



## User manual

## Gait analysis



KinTrack Version 3.2



**EKINNOX**

Bioparc - 2400 route des Colles  
06410 BIOT  
France

Phone: +33 (0) 6 37 74 03 38

[www.ekinnox.com](http://www.ekinnox.com)





## Table of contents

Table of illustrations .....	6
Symbols glossary .....	10
<b>1. Cautions and safety information.....</b>	<b>11</b>
<b>2. General information.....</b>	<b>12</b>
<b>2.1. Intended use .....</b>	<b>12</b>
<b>2.2. Indications.....</b>	<b>12</b>
<b>2.3. Mode of operation .....</b>	<b>12</b>
<b>2.4. Conditions of use.....</b>	<b>12</b>
<b>2.5. Performance.....</b>	<b>13</b>
2.5.1. Visual analysis.....	13
2.5.2. Qualitative analysis.....	13
2.5.3. Quantitative analysis .....	13
<b>3. Installation and start-up .....</b>	<b>16</b>
<b>3.1. Installation .....</b>	<b>16</b>
<b>3.2. Login page .....</b>	<b>17</b>
<b>4. Patient management.....</b>	<b>19</b>
<b>4.1. Presentation of the patient list .....</b>	<b>19</b>
<b>4.2. Enter a new patient .....</b>	<b>21</b>
<b>4.3. Protection of personal data.....</b>	<b>23</b>
4.3.1. The collected data .....	23
4.3.2. Why is this data collected? .....	23
4.3.3. Who has access to this data? .....	23
4.3.4. Retention period .....	24
4.3.5. Data protection.....	24
4.3.6. Patients' rights to their personal data .....	25
4.3.7. Image rights.....	25
<b>4.4. Find an existing patient .....</b>	<b>25</b>
<b>4.5. Modify a patient .....</b>	<b>25</b>
<b>4.6. Archive and delete a patient.....</b>	<b>26</b>
<b>4.7. Show patients .....</b>	<b>27</b>
<b>4.8. Sort patients .....</b>	<b>27</b>
<b>5. Patient page.....</b>	<b>28</b>
<b>5.1. Filtering and sorting.....</b>	<b>28</b>
<b>5.2. Selection of activities.....</b>	<b>29</b>
<b>5.3. Actions on selected activities.....</b>	<b>30</b>
<b>6. Recording.....</b>	<b>31</b>
<b>6.1. Recording protocols .....</b>	<b>31</b>
6.1.1. Frontal analysis .....	31
6.1.2. Sagittal recording.....	39
6.1.3. Timed Up-and-Go (TUG).....	43
6.1.4. Tinetti.....	46
6.1.5. Static balance.....	49
6.1.6. SPPB (Short Physical Performance Battery) .....	53
<b>6.2. Enter a comment for a patient .....</b>	<b>60</b>
<b>6.3. Enter annotations about the activity .....</b>	<b>61</b>
<b>7. Visualize a video recording .....</b>	<b>63</b>
<b>7.1. Visualization tools.....</b>	<b>63</b>



7.2.	Visualization of a frontal analysis .....	65
7.3.	Visualization of a sagittal recording .....	66
7.4.	Visualization of a TUG evaluation .....	67
7.5.	Visualization of a Tinetti evaluation .....	69
7.6.	Static balance activity visualization .....	71
7.7.	SPPB activity visualization .....	72
7.8.	3D view .....	73
7.9.	Comparison .....	75
7.10.	Graphs .....	77
7.10.1.	Stride length .....	78
7.10.2.	Foot width .....	79
7.10.3.	Mean knee angle on a cycle .....	80
7.10.4.	Mean hip angle on a cycle .....	81
8.	Generate an analysis report .....	82
8.1.	Screenshots .....	82
8.2.	Sequences selection .....	82
8.3.	Create a report .....	85
8.4.	Saving the report .....	86
8.5.	Export to USB key and download .....	86
9.	Export data .....	86
9.1.	Selection and Export .....	86
9.2.	Data format .CSV .....	88
9.3.	Export of video portions .....	88
10.	Data synchronization and web application .....	89
10.1.	At the start .....	89
10.2.	At login .....	89
10.3.	At disconnection or extinction .....	90
10.4.	Archiving .....	90
10.5.	Delete patients .....	91
10.6.	Access to data via the web application .....	91
11.	Administration .....	92
11.1.	Synchronization .....	92
11.2.	Change your password .....	92
11.3.	Operators management .....	93
11.3.1.	Create an operator .....	93
11.3.2.	Modify an operator .....	95
11.3.3.	Reset an operator's password .....	96
11.3.4.	Archive an operator .....	96
11.4.	License management for the web application .....	96
11.5.	Other administrator actions .....	97
11.5.1.	Update .....	97
11.5.2.	Change the automatic logout time .....	98
11.5.3.	Exporting data .....	98
11.5.4.	Importing data .....	98
12.	Assistance .....	99
13.	Appendix 1: Quantitative performance .....	101
13.1.	Success rate .....	101
13.2.	Cadence, step lengths and foot width .....	101
13.2.1.	Step length .....	101
13.2.2.	Speed .....	102



13.2.3.	Foot width.....	102
<b>13.3.</b>	<b>Spatiotemporal parameters: comparison with the GAITrite system .....</b>	<b>103</b>
<b>13.4.</b>	<b>Kinematics .....</b>	<b>104</b>
<b>14.</b>	<b>Appendix 2: KinTrack reference data.....</b>	<b>105</b>
<b>14.1.</b>	<b>Mean angles on a gait cycle.....</b>	<b>105</b>
14.1.1.	KinTrack data.....	105
14.1.2.	Literature data.....	106
<b>14.2.</b>	<b>Spatiotemporal parameters .....</b>	<b>107</b>
14.2.1.	KinTrack data.....	107
14.2.2.	Comparison with literature data.....	109
<b>14.3.</b>	<b>Static balance.....</b>	<b>110</b>
14.3.1.	Results on healthy people.....	110
14.3.2.	Comparison with Normes 85 standards .....	111



## Table of illustrations

Figure 1: Complete equipment (non-contractual picture).....	16
Figure 2: Login page.....	17
Figure 3: « About » window.....	18
Figure 4: User's manual.....	18
Figure 5: Patient list.....	19
Figure 6: Patient file.....	21
Figure 7: Show patients.....	27
Figure 8: Sort patients.....	27
Figure 9: Patient page.....	28
Figure 10: Filtering activities.....	28
Figure 11: Sorting activities.....	29
Figure 12: Selection of activities.....	30
Figure 13: Choosing an acquisition protocol.....	31
Figure 14: Calibration page (frontal analysis, TUG, Tinetti or SPPB).....	32
Figure 15: Reduced exercise area.....	33
Figure 16: Patient positioning.....	34
Figure 17: Reduced area benefit for a gait analysis with a caregiver support.....	35
Figure 18: Recording of a frontal analysis.....	36
Figure 19: Sequence detection messages.....	37
Figure 20: Sequence editing.....	38
Figure 21: Confirmation of sequence editing.....	39
Figure 22: Calibration page, sagittal record.....	40
Figure 23: Patient detection, sagittal recording.....	41



Figure 24: Sagittal recording .....	42
Figure 25: TUG, material window .....	43
Figure 26: TUG, recording window .....	44
Figure 27: TUG, form windows.....	45
Figure 28: Window for visualizing an incomplete TUG activity.....	46
Figure 29: Tinetti, exercise 1 .....	47
Figure 30: Tinetti, exercises 2 to 6.....	48
Figure 31: Uncomplete Tinetti visualization.....	49
Figure 32 : Configuration of the static balance exercise zone.....	50
Figure 33 : Static balance recording page.....	51
Figure 34 : Adjust balance time .....	52
Figure 35 : SPPB feet together recording page .....	53
Figure 36 : Feet together balance validation.....	54
Figure 37 : semi-tandem balance recording.....	55
Figure 38 : SPPB semi-tandem validation.....	55
Figure 39 : Full tandem stand recording.....	56
Figure 40 : SPPB semi-tandem validation .....	57
Figure 41 : SPPB gait recording.....	57
Figure 42 : Results of SPPB gait analysis .....	58
Figure 43 : SPPB chair stand recording.....	59
Figure 44 : SPPB chair stand validation .....	60
Figure 45: Visualization page with the annotation area .....	62
Figure 46: Visualization page, frontal analysis .....	65
Figure 47: Display of the gait parameters on the video.....	66
Figure 48: Visualization page, sagittal recording .....	66



Figure 49: Visualization page, TUG summary.....	67
Figure 50: Visualization page, TUG form.....	68
Figure 51: Visualization page, Tinetti summary .....	69
Figure 52: Visualization page, Tinetti form.....	70
Figure 53 : Static balance visualisation page.....	71
Figure 54 : SPPB activity visualisation page .....	72
Figure 55: 3D view .....	73
Figure 56: 3D view with representation of the skeleton.....	74
Figure 57: Selection of activities to be compared.....	75
Figure 58: Comparison page.....	76
Figure 59: 3D view comparison .....	77
Figure 60: Stride length graph .....	78
Figure 61: Graph for the lateral distance between the feet.....	79
Figure 62: Mean knee angles on a cycle .....	80
Figure 63: Average hip angle over one cycle .....	81
Figure 64 : Screenshot window .....	82
Figure 65: Overview of the sequences of an activity .....	83
Figure 66: Selected activity .....	85
Figure 67 : Create a report.....	85
Figure 68: Saved report .....	86
Figure 69: Archiving to free disk space.....	91
Figure 70: Update of the password.....	93
Figure 71: Operators page.....	94
Figure 72: Operator's file .....	95
Figure 73: Creation of an operator, login, and password.....	95









---

Figure 74: Other administrator actions.....97

Figure 75: Update software window .....97

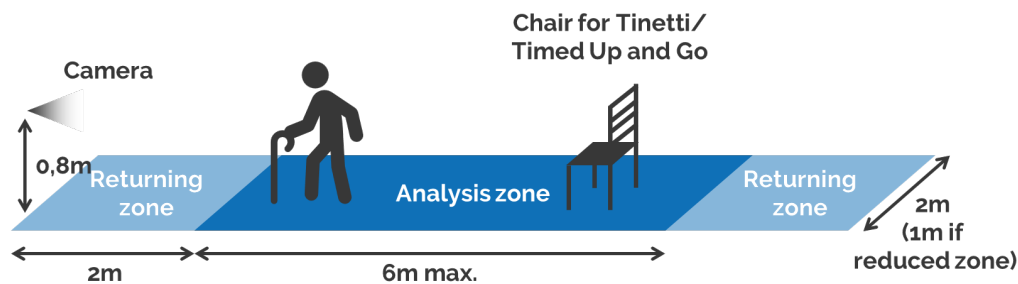



## Symbols glossary

Symbol	ISO 15223-1:2021 Reference	Description
 <b>Caution</b>	<b>5.4.4</b>	Indicates that caution is necessary when operating the device or control close to where the symbol is placed, or that the current situation needs operator awareness or operator action to avoid undesirable consequences.
 <b>Date of manufacture</b>	<b>5.1.3</b>	Indicate the date when the medical device was manufactured
 <b>Manufacturer</b>	<b>5.1.1</b>	Indicate the medical device manufacturer
 <b>Serial number</b>	<b>5.1.7</b>	Indicate the manufacturer's serial number so that a specific medical device can be identified
 <b>Medical device</b>	<b>5.7.7</b>	Indicate the item as a medical device
 <b>Unique device identifier</b>	<b>5.7.10</b>	Indicates a carrier that contains unique device identifier information

## 1. Cautions and safety information

- ⚠ This software is a tool to assist in the evaluation of a patient. The provided results cannot, by themselves, motivate a treatment or provide a diagnosis.
- ⚠ Ensure your patient security during the realization of the exercises.
- ⚠ Do not unplug the computer during use, you may lose data. It is recommended to choose a secure socket with an inverter.
- ⚠ Protect your patients' data:
  - Please log out after using the software. As a protective measure, the system will automatically log out after 20 to 60 minutes of inactivity (configurable time).
  - Please do not share your login information.
- ⚠ Take care of the equipment: please turn off the computer after use. As a protection measure, it will automatically shut down after 4 hours of inactivity.
- ⚠ Please do not modify the provided installation to ensure the proper operation of the software.
- Please install the equipment in a space that allows the patient to walk at least 5 m back and forth in front of the camera.



-  To export activity reports, use only the USB sticks provided by EKINNOX and do not connect other types of devices to the system's ports without EKINNOX's approval.
- ⚠ Use a secure internet connection and never leave the machine alone during data synchronization.



- ⚠ If you have remote access codes to KinTrack, please give them only to EKINNOX service agents.

## 2. General information

### 2.1. *Intended use*

KinTrack is a software that allows to analyze the patients' gait visually, qualitatively, and quantitatively. Its objective is to provide an aid to the evaluation of a patient for gait rehabilitation.

It is recommended for professionals in gait rehabilitation: physical and rehabilitation specialists, physiotherapists, and occupational therapists.

### 2.2. *Indications*

KinTrack is recommended for all types of patients requiring gait rehabilitation following traumatological or neurological injuries.

### 2.3. *Mode of operation*

KinTrack is based on software solutions that process the information provided by a camera that films the patient. This camera has a distance sensor based on the emission of low intensity infrared radiation.

