguez-Fernández et al. Systematic review on wearable lower-limb exoskeletons for gait training in neuromuscular impairments (2021).
[2] Kerdraon,. et al. Evaluation of safety and performance of the self balancing walking system Atalante in patients with complete motor SCI (2021).
[3] Molteni et al. Wearable robotic exoskeleton for overground gait training in sub-acute and chronic hemiparetic stroke patients: preliminary results (2017).
[4] Afzal et al. Exoskeleton-assisted Gait Training in Persons With Multiple Sclerosis: A Single-Group Pilot Study (2020).