REF **Dynamic Subjective Visual Vertical (DSVV)**

$C\epsilon$ Class I Medical Device

User manual

Distribution mode

Available for direct download at

http://virtualisvr.com/espace-client/

Use under license

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1. GENERAL

1.1. Description

Dynamic Subjective Visual Vertical (DSVV) software is an immersive 3D simulation based on virtual reality technology, i.e. it allows a person to be immersed in an artificial digitally created world.

DSVV is a software used to assess the perception of verticality with optokinetic disturbance.

1.2. Indications

Assessment of the perception of verticality in the context of balance disorders or neurological diseases (e.g. strokes).

1.3. Contraindications

Epileptic patients, children under 15 years of age, pregnant women.

1.4. Software field of application

Evaluation of verticality perception in the context of balance disorders or neurological conditions (e.g. stroke).

Software for measuring Subjective Visual Vertical.

The patient must orientate a line vertically in a space devoid of vertical reference points.

1.5. Intended user

Healthcare professionals: physiotherapists; occupational therapists; neuropsychologists; ENT doctors; neurologists; PMR doctors (physical medicine and rehabilitation), etc.

Research Centers: CNRS, CHU, INSERM, etc.

1.6. Warnings and caution

Immersion in Virtual Reality is a powerful tool, especially for stimuli that can induce sensory conflicts.

⚠️ WARNING

These stimulations can potentially cause certain disorders: vagal discomfort, epileptic seizures, migraines, vomiting, malaise, dizziness, syncope etc.

This type of re-education must be approached progressively, particularly in Virtual Reality where the stimulation is "powerful".

The contraindications are identical: mainly epilepsy and migraines.

❗ RECOMMENDATION

As postural reactions can be spectacular, we STRONGLY recommend that you place the patient in a secure environment and stay close to him/her throughout the session to anticipate any loss of balance or discomfort caused by the use of virtual reality.

❗ RECOMMENDATION

It is also recommended to increase the duration and intensity of stimulation very gradually after an initial short session to ensure the patient's tolerance to this type of type of stimulation

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Motion sickness is treated by "habituation", so you need to recreate the symptoms experienced during transport.

⚠️ WARNING

It is essential to stop the session when the first symptoms appear, generally "sweating".

Define a working area of about 3m² to allow for risk-free movements.

Take a 10-to-15-minute break every 30 minutes of use.

It would be counterproductive to take into account the fact that some motivated patients may wish to go further. It's up to the professional to "dose" immersion so as not to provoke neurovegetative symptoms. This type of symptom can intensify in the hour following the session.

Nor can Virtualis be held responsible for any disturbances suffered by patients during or use of their software.

The accessories required to use the software may emit radio waves that can interfere with the operation of nearby electronic devices. If you have a pacemaker or other implanted medical device, do not use the product until you have taken advice from your doctor or the manufacturer of your medical device.
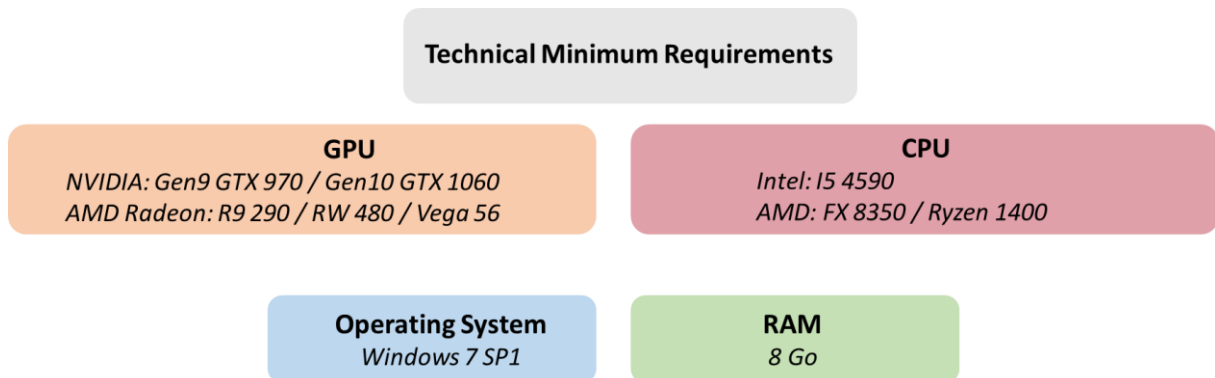
⚠️ *Any serious incident should be notified in writing to* qualite@virtualisvr.com