### 2.4. *Conditions of use*

- The device is for indoor use. Avoid external light such as bay windows that may interfere with patient detection.
- Patients must wear clothes that allows the software to detect their silhouette from the video recording:
  - Do not wear dresses or blouses.
  - Pants, shorts, or Bermuda shorts must be close-fitting.
  - Avoid dark clothes that can absorb infrared radiation and compromise the camera's performance: prefer light-colored clothes.
- Keep the area where the patient is walking clear of objects and ensure that nothing enters the area during recording.
- Only health professionals (rehabilitation doctors, physiotherapists, occupational therapists) for whom an account has been created by the device administrator can log in to the device.



## 2.5. Performance

### 2.5.1. Visual analysis

KinTrack allows to film the patient while he is walking back and forth frontally or laterally compared with the camera axis.

These videos are recorded and allow a visual analysis a posteriori, in simple display or in comparison. KinTrack allows to visually compare the patient at 2 different moments of his rehabilitation, or to display simultaneously a frontal video and a sagittal video.

Several visual analysis tools are available as described in the chapter **Visualize a video** recording.

### 2.5.2. Qualitative analysis

KinTrack gives the possibility to qualitatively evaluate a patient according to 2 evaluation scales, TUG (Timed Up and Go) and Tinetti. To do so, KinTrack allows to film the patient while he/she performs the exercises requested by the evaluation test, and to fulfil the associated form (which constitutes his/her qualitative evaluation) by viewing the recorded video.

The procedures for performing these tests are described in the chapters **Timed Up-and-Go** and **Tinetti**.

### 2.5.3. Quantitative analysis

From the video obtained by recording the patient walking back and forth frontally compared with the camera axis, KinTrack provides gait parameters, either as values or as graphs. The procedure to obtain these parameters is described in the chapter **Frontal analysis**.

#### 2.5.3.1. Numerical values

##### 2.5.3.1.1 Gait analysis

The following spatio-temporal parameters are calculated:

- Speed
- Cadence

For these two parameters, the values are calculated for a walking sequence, i.e., one way to or from the camera. For a whole activity, i.e., a set of walking sequences in front of the camera, the average value over the different sequences is calculated.

- Foot width
- Stride length
- Left and right step length
- Duration and proportion of the right and left support phase on a gait cycle



- Duration and proportion of right and left single support over a gait cycle
- Duration and proportion of double support over a gait cycle

The given values for each of these parameters are:

- For a sequence, i.e., one way to or from the camera, the median value of the parameter on this sequence.
- For a complete activity, i.e., a set of walking sequences in front of the camera, the average value of the values obtained for each sequence.

The details of the expected precision for these different parameters are given in **Appendix 1: quantitative performances**.

#### 2.5.3.1.2 Static balance analysis

A static balance activity provides the following parameters:

- Lateral imbalance
- Frontal imbalance
- Imbalance surface
- Length of excursion
- Average velocity

These parameters are calculated from the projection on the ground of the centre of gravity of the patient's point cloud, obtained with the camera's depth sensor.

Details of the values obtained with KinTrack on healthy patients are given in **Appendix 2: EKINNOX reference data**.

#### 2.5.3.2. Graphs

##### 2.5.3.2.1 Gait analysis

In addition to the numerical data, KinTrack provides representative graphs of the patient's gait described in the chapter **Graphs**.

- Stride length: 2 curves that represent the distance of each foot from the camera over time, over a walking sequence.
- Foot width: 2 curves representing the distance of each foot from the camera axis and a graph representing the difference between these 2 curves and giving the foot width.

These graphs correspond to the data used to calculate the figures presented in the previous paragraph.



- Mean knee angle on a cycle: 2 curves that represent the average knee flexion/extension angles on a cycle, computed over the entire activity, for each leg.
- Mean hip angle on a cycle: 2 curves that represent the average hip flexion/extension angles on a cycle, computed over the entire activity, for each leg.

These graphs provide a characterization of the patient's gait at a given time. They also give references obtained on healthy people.

The details of the expected precision for the points of these curves are given in **Appendix 1: quantitative performances**.

Details of the data obtained with KinTrack on healthy people are given in **Appendix 2: EKINNOX reference data**.

#### **2.5.3.2.2 Static balance analysis**

In addition to numerical data, KinTrack provides the curve of the projection of the patient's center of gravity on the ground, in the same way as a stabilometer.

This curve provides a graphical representation of the displacement of the patient's center of gravity during a static balance exercise, and also represents references obtained on healthy people.

Details of the data obtained with KinTrack on healthy patients are given in **Appendix 2: EKINNOX reference data**.

### 3. Installation and start-up

#### 3.1. Installation

The KinTrack software is installed by EKINNOX on a computer with a Kinect Azure camera plugged on the USB ports. If applicable, KinTrack can be installed on a compatible equipment of this type:

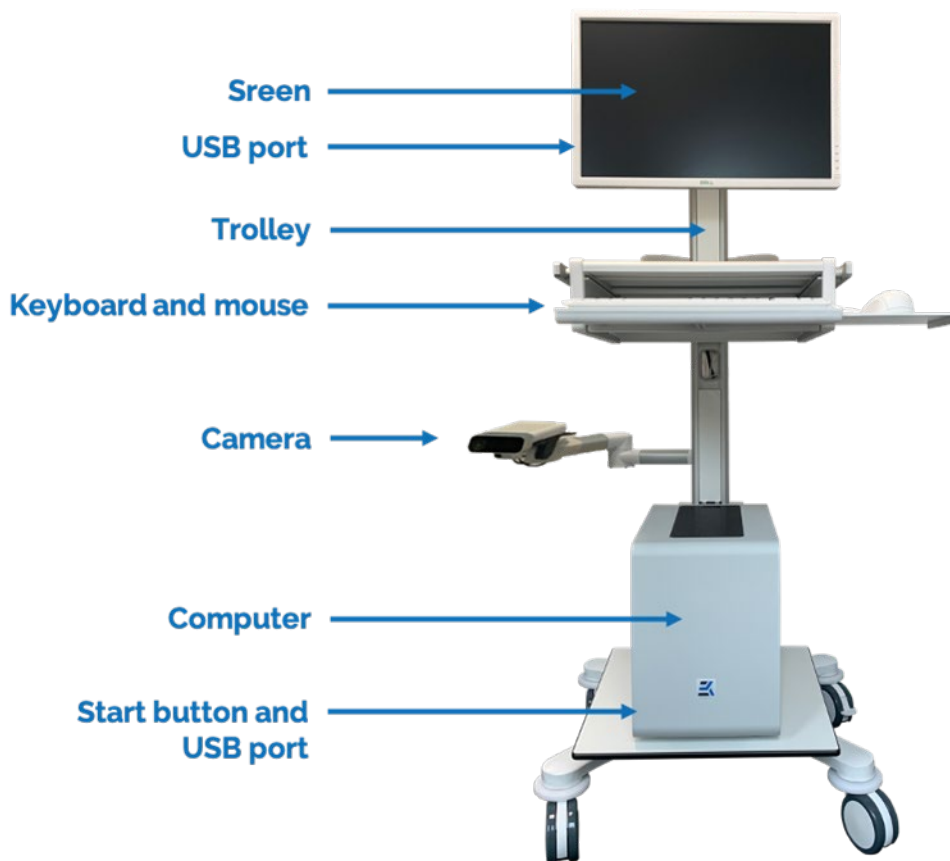


Figure 1: Complete equipment (non-contractual picture)

- Please install the equipment in a space that allows the patient to walk at least 5 m back and forth in front of the camera.
- Plug in the device and make sure that the power cable is not in a walking area.
- Turn on the computer and the screen. You will have access to the device login page.



### 3.2. Login page

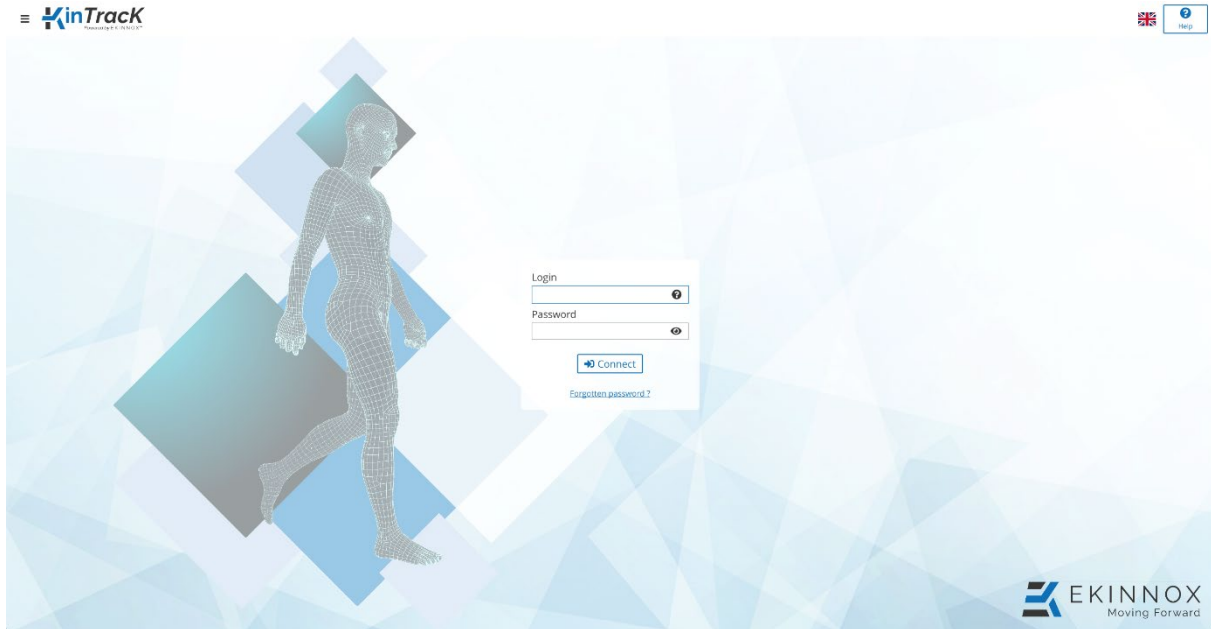



Figure 2: Login page

- Please enter your login and password in the corresponding fields to login. Clicking on  next to the login will give you instructions on how to find your login. Clicking on the eye icon in the password field will display the password you entered in plain text.

Click on "Forgotten password" if you have forgotten your password: a window will give you the list of administrators to contact to reset your password.


- Click on the flag in the upper right corner to change the language of the software (only applicable to the web version)
- Click on  to:
  - Turn off the machine (not applicable on the web version).
  - Have access to the "About" window which gives the version of the device and contact information.



Figure 3: « About » window

- Click on  at the top right of the screen to access the user manual:

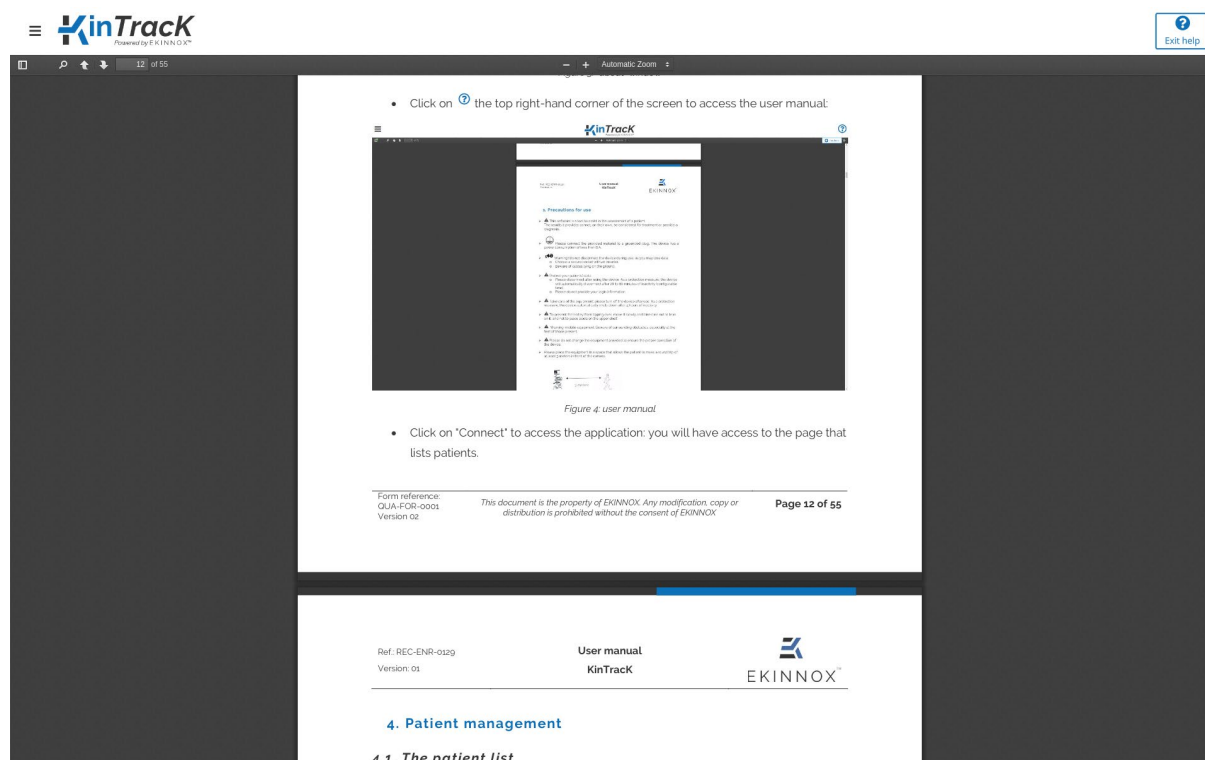


Figure 4: User's manual

- Click on **“Connect”** to access the application: you will be taken to the page that lists the patients.

