Assessing gait adaptability longitudinally in rehabilitation after a transtibial amputation.
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Introduction
An important goal of the rehabilitation after a transtibial amputation is to increase walking ability. An important aspect of walking ability related to fall risk in community walkers is the capacity to adjust gait to environmental circumstances, such as avoiding obstacles and targeting safe foot placement locations. However, research on the course of walking ability and specifically gait adaptability during the rehabilitation program is scarce. The aim of the present study is to assess gait adaptability longitudinally in rehabilitation by exploiting an innovative instrumented treadmill (C-Mill, ForceLink) with visual context (e.g., stepping targets, obstacles) projected on the belt’s surface.

Methods
Longitudinal descriptive study. Six patients with a recent transtibial amputation, who were in primary amputee rehabilitation, were included in the study. They performed obstacle avoidance and visually-guided stepping tasks on the treadmill and overground three times with intervals of six weeks. Outcome measures include walking velocity, obstacle-crossing success rates and crossing strategies.

Results
Soon after participants received the prosthesis, they were able to perform the C-Mill gait adaptability tasks. Preferred walking speed increased and most patients showed improvements in obstacle avoidance and visually-guided stepping tasks. The number of strategies to avoid obstacles increased over time. Patients required less stabilizing walking aids in daily life as gait adaptability improved over time.

Discussion
The C-Mill can be used to evaluate walking ability in terms of gait adaptability during rehabilitation in prosthetic patients, who become community-walkers. It is important to assess gait adaptability in this group for several reasons: 1) to evaluate progress in the rehabilitation process, 2) to facilitate goal setting during the rehabilitation process, 3) to guide prosthesis fitting and 4) to assess their fall risk.

Conclusion
With rehabilitation, patients with a recent transtibial amputation increase their preferred walking speed, improve gait adaptability performance and develop multiple obstacle-crossing strategies.