1.7. Hardware and minimum configuration requirements

Hardware required to use the system:

- VR Ready PC
- VR System: HTC VIVE, HTC VIVE Pro or compatible system
- Lighthouse bases (HTC VIVE tracking)

In order to install and use our virtual reality applications, we recommend a configuration equal to or higher than the system requirements:

Technical Minimum Requirements

GPU	CPU
NVIDIA: Gen9 GTX 970 / Gen10 GTX 1060 AMD Radeon: R9 290 / RW 480 / Vega 56	Intel: I5 4590 AMD: FX 8350 / Ryzen 1400

Operating System	RAM
Windows 7 SP1	8 Go

1.8. Required accessories

Headset. Xbox controller, Hive controller(s) or keyboard are all optional.

2. SOFTWARE USE

2.1. Patient setup

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Tel : +33 (9) 80 80 92 91   contact@virtualisvr.com
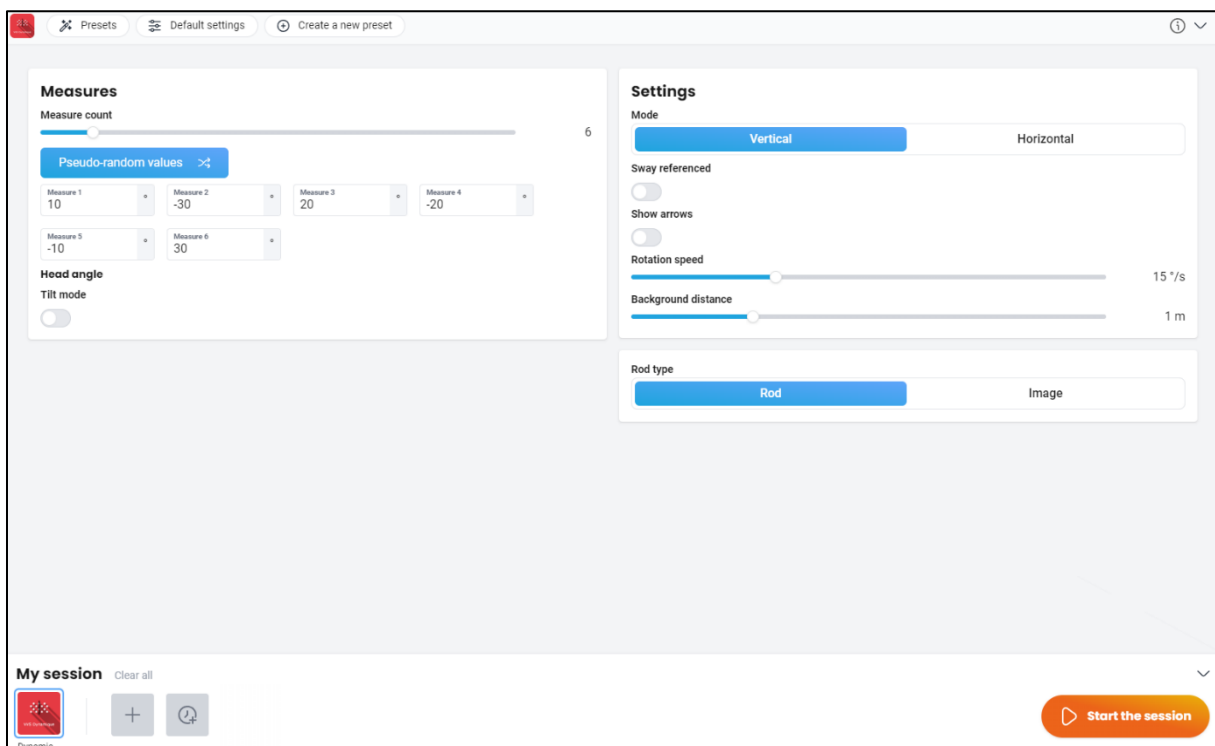
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The principle of measuring patients' Subjective Visual Vertical is that they have no vertical or horizontal, visual or proprioceptive reference.