## 4. Patient management

### 4.1. Presentation of the patient list

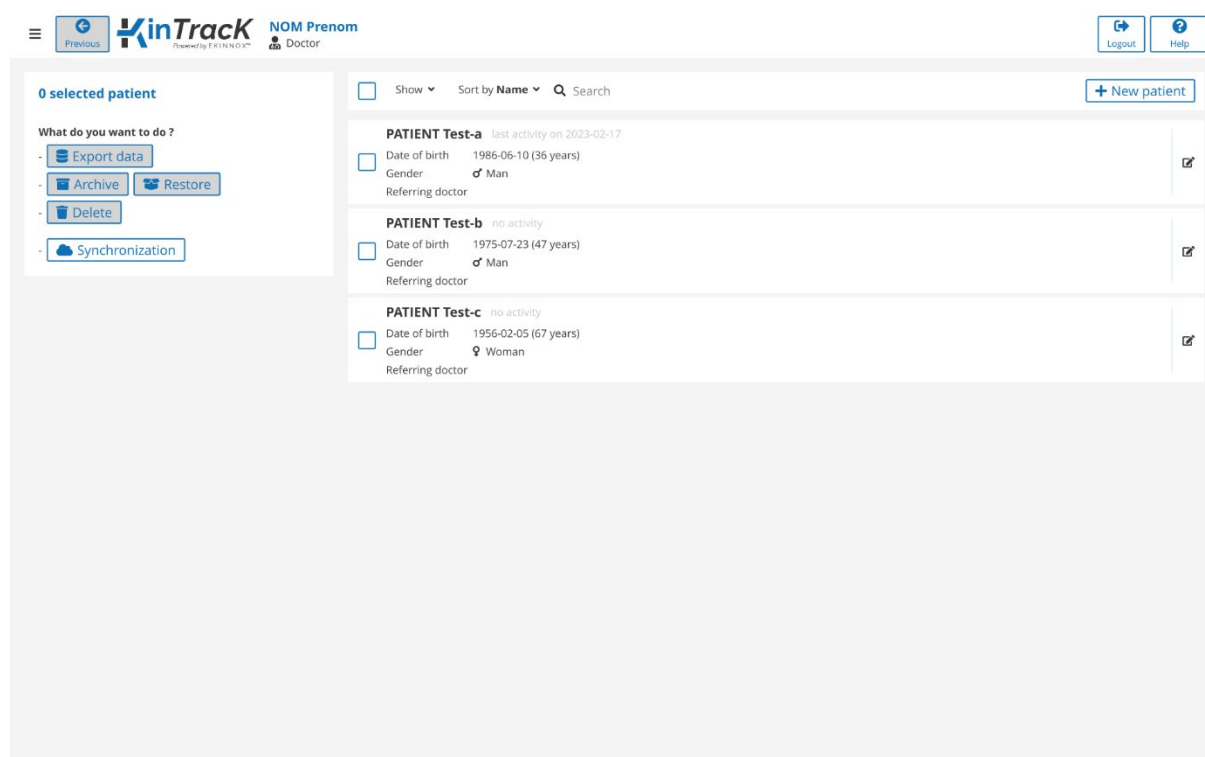



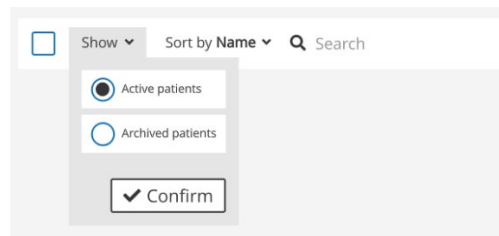


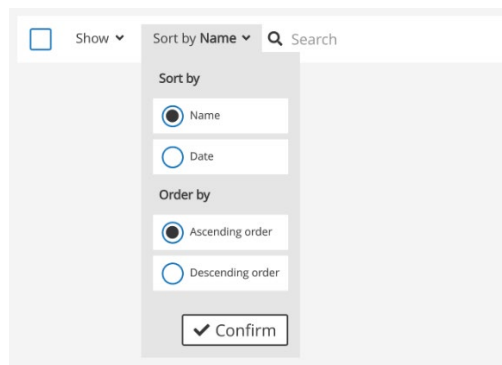
Figure 5: Patient list




The page that lists the patients allows you to:

- Add a new patient: 
- Search for an existing patient:  Rechercher
- Select a patient: ☐
- Modify a patient: 
- Show active or archived patients:





- Sort patients:



- Clicking on  allows to:
  - Turn off the machine.
  - Access the **"About"** window. See 3.2.
  - Change your password (see 11.2).
- Click on  allows you to disconnect from the application.
- Click on  to access the user manual. See Login page.
- A list of buttons is available on the left side of the page.

**Note:** If the buttons are greyed out the actions are not available.

 : allows to synchronize the patient data with the remote database. See Chapter 10.

 : on the web version, allows to update the patient data with the database. See Chapter 10.

- **If one or more active patients are selected:**

 : allows you to export the gait parameters of a frontal analysis in .csv format. See Chapter 9.



: allows you to archive patients.

➤ **If one or more archived patients are selected:**



: allows you to restore an archived patient.



: allows you to delete an archived patient (not applicable on the web version).

For archiving and deleting operations, see chapter 4.6 Archive and delete a patient.

## 4.2. Enter a new patient

- From the list of patients, click on : you have access to the patient file.

Figure 6: Patient file

In the patient file, enter personal and additional information.

**Note:** Birth name, first name, gender, height, date, and place of birth are mandatory.  
The IPP and common name are optional.



- Enter optional information if you wish: IPP, common name, referring doctor, pathology, weight, and laterality.
- Ask the patient's consent before using his/her personal information.

**Note:** *To use the device on a patient, the patient must give consent for the processing of his/her personal data on this particular device. This consent is mandatory to use the device and is recorded by the operator by ticking the following option:*

☐ As a KinTrack user and healthcare professional, I guarantee that the patient (or, if applicable, his/her legal representative) (i) has been informed of the collection and processing of his/her personal data, as well as of the capture of his/her image as part of the intended use of the KinTrack device for the purpose of his/her care and (ii) that he/she has consented to it.

*In addition, to enable EKINNOX to collect usage data on its device and to use this data to improve its device, the patient can give his/her consent for his/her data to be processed not only by the device for the analysis of his/her walk, but also by EKINNOX for the improvement of the device. This consent is not mandatory and is recorded by ticking:*

☐ As a KinTrack user and healthcare professional, I guarantee that the patient (or, if applicable, his/her legal representative) (i) has been informed of the use of his/her personal data and image, previously pseudonymized, for secondary purposes of evaluation, development and improvement of the KinTrack device, under the conditions mentioned in the user manual, and (ii) that he/she has not objected.

- Click on the corresponding box(es).
- Click on « **Confirm** »: you have access to the patient page which allows you to record an activity.
- If the patient already exists, a window will show you the line of the corresponding existing patient. You can then:
  - Return to the patient creation page by clicking on "**Cancel**".
  - Open the existing patient page either by clicking on the row or by clicking on "**Restore**" if the patient was archived.



### 4.3. *Protection of personal data*

This chapter provides information about the confidentiality and protection of personal data collected and processed when using the KinTrack device. The healthcare professional user is responsible for providing this information to the patient and, where applicable, to his/her legal representative, at the time of the data collection in the KinTrack application, so that the patient or, where applicable, his/her legal representative, can consent to the processing of these data in a free and informed manner.

#### 4.3.1. *The collected data*

KinTrack allows the collection of the following data:

- Personal information: last name, first name, sex, age, pathology, weight, height, and laterality
- Patient videos
- Snapshots from the videos
- 3D reconstructions of his/her silhouette
- The spatiotemporal parameters of the patient's gait: speed, cadence, step length/width, foot support times, knee, and hip angles
- The results of quantitative analyses of the standard Timed Up and Go and Tinetti tests.

#### 4.3.2. *Why is this data collected?*

This data is collected for the following purposes:

- For the gait analysis to be carried out by the healthcare professional as part of the patient's care.
- For the assessment, development, and improvement of the KinTrack device, thus helping to provide better patient care. In this context, this data will make it possible to:
  - Test new algorithms.
  - Carry out retrospective studies to assess the relevance of the made measurements.

#### 4.3.3. *Who has access to this data?*

- Personal data processed as part of care:

The collected data is under the responsibility of the healthcare professional who performs the gait analysis and who guarantees the protection of this data as part of the medical practice.



The healthcare team may need to access the patient's personal data processed in the KinTrack application, for the purpose of providing medical care to the patient.

As the publisher of the KinTrack device, EKINNOX, through its technical team, may need to access to the patient's personal data to maintain the operating software of the KinTrack device. EKINNOX acts as a subcontractor of the healthcare professional, under the contractual conditions concluded between the healthcare professional and EKINNOX, in the strict compliance with the regulations applicable to the protection of personal data.

- Personal data processed for secondary purposes of evaluation, development, and improvement of the KinTrack device:

As part of the secondary use of data for the evaluation, development, and improvement of the KinTrack device, the development team of the EKINNOX company will have access to the patient's personal data, after pseudonymization of these data (i.e. which do not allow the direct identification of the patient, first and last names will not be accessible and faces will be blurred on videos and other images). EKINNOX is responsible for the processing of personal data in this context.

EKINNOX is a limited company with a Board of Directors, registered in the Antibes Trade and Companies Register under number 828 971 192, whose registered office is located at Bioparc - 2400, route des Colles, 06410 BIOT, FRANCE.

#### 4.3.4. *Retention period*

Personal data is retained by the health professional for the legal period of conservation of the medical file.

EKINNOX shall retain this data for a maximum period of 10 years from the date of collection, after which time the company undertakes to anonymize it.

#### 4.3.5. *Data protection*

EKINNOX implements all technical and organizational measures appropriate to the nature of the data and the risks presented by their processing, to preserve the safety and confidentiality of patients' personal data and to prevent it from being distorted, damaged, or accessed by unauthorized third parties.

As part of secondary use of the data for evaluation, development and improvement of the device, this data will be strictly confidential and exclusively reserved for the use of the EKINNOX development team, and will under no circumstances be distributed, in any way whatsoever outside the company without prior consent. Any statistical and/or scientific publication that may be carried out by EKINNOX based on the collected data, in accordance with the purposes set out in Article 4.3.2, shall be exclusive of any personal data of the patient.

EKINNOX expressly refrains from disclosing data collected to third parties, other than those expressly provided for in Article 4.3.3 above.





#### 4.3.6. *Patients' rights to their personal data*

If applicable, in accordance with the provisions of Regulation (EU) No. 2016/679 of April 27, 2016, known as the General Data Protection Regulation, and Law No. 78-17 of January 6, 1978, as amended, relating to data processing, files and individual liberties, A patient (or, where applicable, his/her legal representative) has a right to access, modify, delete, and transfer his/her personal data. He/she also has the right to request the limitation of the processing under the conditions provided for by law, as well as the right to object to the processing of his/her personal data by EKINNOX. Finally, the patient has the right to file a complaint with the Commission Nationale de l'Informatique et des Libertés (CNIL, French personal data protection authorities) if he/she considers that the data processing carried out by the healthcare professional and/or EKINNOX constitutes a violation of his/her personal data.

The patient (or, if applicable, his/her legal representative) may exercise his/her rights at any time by contacting the healthcare professional who performed his/her gait analysis.


#### 4.3.7. *Image rights*

For the healthcare professional to use the KinTrack device, the patient's image can be captured by video and snapshot.


These images are made unidentifiable by masking the face and/or distinctive signs, before being sent to the EKINNOX development teams for the needs of the evaluation, development, and improvement of the KinTrack device. In this regard, EKINNOX may reproduce the patient's image on any medium whatsoever (paper, digital) and for any means of distribution whatsoever (newspapers, internet, etc.), throughout the world, for the duration provided for in article 4.3.4 above.

EKINNOX shall refrain from any illicit use, or use not provided for above, of the recording of this image that may affect the dignity, reputation or privacy of the patient and any other harmful use according to the laws and regulations in force.


### 4.4. ***Find an existing patient***

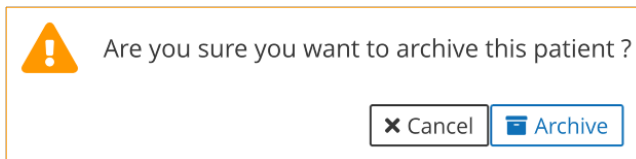
- Click on  Search above the list of patients and type the first few letters of the patient's first or last name.
- Click on the line of the patient you are interested in: you reach the patient page (Chapter 5.) where you can record a new activity or generate a report.




### 4.5. ***Modify a patient***


- In the list of patients, click on  on the line of the concerned patient.
- You can modify the personal and additional information of the patient record (see Figure 6).

#### 4.6. Archive and delete a patient

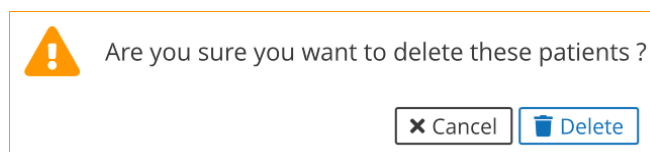
- In the list of patients, select the relevant patient by checking the corresponding box ☐.
- Click on  **Archive**.
- A message asks if you really want to archive this patient.



