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Short communication

P 130—The influence of different settings on accuracies of gait algorithms

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1. Introduction

Gait and movement analysis is essential in clinical practice and is currently moving away from stationary systems to analyses based on inertial measurement units (IMUs). These systems can be used to assess patients outside clinical settings and can therefore provide additional information to clinical assessments, e.g. symptom fluctuation during a day. Especially gait and the underlying parameters (e.g., step length, frequency) are of particular interest as those parameters are related to specific clinical diagnoses or treatment outcomes. Algorithms to analyse gait are usually developed in a laboratory setting, where they can be compared to the gold standard. Since the gold standard is not available in homes, the performance of these algorithms in a home setting is often unknown. Therefore, it would be beneficial to know about the influence of different settings on the accuracies of gait algorithms.

2. Research question

How do different settings (here: treadmill walking, “home-like” walking) influence accuracy values of gait algorithms?

3. Methods

In this ongoing study, two groups of participants (healthy adults and patients with neurological movement disorders) will perform treadmill walking and daily-like activities in a home-like situation. Participants will wear IMUs on multiple body segments, including lower back and feet, and an optical motion capture system will be used as gold standard (Fig. 1). Besides implementation of already existing gait algorithms from our group (based on the lower back), algorithms from other groups will be analysed with the new dataset as well. The stride length, foot clearance, heel strike and toe-off will be calculated from the feet

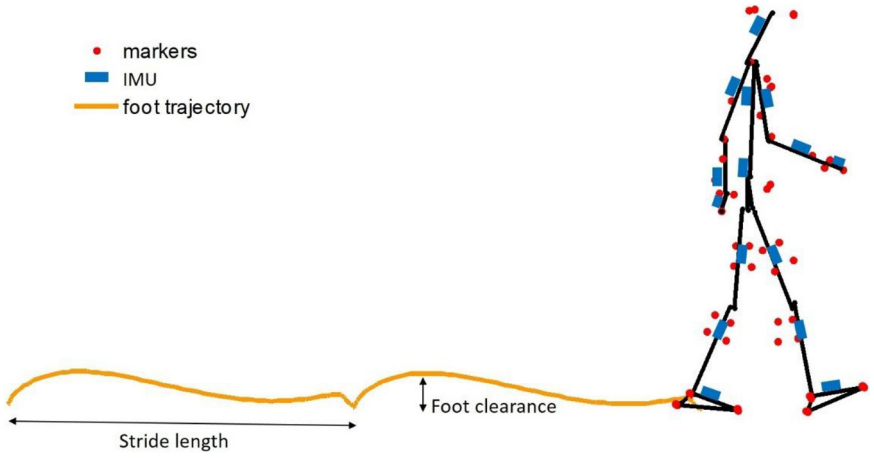

Fig. 1. The measurement set-up with markers measured by the optical motion capture system, the IMUs and the foot trajectory that will be used to calculate the stride length and foot clearance.

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IMUs as reported in Mariani et al. [1]. The accuracy (mean difference between algorithm and gold standard) and precision (standard deviation of difference) will be reported for each gait parameter in both settings and the agreement will be shown with a Bland-Altman plot. The difference in accuracy between settings will be analysed with a repeated measures ANOVA.

4. Results

Recruitment of participants has already started, and is straightforward because we have direct access to inpatients of the local Neurology hospital. We aim at including 80 participants per group. At the date of the congress, we expect that we can present an interim analysis of about 20 participants per group.

5. Discussion

We expect higher accuracies for treadmill walking, since the algorithms are developed with lab-based data. Walking data from a home-like setting will have more variability and asymmetry, which might reduce the accuracy. This new dataset will also be used to analyse which IMU location is the best for calculating a certain gait parameter since there is IMU data available from each body segment.

References

[1] B. Mariani, C. Hoskovec, S. Rochat, C. Büla, J. Penders, K. Aminian, 3D gait assessment in young and elderly subjects using foot-worn inertial sensors, J. Biomech. 43 (15) (2010) 2999–3006.