It is therefore recommended to take the measurements using the following installation:
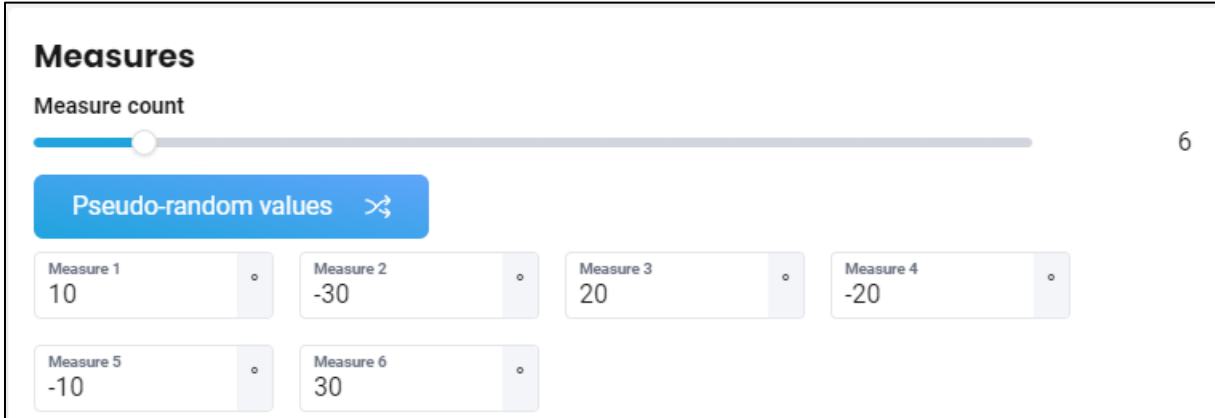
- Patient seated (preferably on an "upholstered" seat, a swivel chair is ideal)
- Feet on a footrest, not on the ground
- Keyboard, controller(s) or Xbox controller in hand so they can take the measurements themselves (if possible).

2.2. Session settings

The variable settings for this module are as follows:

2.2.1. Measures

Measures

Measure count

6

Pseudo-random values ⤬

Measure 1	Measure 2	Measure 3	Measure 4
10	-30	20	-20

Measure 5	Measure 6
-10	30

Used to define the value of the various measurements for the entire protocol.

Measure count:
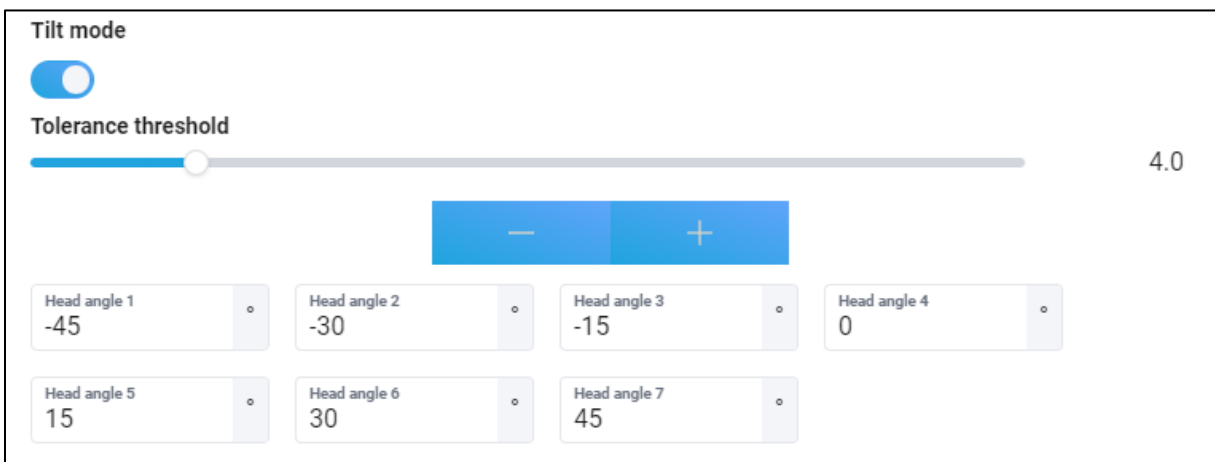
Number of measures taken during the session.

Value: 4 to 24.