- Click on  **Archive** : the patient disappears from the list of active patients.
- Show archived patients and:
  - Click on  **Restore** to cancel the archiving operation.
  - Click on  **Delete** to delete the patient (not applicable on the web version).

 **Deleting a patient deletes all data and video recordings of the patient, no information is stored.**

- A message asks if you really want to delete this patient.



- Click on **"Delete"**.

## 4.7. Show patients

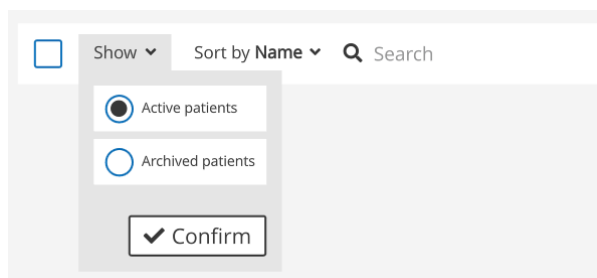


Figure 7: Show patients

- Click on **"Show"**: a filter allows you to display only active patients or archived patients. By default, only active patients are listed.

## 4.8. Sort patients

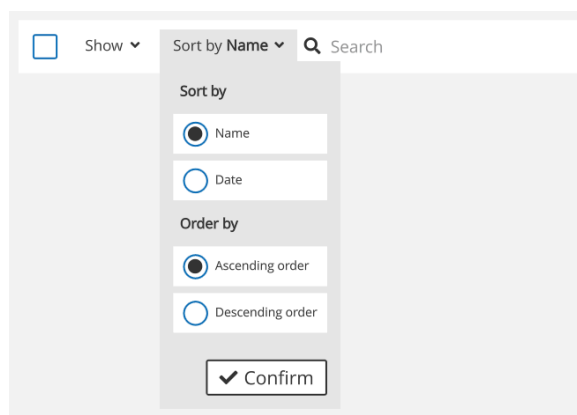
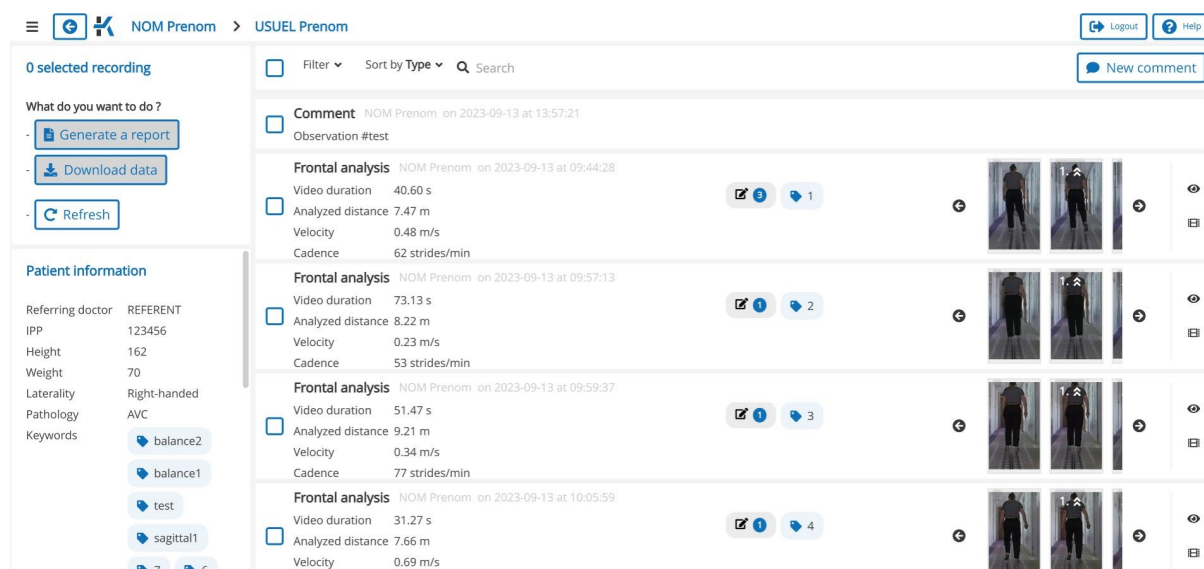


Figure 8: Sort patients

- Click on **"Sort by"**: patients can be sorted by Name (alphabetical order) or by date of last activity, in ascending or descending order. By default, patients are sorted by name, in ascending alphabetical order.

## 5. Patient page

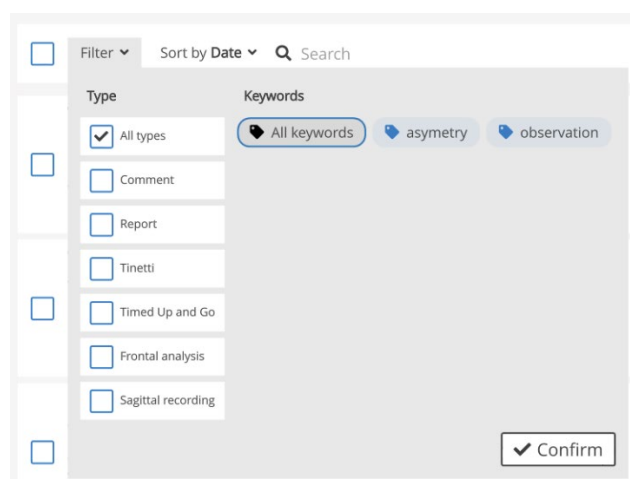
- When you click on the line of an active patient in the list of patients, you arrive on the patient page.



The screenshot displays the 'Patient page' for a patient named 'NOM Prenom'. The page includes a sidebar with 'Patient information' (Referring doctor: REFERENT, IPP: 123456, Height: 162, Weight: 70, Laterality: Right-handed, Pathology: AVC, Keywords: balance2, balance1, test, sagittal1) and a main area with a list of recordings. The recordings are filtered by 'Type' and sorted by 'Type'. The list shows four 'Frontal analysis' recordings with details such as Video duration, Analyzed distance, Velocity, and Cadence. Each recording has a thumbnail image and a 'New comment' button.

Figure 9: Patient page

### 5.1. Filtering and sorting



The screenshot shows the 'Filtering activities' dialog box. It has a 'Filter' dropdown and a 'Sort by Date' dropdown. The 'Type' section lists various activity types: All types (checked), Comment, Report, Tinetti, Timed Up and Go, Frontal analysis, and Sagittal recording. The 'Keywords' section lists: All keywords (checked), asymetry, and observation. A 'Confirm' button is at the bottom right.

Figure 10: Filtering activities

- Click on "Filter".

- You can filter the list of patient activities by type by checking the corresponding box(es).
- You can filter by keyword by clicking on the corresponding keyword(s).

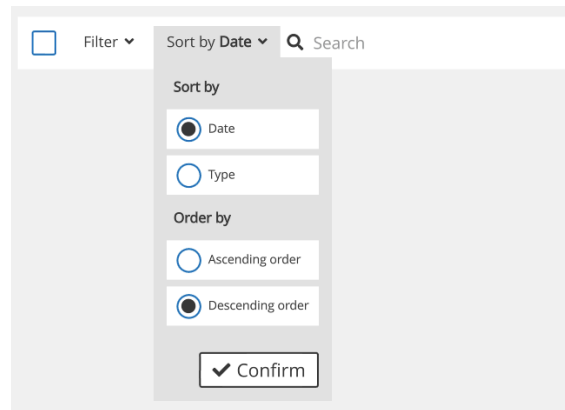


Figure 11: Sorting activities

- Click on "**Sort by**".
- You can sort by date or type (Observations, Frontal Analysis, Sagittal Recording, Timed Up and Go or Tinetti) by ticking the corresponding box.
- You can sort in ascending or descending order (date or type in alphabetical order) by ticking the corresponding box.

By default, the activities are sorted by date, in descending order.

## 5.2. Selection of activities

- By default, no activities are selected. You can select all the patient's activities and observations by ticking the box at the top of the patient page.

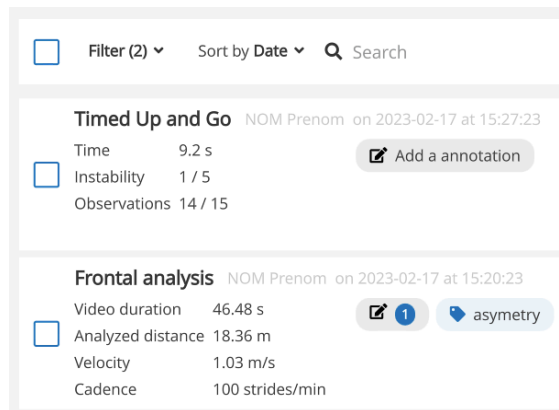


Figure 12: Selection of activities

- You can select certain activities that you want to include in the general report by ticking the corresponding activity box.

### 5.3. Actions on selected activities

Actions are possible and listed on the left side of the screen:

#### 1 selected recording


What do you want to do ?

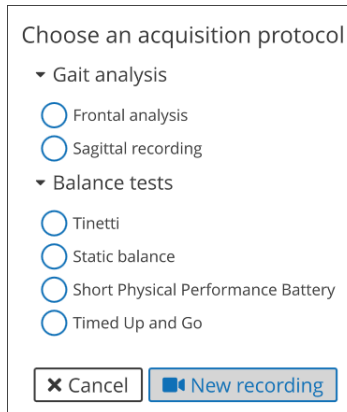
-  Generate a report
-  Export data
-  Delete

- Depending on the selected activities, the actions are activated (white) or deactivated (grey).
- "Generate a report"** is active when:
  - At least 1 activity of type Comment, Frontal Analysis, Tinetti, TUG, Static balance or SPPB is selected.
- "Export data"** (or **"Download data"** for the web app) is active when:
  - At least one Frontal Analysis, Sagittal Recording, Tinetti, TUG, Static balance or SPPB activity is selected.
  - At least one Frontal Analysis is selected for the web version which only allows downloading .csv files.
- "Delete"** is active when at least one activity is selected (not applicable on the web version).

## 6. Recording

 **This entire section is not applicable to the web version.**

- In the patient page click  to access the video recording page.
- A window asks you to choose the video recording protocol you want to use:



Choose an acquisition protocol

- ▼ Gait analysis
  - ☐ Frontal analysis
  - ☐ Sagittal recording
- ▼ Balance tests
  - ☐ Tinetti
  - ☐ Static balance
  - ☐ Short Physical Performance Battery
  - ☐ Timed Up and Go

Figure 13: Choosing an acquisition protocol

- Choose then click on  : you arrive on the calibration page.

### 6.1. Recording protocols

#### 6.1.1. Frontal analysis

- If you have chosen the acquisition protocol "Frontal analysis", you can make the corresponding recording. This protocol allows you to calculate the spatiotemporal and kinematic gait parameters.
- This protocol requires a configuration of the exercise area prior to the recording, to allow the calculation of the parameters and the 3D display.

## 6.1.1.1. Calibration of the exercise area

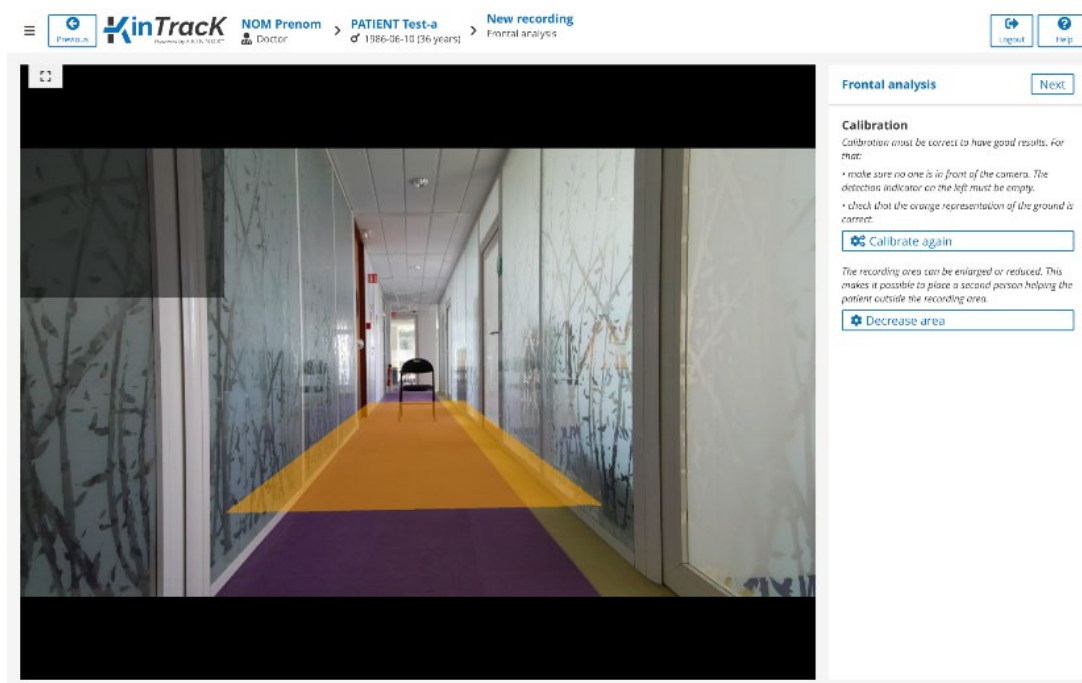



Figure 14: Calibration page (frontal analysis, TUG, Tinetti or SPPB)

- The calibration page displays the camera's field of view as well as:
  - A yellow area that represents the ground detected by the device.
  - A gray screen in the upper left corner that will display the patient's silhouette in pink when the patient is detected.
- To calibrate the exercise area:
  - Make sure that the patient's walking area in front of the camera is completely clear.
  - Set up the exercise area by pressing the button:
 


- The yellow area on the image is recalculated and corresponds to the area on which the patient's gait can be analyzed.

