“Gait-&Balance-Box”

The "Gait-&Balance-Box" suggests a standardization for clinical walk and balance tests with the aim to improve quality, applicability and comparability. Heart of the patient monitoring is the actibeltblue, an autonomous wireless accelerometer that is worn like a belt. The actibelt sends the acceleration data via blue-tooth to a tablet that provides direct analysis of the human motion. The box can be quickly unfolded into a mobile gait lab using 2 light barriers to perform walking test. The acceleration measurement plus the duration for the fixed walking distance are combined to an enhanced 4-meter walk test.
"Gait-&Balance-Box"
A prototype to standardize clinical walk and balance tests
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Abstract

The “Gait-&Balance-Box” suggests a standardization for clinical walk and balance tests with the aim to improve quality, applicability and comparability. Heart of the patient monitoring is the actibelt-blue, an autonomous wireless accelerometer that is worn like a belt. The actibelt sends the acceleration data via blue-tooth to a tablet that provides direct analysis of the human motion. The box can be quickly unfolded into a mobile gait lab using 2 light barriers to perform walking test. The acceleration measurement plus the duration for the fixed walking distance are combined to an enhanced 4-meter walk test.

Measurement

Acceleration
- monitoring of human acceleration vectors with an actibelt©
- 100 3D-acceleration values per second
- sensor is directly attached to the hip (body center of mass)
- acceleration data sent in realtime via blue-tooth to a tablet
- online analysis with always newest algorithms
- Unix timestamp provides relation of every acceleration vector to a 10 milliseconds period in the chosen timezone

Gait duration
- 4-meter walk distance with a light barrier at start and end point
- test begins automatically by passing the start line and stops by passing the end point
- the provided analysis of the fixed walk distance can also be integrated in longer walk tests

Clinical applications

The software on the tablet can be used in three different ways:
- Balance test
- Automatic 4-meter walk test
- Manual 4-meter walk test

Balance test
In this application the horizontal hip-movement in two dimensions is monitored for 10 seconds. The projection in a coordinate system provides a quick visualization of the balance quality. This measurement can be used to monitor lots of standardized clinical balance tests (e.g Romberg Tests)

Automatic 4-meter walk test
The patient is asked to wear an actibelt that has a blue-tooth connection to the "Gait-&Balance-Box". Without further instructions he is told to start walking somewhere before the start line in his normal pace. The Gait-&Balance-Box merges the acceleration data with the signals from the light barriers and returns the analysis result on the tablet screen. Extracted parameters are:
- walking speed
- step length
- step ratio

Manual 4-meter walk test
The walking test can also be started and stopped manual on the tablet independent from the light barriers. This makes the System even more flexible and portable.