Pseudo-random values:

Defines random values for measurements.

Values are mirrored: they are tilted both to the right (positive values) and to the left (negative values).

2.2.2. Tilt

Tilt mode

Tolerance threshold

4.0

—	+

Head angle 1	Head angle 2	Head angle 3	Head angle 4
-45	-30	-15	0

Head angle 5	Head angle 6	Head angle 7
15	30	45

Tilt mode:

Checking this option unlocks the following parameters:

Tolerance threshold:

Value: 1.0 to 20.0.

Head angle:

Delete or add measures by clicking on the "**-**" or "**+**" button.

2.2.3. Settings
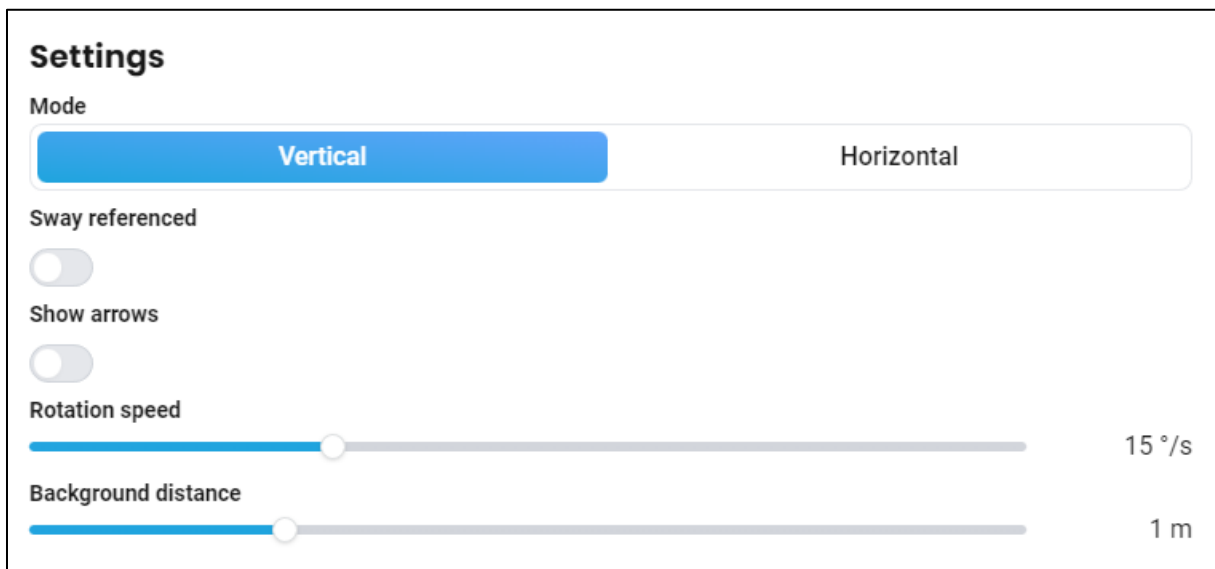
Mode:

Allows you to choose between vertical or horizontal measurements for the entire protocol.

Sway referenced:

Check this option to have the image displayed in the VR headset matched to the patient's head movements.

If enabled, the bar is "fixed" in front of the patient, and tilts with the patient's own head tilts. Measured values are relative to the earth's vertical, without taking head tilt into account.

Otherwise, the bar is in "real conditions", as if it were floating in the room. It is therefore unaffected by the patient's head movements.

Show arrows:

Check this option to make the arrows visible and help the patient visualize the direction of movement of the bar (right or left).
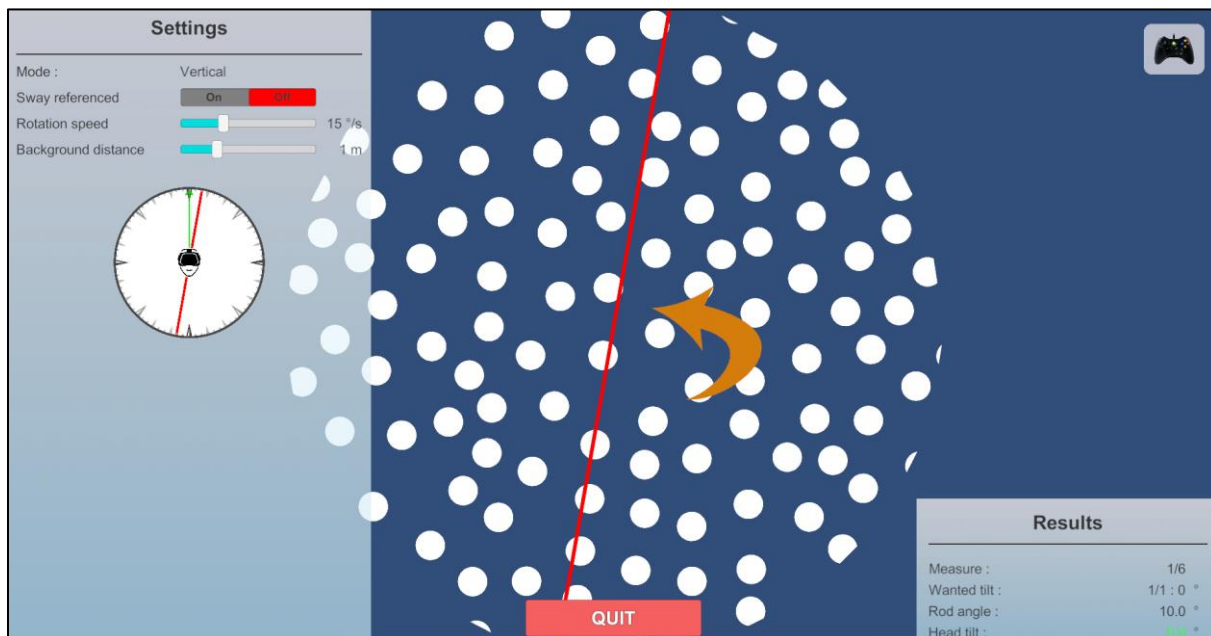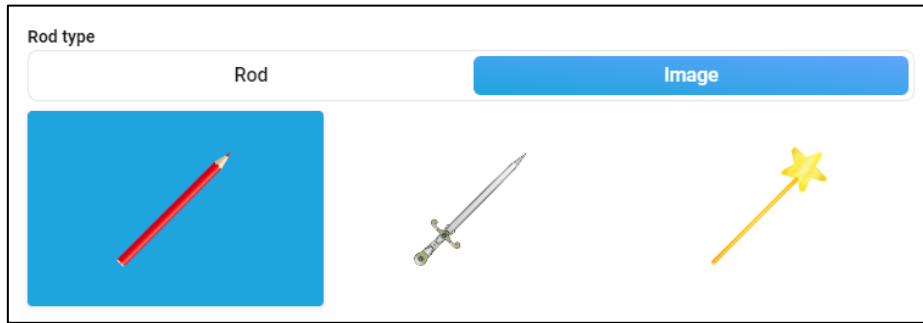

Rotation speed:

Determines the rotation speed of the optokinetic disk. Its direction of rotation follows the direction of bar inclination.

Value: 0 to 50°/s.