**⚠ The patient should not be in front of the camera at this point.**

**⚠ It is essential to configure the exercise area before recording an activity, even if the yellow area representing the ground detected by the device is present.**



- You can reduce the width of the exercise area by clicking on

 Decrease area

- By clicking on this button, the exercise area is both reduced and configured.

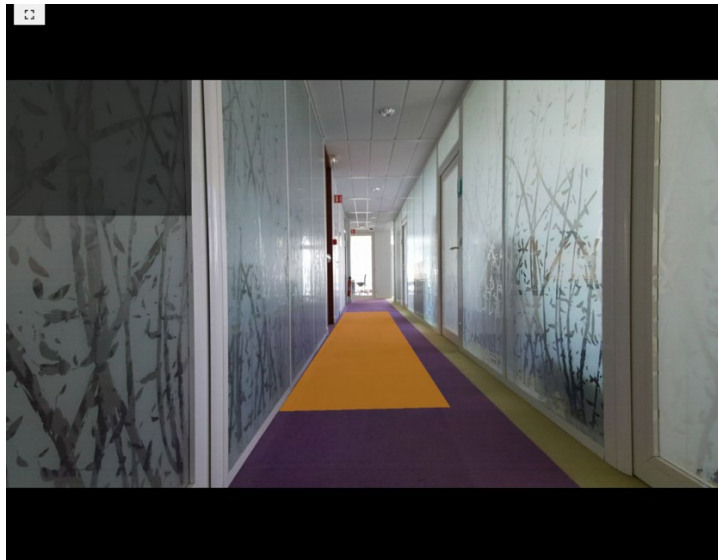


Figure 15: Reduced exercise area

#### 6.1.1.2. Patient detection

- Place the patient in the camera's field of view, at the end of the yellow zone (see figure below).
- Verify that only the patient's silhouette appears in pink on the top left detection indicator.

**⚠ If the patient's silhouette does not appear, ask the patient to move forward until the silhouette appears in pink.**

**⚠ To obtain good results, the patient must be detected at least at 5 m in front of the camera.**

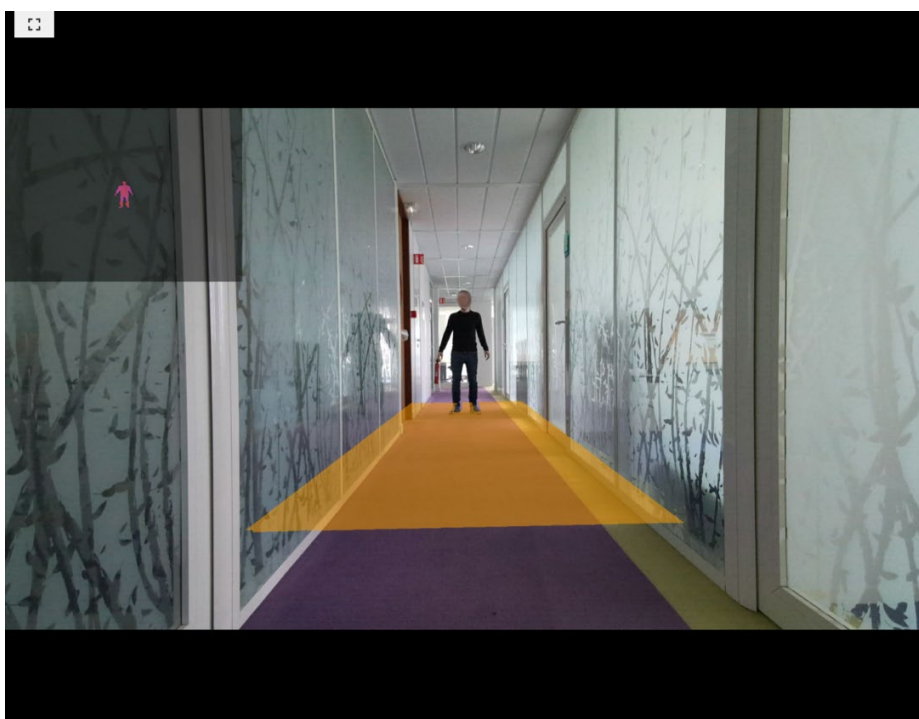


Figure 16: Patient positioning

- If you are recording with a caregiver support, reduce the exercise area so that the caregiver's silhouette does not appear on the detection indicator.

**Note:** You can place cones to define the boundary between the patient and the caregiver and prevent the caregiver from entering the exercise area.

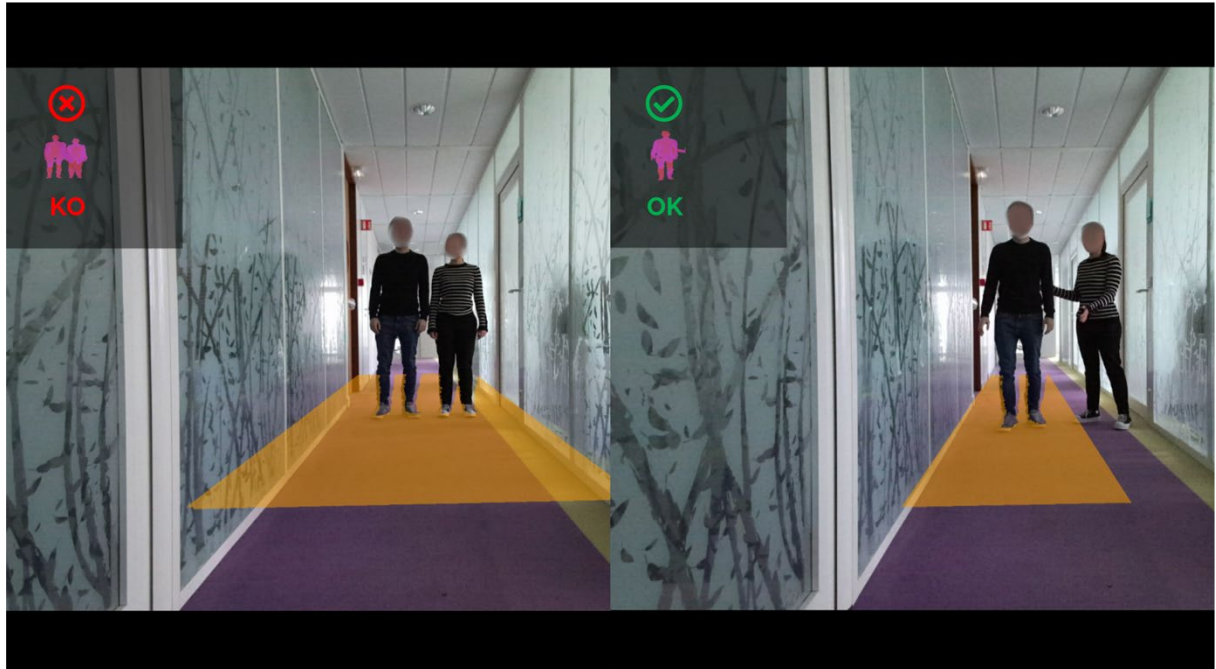


Figure 17: Reduced area benefit for a gait analysis with a caregiver support

- Once the exercise area is calibrated, you can access the recording page corresponding to the protocol you have chosen by clicking on: [Next](#).

## 6.1.1.3. Recording

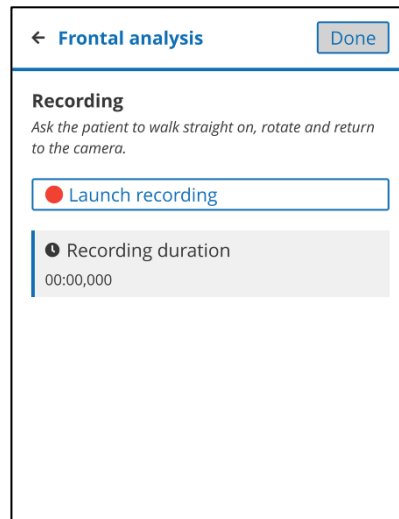






Figure 18: Recording of a frontal analysis

- Start the recording by clicking on 
- Ask the patient to walk as many go and return as desired (one way minimum), making sure that:
  - The patient starts walking outside the exercise area, either from the camera side or from the end of the exercise area.
  - The patient makes the U-turns outside the exercise area.
- Stop the recording by clicking on 
- You can then redo the recording by clicking on: 

 **The previous record will be deleted.**

- When the recording is complete, click  to return to the patient page.

 **To get parameters, you need to have at least one walking sequence (one way or back) with:**

- A duration of at least 3 seconds
- A walking distance of at least 2 m

**Otherwise, you will have a video recording without walking sequences and without parameters.**

#### 6.1.1.4. Editing sequences

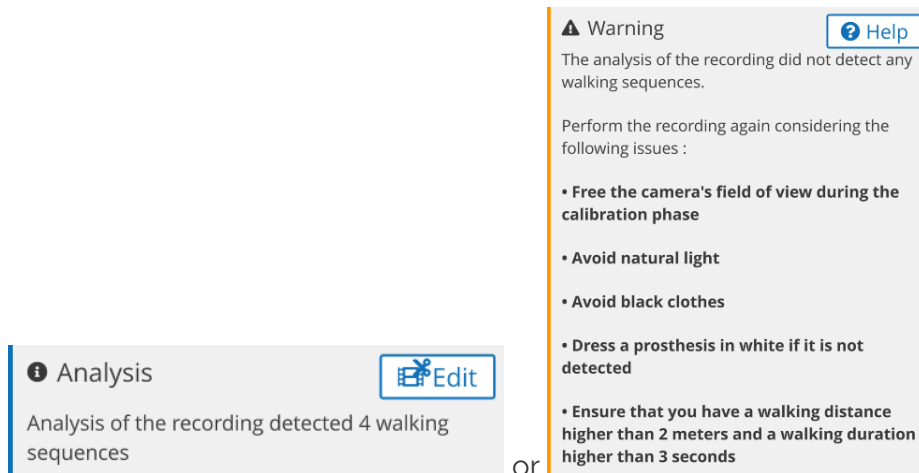


Figure 19: Sequence detection messages

- At the end of a recording in frontal analysis, a message indicates how many sequences have been detected or displays a message that reminds the user of the instructions for redoing the recording.
- If no sequence was detected, repeat the recording after having:
  - **recalibrated the floor:** during calibration, no one should be in the camera's field of view, especially the patient should not be in the exercise area.
  - Once the calibration is done, **the gray box in the upper left corner of the video should not contain any pink areas.** If it does, remove any infrared light sources, usually natural light, and redo the calibration.
  - Then verify that the patient is fully detected when in the exercise area:
    - **The whole silhouette appears in pink.**
    - If some parts of the silhouette do not appear (lower body, prosthesis, ...), it is due to clothing or materials that absorb infrared radiation, typically if they are black.
- If sequences have been detected, it is possible to edit them by clicking on



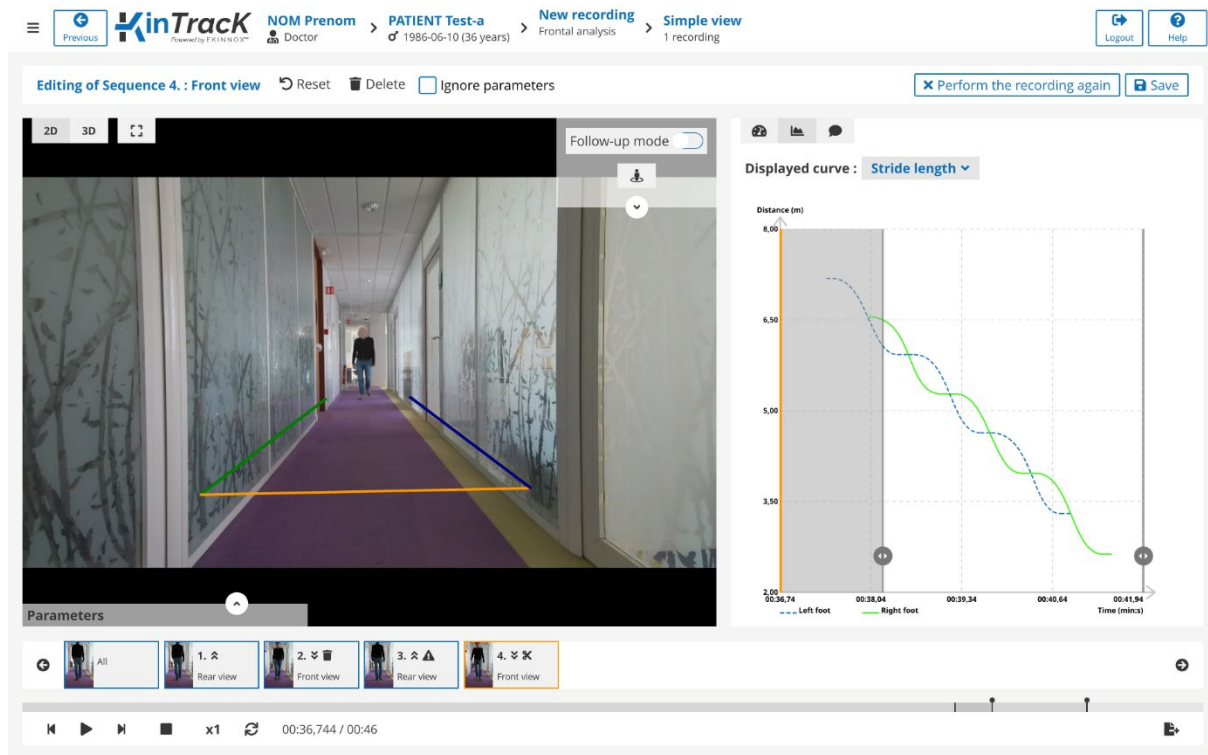








Figure 20: Sequence editing

- Click on  : the editing page appears.
- The first sequence is displayed. Click on one of the thumbnails below the images to display another sequence.
- Click on "Delete" to delete a sequence: a sign  appears on the corresponding thumbnail.
- Tick "Ignore parameters" if you want to keep a sequence for visualization but exclude its results for the calculation of the gait parameters: a sign  appears on the corresponding thumbnail.
- Move the round sliders on the graphs  ,  
or reduce the walking sequence on the video player thread   
to reduce the sequence: a sign  appears on the corresponding thumbnail.
- Click "Perform the recording again" to return to the recording page.
- Click "Reset" to undo changes made to a sequence.

