Validity of an IMU based trunk motionanalysis system coupled to a VRenvironment

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We hypothesize that an IMU based trunk motion-analysis system coupled to a VRenvironment is a valid and feasable tool to assess trunk movements.

Ethische beoordeling	Positief advies
Status	Werving gestart
Type aandoening	-
Onderzoekstype	Observationeel onderzoek, zonder invasieve metingen

Samenvatting

ID

NL-OMON24434

Bron NTR

Verkorte titel TrunkyXL

Aandoening

Not relevant

Ondersteuning

Primaire sponsor: Sint Maartenskliniek **Overige ondersteuning:** Interreg North-West Europe (NWE)

Onderzoeksproduct en/of interventie

Uitkomstmaten

Primaire uitkomstmaten

The main study parameter is trunk movement. Trunk movements are defined as relative

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movements in flexion-extension, lateroflexion and rotational directions of the upper back to the lower back, and lower back to the pelvis. This will be assessed with IMUs (2M Engineering) and 3D optical movement analysis (VICON). The kinematic output from the different IMU-models will be compared to the kinematic output from the plug-in-gait VICON model by correlation analysis. From the correlation of the different IMU-models, optimal sensor locations will be identified to represent trunk movements accurately.

Toelichting onderzoek

Achtergrond van het onderzoek

Rationale: A significant proportion of stroke patients experience poor trunk stability. This is highly associated with decreased gait ability and difficulty with activities of daily living. Trunk stability is highly complicated to train and is perceived as uninteresting by patients, often resulting in reduced therapy compliance. Virtual Reality (VR) rehabilitation enables the possibility of real-time feedback on a personalized training, with high acceptability and excellent usability. Previously, the displacement of the Center of Pressure (CoP) has been used to control a VR-game. Although this method identifies the limits of stability while sitting, it does not provide any information about the execution of the movement in order to displace the CoP. Inertial Measurement Units (IMUs) could provide a more direct measure of movement execution by placing multiple IMUs on various segments of the body. This way, relative movements between these segments can be calculated and used as an input for a VR-game.

A VR-training prototype was developed in order to fill the gap in direct measures of movement execution in combination with VR-training to improve trunk stability. In this study, we would like to investigate the validity and optimal sensor position of an IMU-based system. Furthermore, usability of the VR-training prototype will be studied.

Objective:The aim of this pilot study is to test the validity and feasibility of an IMU based trunk motion-analysis system coupled to a VR-environment in healthy individuals. The secondary aim is to identify the optimal sensor locations to assess trunk movements in healthy individuals.

Study design: Cross-sectional, validation study.

Study population: Healthy human volunteers, age 40 - 65 years.

Intervention: Participants will be equipped with 5 IMUs and 27 optical markers. Subsequently, participants perform flexion, extension, lateroflexion, rotation and a combination of these movements with their trunk, starting from a sitting upright position. Finally, participants will play a demo version of the VR-training prototype before filling out the System Usability Scale (SUS) and a survey.

Main study parameters: The primary outcome measurement is the trunk movement (range of motion and movement over time during performance of the tasks).

Nature and extent of the burden and risks associated with participation, benefit and group relatedness: The participant needs to visit the Sint Maartenskliniek once. Duration of preparation and tests will be 60 to 90 minutes. Execution of the trunk movements starting from an upright sitting position is not associated with any risks. Hereafter, a demo version of

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the VR-training will be played. This does not include any additional risks compared to playing a commercially available VR-game. The participant will be asked to fill out a survey and the SUS by the end of the visit. Participants have no direct benefit from participating in the study. Participating in the study contributes to increasing knowledge about trunk stability and the validity of an IMU based motion analysis system in order to control a VR-trunk stability game.

Doel van het onderzoek

We hypothesize that an IMU based trunk motion-analysis system coupled to a VRenvironment is a valid and feasable tool to assess trunk movements.

Onderzoeksopzet

One single session

Onderzoeksproduct en/of interventie

N/A

Contactpersonen

Publiek

Sint Maartenskliniek Carmen Ensink

024-365 9140

Wetenschappelijk

Sint Maartenskliniek Carmen Ensink

024-365 9140

Deelname eisen

Belangrijkste voorwaarden om deel te mogen nemen (Inclusiecriteria)

Healthy participants, age between 40 and 65 years.

Belangrijkste redenen om niet deel te kunnen nemen (Exclusiecriteria)

- Lower back pain
- Spine deformities
- Balance problems
- Epilepsy
- Any form of motion sickness experienced before with VR

Onderzoeksopzet

Opzet

Туре:	Observationeel onderzoek, zonder invasieve metingen
Onderzoeksmodel:	Anders
Toewijzing:	N.v.t. / één studie arm
Blindering:	Open / niet geblindeerd
Controle:	N.v.t. / onbekend

Deelname

Nederland	
Status:	Werving gestart
(Verwachte) startdatum:	20-04-2021
Aantal proefpersonen:	15
Туре:	Verwachte startdatum

Voornemen beschikbaar stellen Individuele Patiënten Data (IPD)

Wordt de data na het onderzoek gedeeld: Nog niet bepaald

Toelichting N/A

Ethische beoordeling

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Positief advies Datum: Soort:

27-05-2021 Eerste indiening

Registraties

Opgevolgd door onderstaande (mogelijk meer actuele) registratie

Geen registraties gevonden.

Andere (mogelijk minder actuele) registraties in dit register

Geen registraties gevonden.

In overige registers

Register	ID
NTR-new	NL9497
Ander register	CMO regio Arnhem-Nijmegen : 2020-6432

Resultaten

Samenvatting resultaten N/A