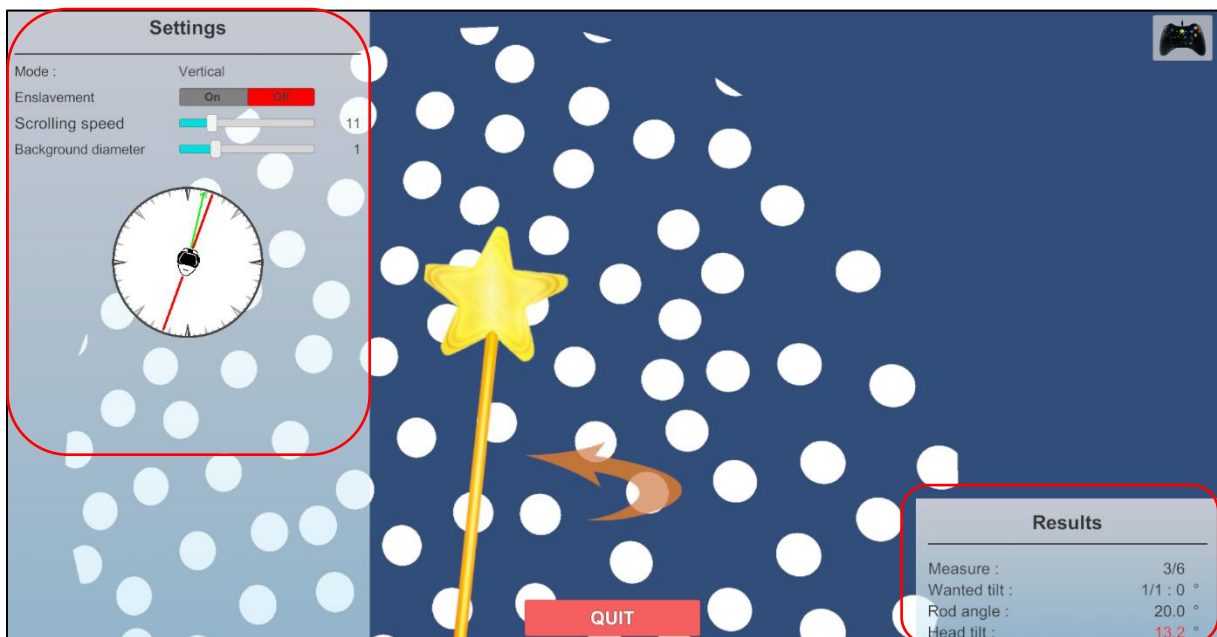**Background distance:**

Value: 0 to 4 m.

2.2.4. Rod type

Changes the type of rod displayed on the screen.

2.3. Session

Once the presets have been selected, the user can launch the virtual interface by selecting the "**Start the session**" button in the bottom right of the screen.
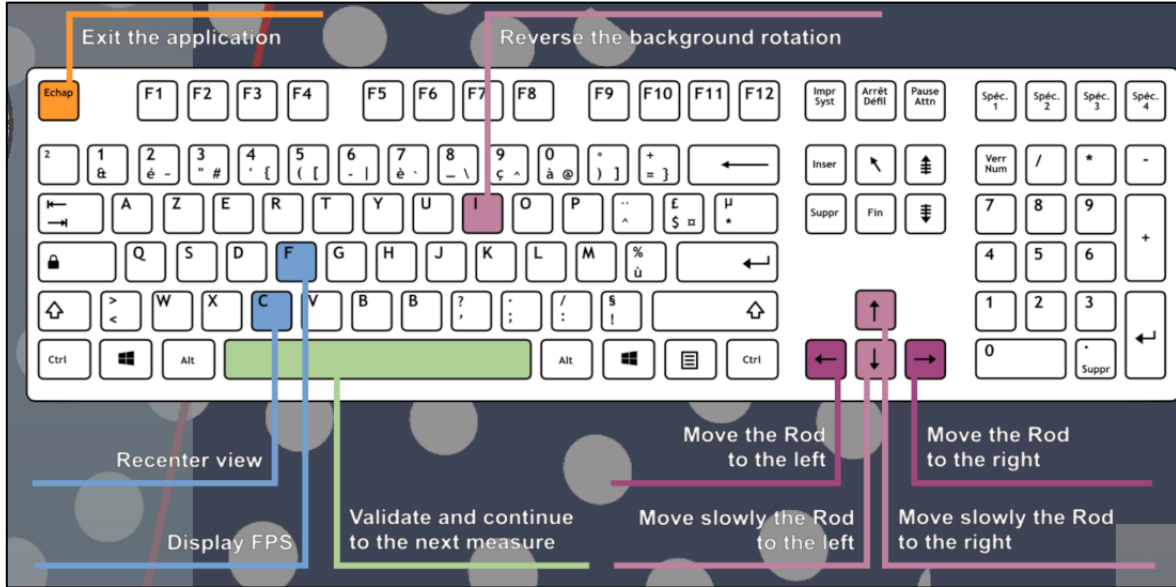

During the session, the user can modify the parameters from the **left side of the screen**. They are not visible to the patient.

In the bottom right corner of the screen, the user can view the results of the session in real time.

2.4. Shortcuts

During the session, the shortcut list is found by clicking on the Xbox controller icon at the upper right corner of the screen.

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2.5. Results

At the end of the session, the different head inclination values of the patient are displayed.

2.6. Data processing

Data retrieval and analysis uses the Patient Management software (see dedicated user manual).