- Click on "**Save**": a page lists the performed modifications.

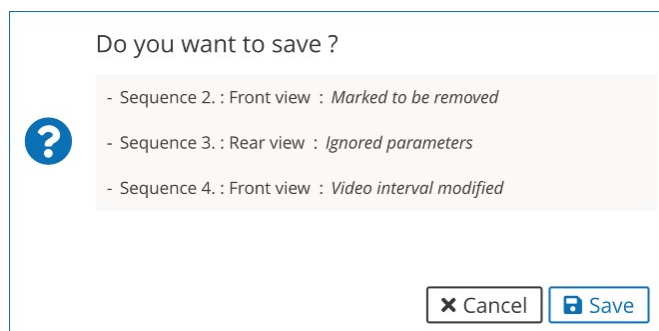


Figure 21: Confirmation of sequence editing.

- Click on "**Save**" to save the changes and return to the patient page.
- Click on "**Cancel**" to return to the editing page.

#### 6.1.2. Sagittal recording

- If you have chosen the acquisition protocol 'Sagittal recording', you can make the corresponding recording. This protocol allows you to record a video of the patient seen from the side to visually appreciate the characteristics of his/her gait, and to visualize simultaneously with a frontal video if necessary.
- This protocol requires a configuration of the exercise area prior to the recording, to allow a 3D display.



### 6.1.2.1. Configuration of the exercise area

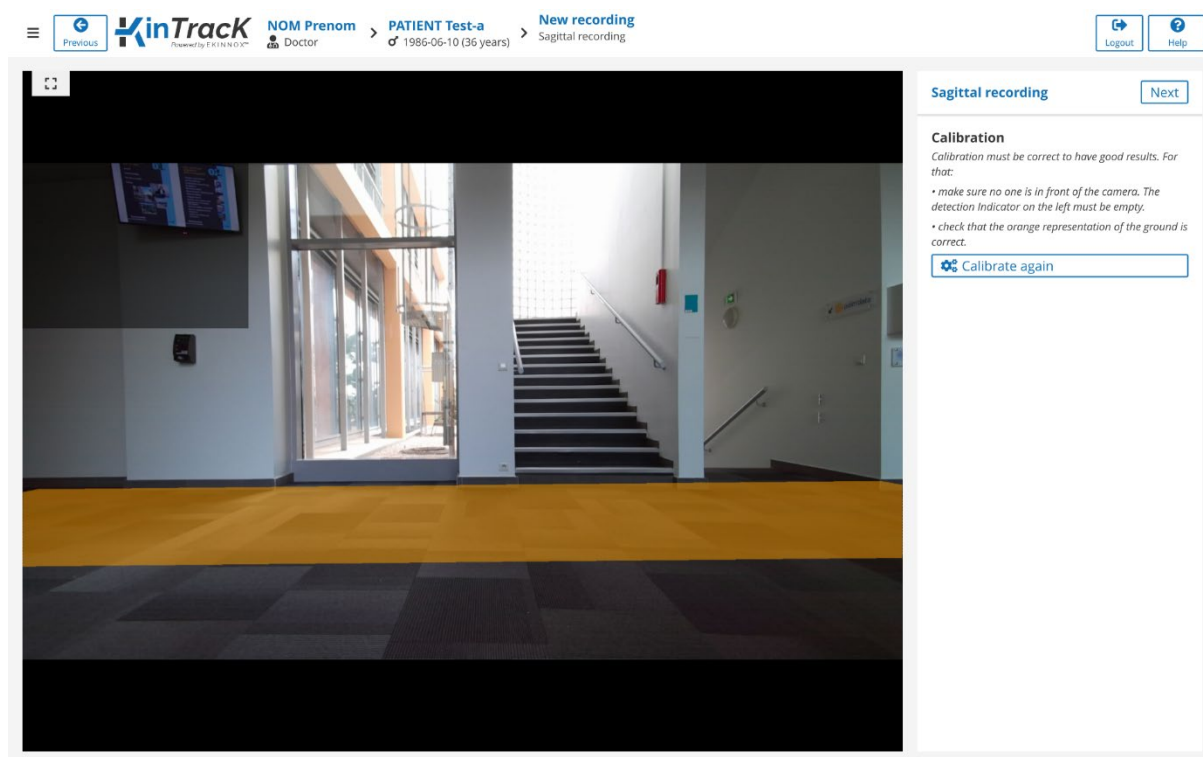



Figure 22: Calibration page, sagittal record

- The calibration page displays the camera's field of view as well as:
  - A yellow area that represents the patient's activity zone.
  - A gray screen in the upper left corner that will display the patient's silhouette in pink when the patient is detected.
- To calibrate the exercise area:
  - Make sure that the area of patient activity in front of the camera is completely clear.
  - Set up the exercise area by pressing the button:
 

 Calibrate again
  - The yellow area on the image is recalculated and corresponds to the area on which the patient's walk can be performed to have the 3D view of the patient.



## 6.1.2.2. Patient detection

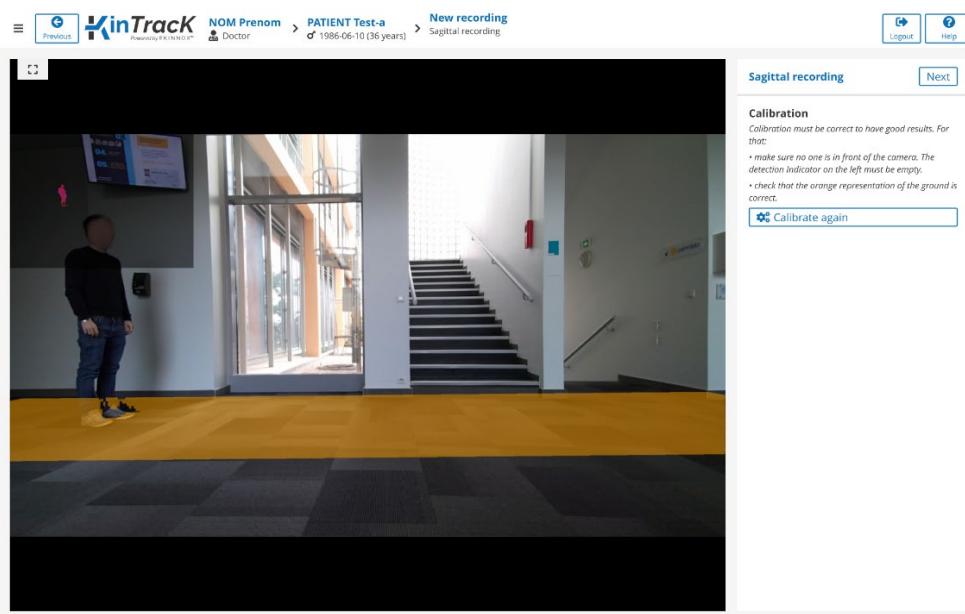


Figure 23: Patient detection, sagittal recording

- Place the patient at either the left or right end of the activity area.
- Verify that the patient's silhouette appears in pink on the detection indicator in the upper left corner.

**⚠ If his/her silhouette does not appear, you can make the recording, but you will not have a 3D view of the patient nor the possibility to zoom on the patient's feet.**

### 6.1.2.3. Recording

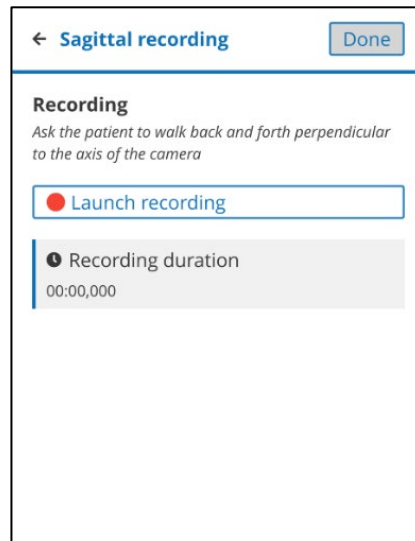





Figure 24: Sagittal recording

1. Give the instruction to the patient and click on 
2. Once the activity is completed, click on: 
- You can then redo the recording by clicking on: 

 **The previous record will be deleted.**

3. When the recording is complete, click  to return to the patient page.

 **To obtain sagittal gait sequences, a gait portion must have at least:**

- **A duration of 2 seconds**
- **A distance of 2 meters**

**Otherwise, you will have a video recording of the patient without walking sequences.**

### 6.1.3. Timed Up-and-Go (TUG)

- If you have chosen the 'Timed Up and Go' acquisition protocol, you can make the corresponding recording. This protocol allows you to perform a functional evaluation according to the 'Timed Up and Go' test and to simultaneously record the performed exercise.
- This protocol requires a configuration of the exercise area (see Calibration of the exercise area) prior to recording, to allow the 3D display.
- Once the exercise area has been calibrated, you can access the recording page by clicking on [Next](#).

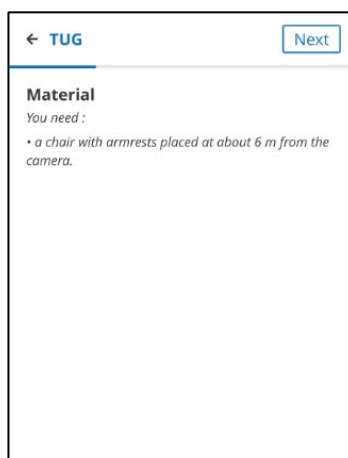


Figure 25: TUG, material window

- Set up the material as indicated and click on [Next](#).

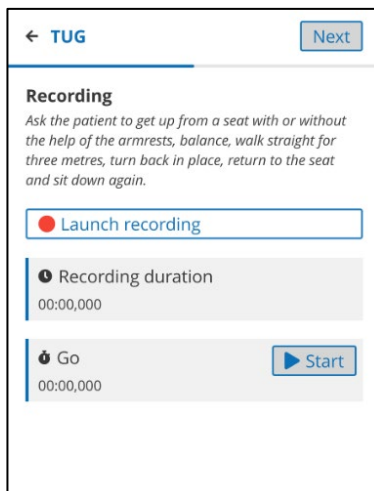







Figure 26: TUG, recording window

- Explain the instruction to the patient and then click .
- Say 'GO' and simultaneously click on .
- When the patient finishes the exercise, click on .

**Note:** you can skip the two previous steps because it will be possible to adjust the stopwatch time in the next step.

- After a few seconds click on .
- You can redo an exercise and its recording by clicking on . Otherwise click on  to access the forms.

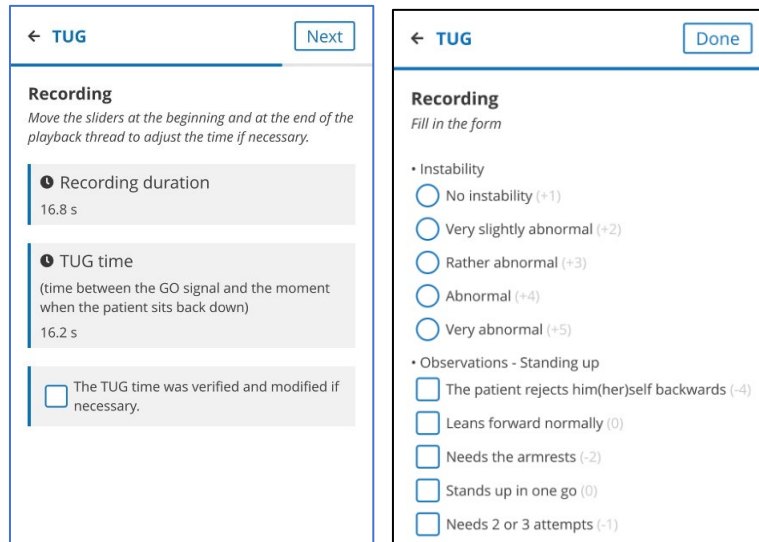
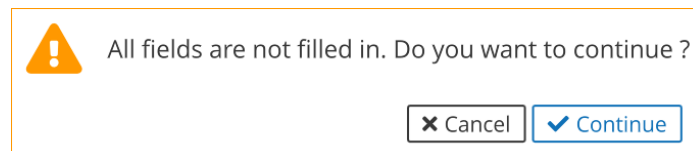


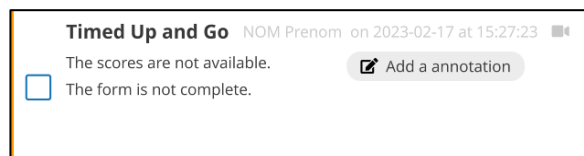
Figure 27: TUG, form windows

At this point, you can either:

- Fill out the form directly (on the right) and adjust the time (with the markers on the feed below the video) with the help of the exercise video that you can watch simultaneously on the left of the form. You can give multiple answers for the square checkboxes. Once the form is filled, click on **Done**.
- Click directly on **Done** to complete the form later. A message will ask you if you really want to finalize without completing the form.



If the forms have not been completed, the results will not be available.



Opening the activity will prompt you to complete the form. You can also adjust the time.

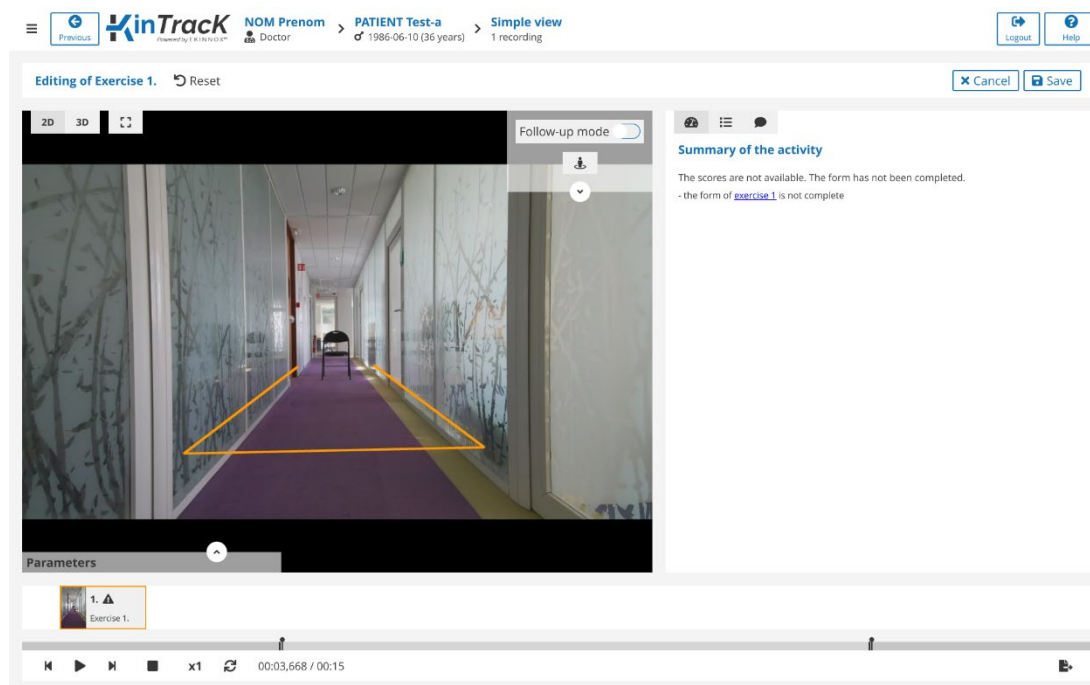


Figure 28: Window for visualizing an incomplete TUG activity

Once you have validated the time and completed the form, click on "Save". The score is then calculated, and the main results are available in the list of activities.

#### 6.1.4. Tinetti

- If you have chosen the 'Tinetti' acquisition protocol, you can make the corresponding recording. This protocol allows you to perform a functional evaluation according to the 'Tinetti' test and to simultaneously record the exercises performed.
- This protocol requires a configuration of the exercise area (see Calibration of the exercise area) prior to recording, to allow the 3D display.
- Once the exercise area has been calibrated, you can access the recording page by clicking on [Next](#).

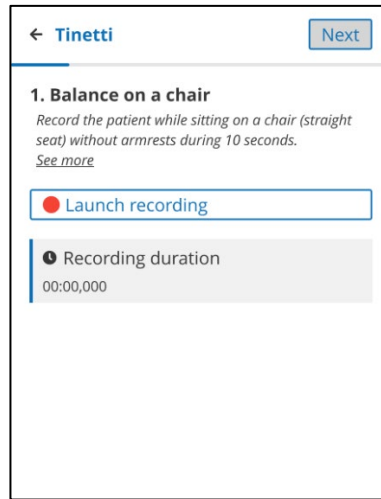






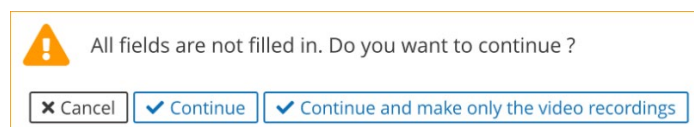
Figure 29: Tinetti, exercise 1

The test with the patient can then begin:

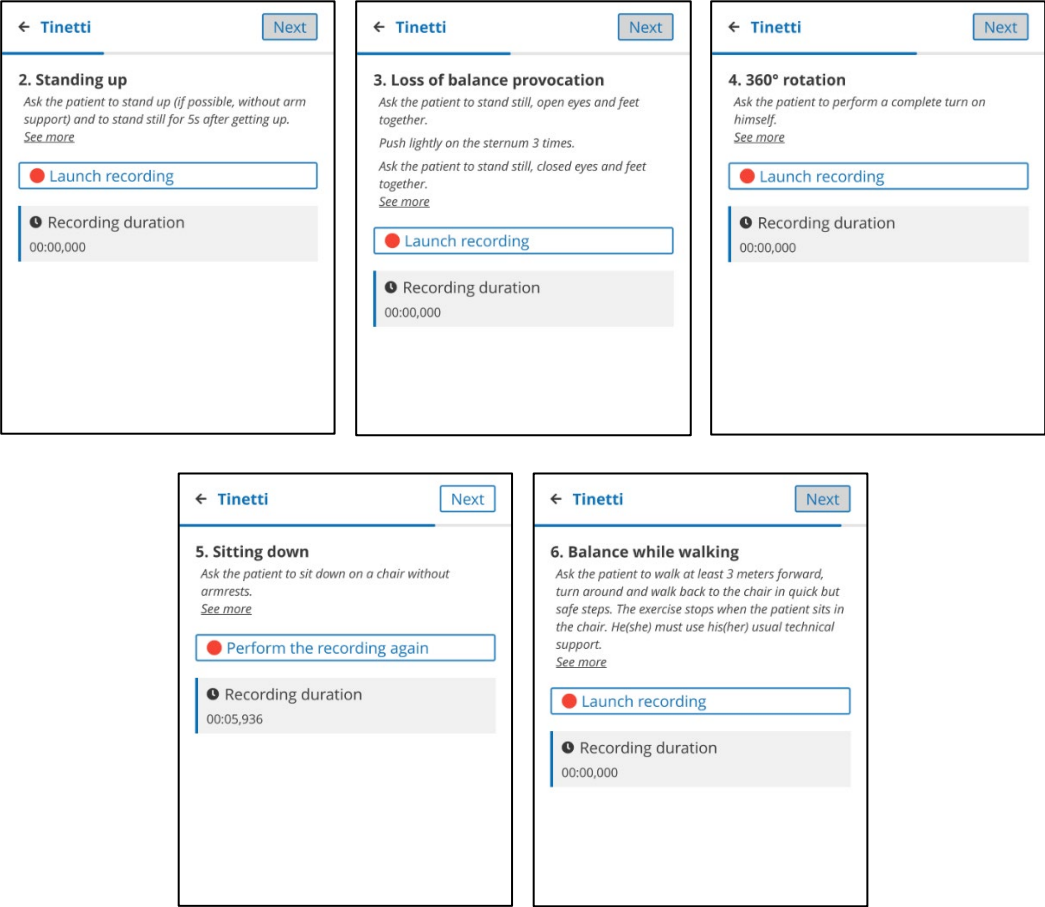
1. Give the patient the instruction and click .  
You can view the form for each exercise by clicking on "See more".
2. Once the activity is completed, click on: .

You can then redo the recording by clicking on: .

3. Click on . The video that has just been recorded is then played in a loop and the form corresponding to the exercise is displayed. You then have 2 choices:
  - You can fill out the form and proceed to the next step,
  - You can click directly on  without filling in the form. A confirmation window will appear asking you if you want to fill in later:
    - Only this form, in this case, the forms will be displayed for the next exercises.
    - All the next ones, in this case, only the video recordings will be displayed for the next exercises.



4. Repeat steps 1 to 3 for each of the 6 exercises.



The figure displays five screenshots of the Tinetti assessment interface, specifically exercises 2 through 6. Each screen features a title, instructions, a 'Launch recording' button, and a 'Recording duration' timer.

- Exercise 2: Standing up**  
Ask the patient to stand up (if possible, without arm support) and to stand still for 5s after getting up.  
[See more](#)  
Launch recording  
Recording duration: 00:00,000
- Exercise 3: Loss of balance provocation**  
Ask the patient to stand still, open eyes and feet together.  
Push lightly on the sternum 3 times.  
Ask the patient to stand still, closed eyes and feet together.  
[See more](#)  
Launch recording  
Recording duration: 00:00,000
- Exercise 4: 360° rotation**  
Ask the patient to perform a complete turn on himself.  
[See more](#)  
Launch recording  
Recording duration: 00:00,000
- Exercise 5: Sitting down**  
Ask the patient to sit down on a chair without armrests.  
[See more](#)  
Perform the recording again  
Recording duration: 00:05,936
- Exercise 6: Balance while walking**  
Ask the patient to walk at least 3 meters forward, turn around and walk back to the chair in quick but safe steps. The exercise stops when the patient sits in the chair. He(she) must use his(her) usual technical support.  
[See more](#)  
Launch recording  
Recording duration: 00:00,000

Figure 30: Tinetti, exercises 2 to 6

5. When the 6 records are complete, click **Done** to return to the patient page.

If some forms have not been completed, the results will not be available.



The screenshot shows the 'Tinetti' results summary for patient 'NOM Prenom' on 2023-02-17 at 15:32:33. It indicates that scores are not available because the form is not complete. There is an 'Add a annotation' button.

**Tinetti** NOM Prenom on 2023-02-17 at 15:32:33

The scores are not available.

☐ The form is not complete

[Add a annotation](#)

When the activity opens, you will be prompted to complete the forms by clicking on the links on the right side of the screen.



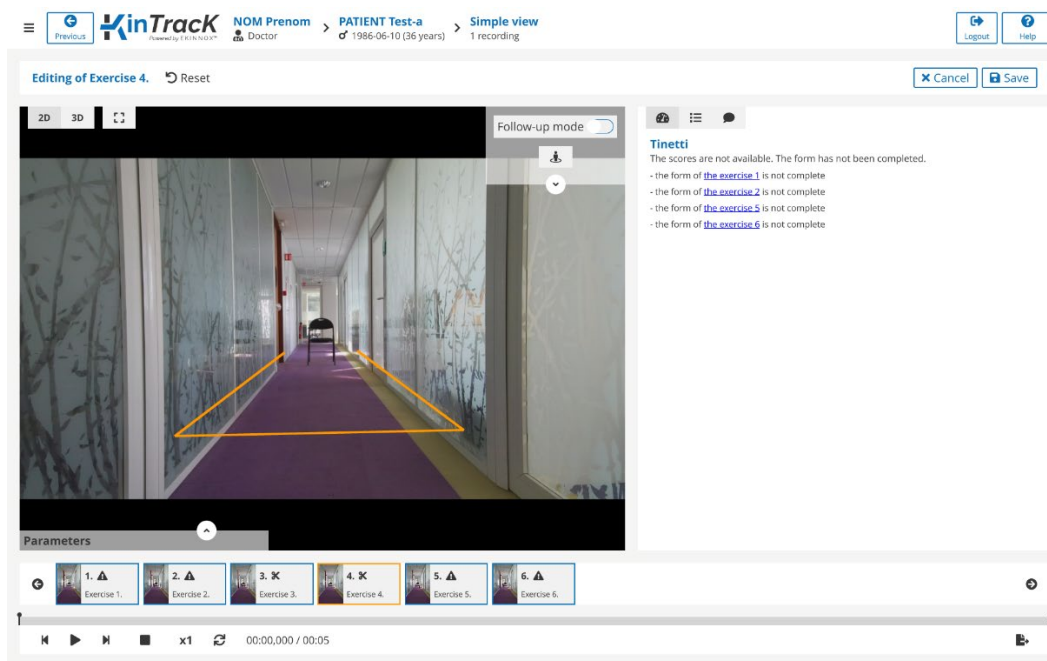


Figure 31: Uncomplete Tinetti visualization

Once all the forms are completed, click on "Save". The score is then calculated, and the main results are available in the list of activities.

#### 6.1.5. Static balance

- If you have chosen the 'Static balance' acquisition protocol, you can make the corresponding recording. This protocol allows you to assess a patient as he or she performs a static balance exercise and simultaneously record the exercise performed.
- This protocol requires the exercise area to be configured prior to recording, to enable 3D display and calculation of exercise parameters.

### 6.1.5.1. Configuration of the exercise zone

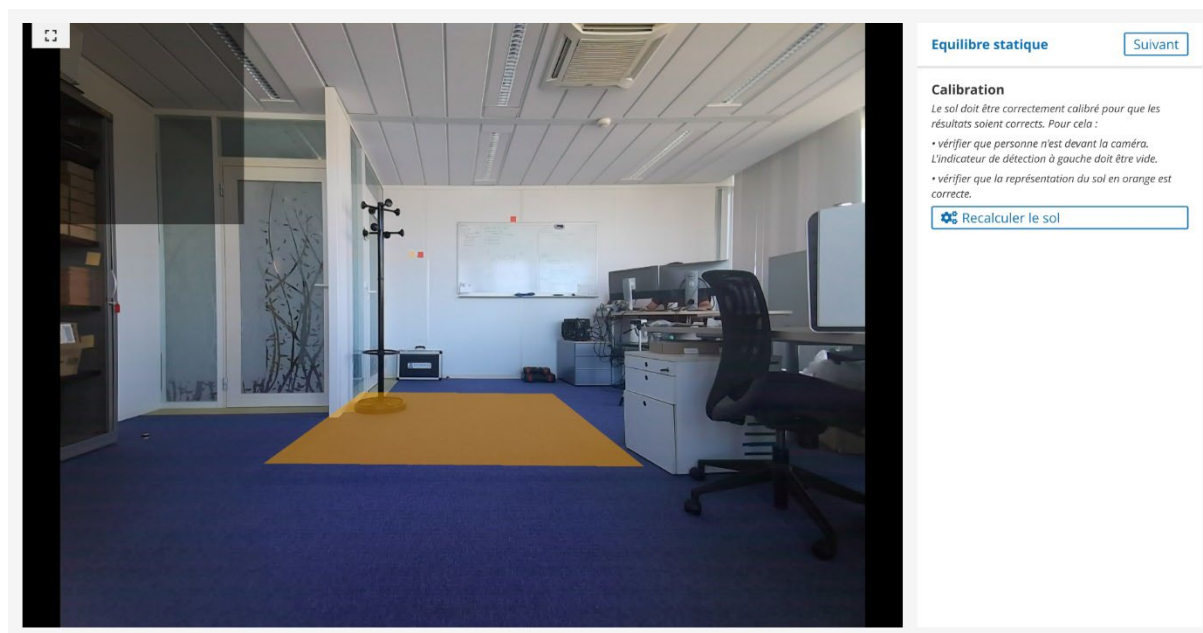



Figure 32 : Configuration of the static balance exercise zone

- The calibration page displays the camera's field of view and:
  - A yellow zone representing the patient's activity zone.
  - A grey insert in the top left-hand corner which will display the patient's silhouette in pink when the patient is detected.
- To calibrate the exercise zone:
  - Ensure that the area of patient activity in front of the camera is completely clear.
  - Configure the exercise zone by pressing the button:
 

 Calibrate again
  - The yellow area on the image is recomputed and corresponds to the area in which the patient should be place for the static balance exercise.

### 6.1.5.2. Recording

- Once the exercise area has been calibrated, you can access the recording page by clicking on [Next](#).

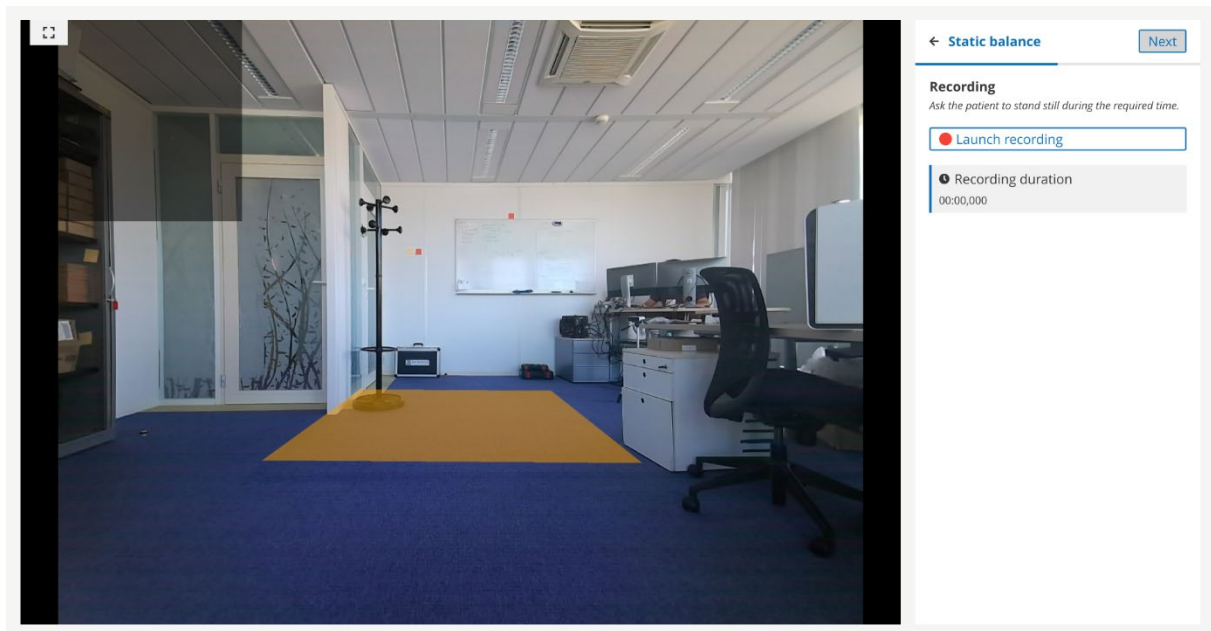


Figure 33 : Static balance recording page

- Explain the instructions to the patient and click [Launch recording](#).
- Once the exercise has been completed, click [Stop recording](#).
- You can repeat an exercise and its recording by clicking on [Perform the recording again](#). Alternatively, click [Next](#) to adjust the balance time.

**Note: to ensure safety, one person must remain close to the patient in case of a fall.**

← Static balance
Done

---

**Recording**  
Move the sliders at the beginning and end of the playback thread to adjust the balance time if necessary.

Recording duration

10.5 s

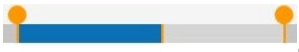
Balance duration

10.5 s

☐ The balance duration was verified and modified if necessary.

Figure 34 : Adjust balance time

At this stage, you can either:

- Adjust the balance time using the video player thread , tick the box indicating that the time has been validated and click Done to return to the patient page where a Static balance activity has been created with balance parameters. The parameters are balance time, lateral imbalance, frontal imbalance.
- Click directly on Done to adjust the time later. If the balance time has not been validated, the results will not be accessible.

**Static balance**
NOM Prenom on 2023-09-14 at 15:43:56

☐ The scores are not available.  
☐ Balance duration is not validated.

Add an annotation



- Opening the activity gives the possibility to adjust and validate the balance time.

#### 6.1.6. SPPB (Short Physical Performance Battery)

- If you have chosen the 'SPPB' acquisition protocol, you can make the corresponding recording. This protocol allows you to carry out a functional assessment using the 'SPPB' test and simultaneously record the performed exercises.
- This protocol requires the exercise area to be configured (See 6.1.1.1) prior to recording, to enable 3D display.
- Once the exercise zone has been calibrated, you can access the recording page by clicking on [Next](#).

##### Notes:

- **Once the exercise area has been calibrated, it is used for all SPPB exercises. As a result, neither the trolley nor the camera should be moved for the duration of the SPPB assessment.**
- **Ensure safety: one person must remain close to the patient during the exercises to prevent any falls.**

##### 6.1.6.1. SPPB static balance tests

- The test begins with the feet together stand balance exercise.

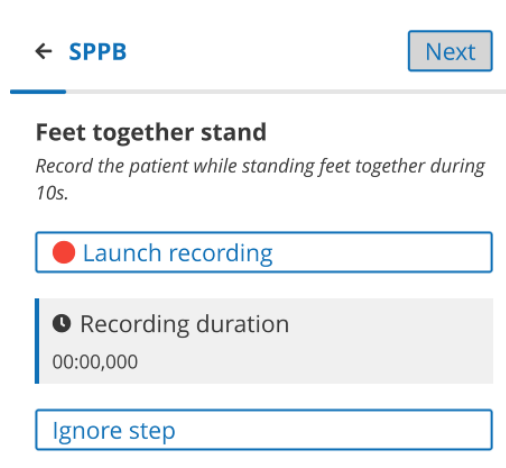
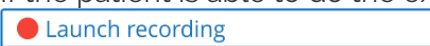
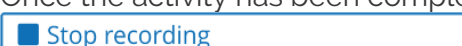


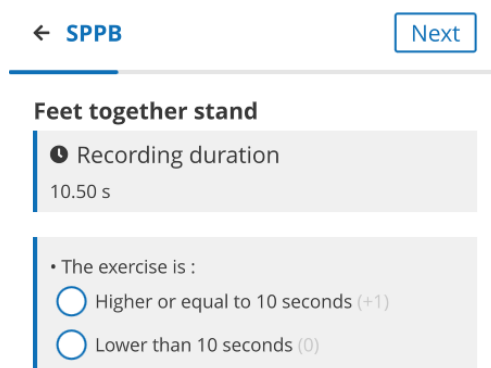


Figure 35 : SPPB feet together recording page

- Ignore the exercise if the patient is unable to do it by clicking "Ignore": the gait analysis recording window is displayed (see 6.1.6.2).
- If the patient is able to do the exercise, give the patient the instructions and click .
- Once the activity has been completed, click on .
- You can then repeat the recording by clicking on .
- Click on . The video that has just been recorded is displayed on the left and a form allows you to choose between 2 options:



← SPPB Next

**Feet together stand**



🕒 Recording duration  
10.50 s

• The exercise is :

☐ Higher or equal to 10 seconds (+1)

☐ Lower than 10 seconds (0)

Figure 36 : Feet together balance validation

- If the patient's feet were together for less than 10s, tick the corresponding option and click : the gait analysis recording window is displayed (See 6.1.6.2).
- If the patient has remained feet together for more than 10s, tick the corresponding choice and click : the semi-tandem balance recording window is displayed.

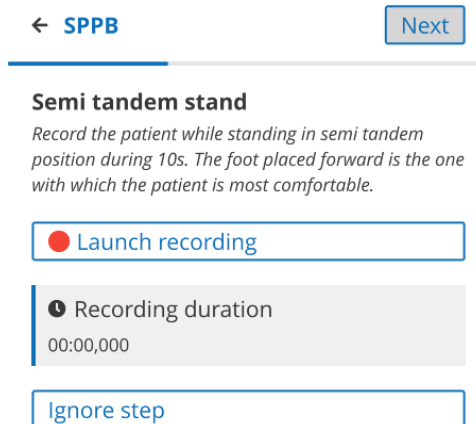

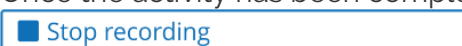




Figure 37 : semi-tandem balance recording

- Ignore the exercise if the patient is unable to do it by clicking "Ignore": the gait analysis recording window is displayed (see 6.1.6.2).
- If the patient is able to do the exercise, give the patient the instructions and click .
- Once the activity has been completed, click on .
- You can then repeat the recording by clicking on .
- Click on . The video that has just been recorded is displayed on the left and a form allows you to choose between 2 options:

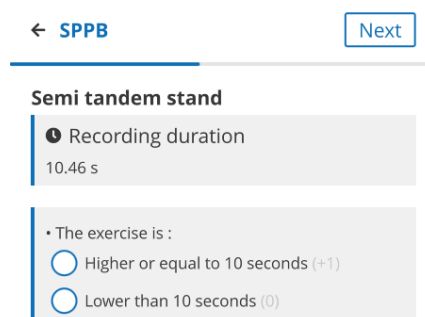

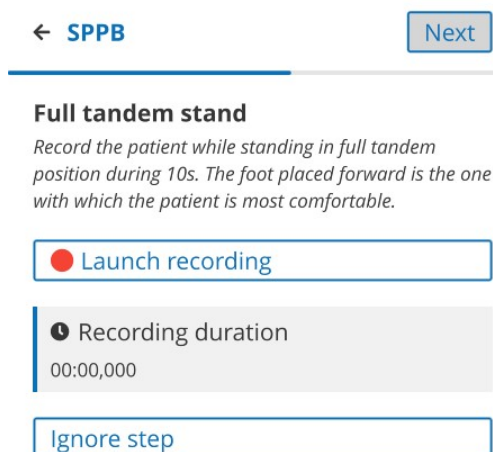


Figure 38 : SPPB semi-tandem validation

- If the patient has stayed in semi-tandem position for less than 10s, tick the corresponding option and click : the gait analysis recording window is displayed (See 6.1.6.2).

- If the patient has remained in semi-tandem position for more than 10s, tick the corresponding choice and click [Next](#) : the full tandem balance recording window is displayed.



← SPPB [Next](#)

**Full tandem stand**

*Record the patient while standing in full tandem position during 10s. The foot placed forward is the one with which the patient is most comfortable.*

[Launch recording](#)

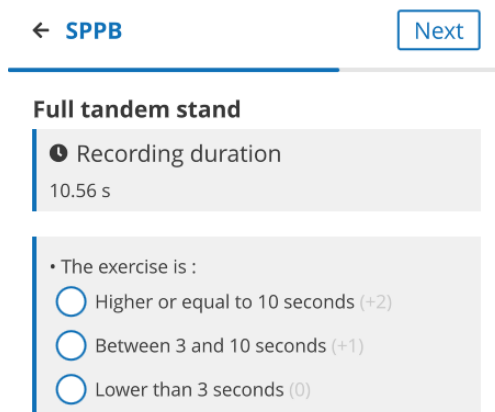
[Recording duration](#)  
00:00,000

[Ignore step](#)

Figure 39 : Full tandem stand recording

- Ignore the exercise if the patient is unable to do it by clicking "Ignore": the gait analysis recording window is displayed (see 6.1.6.2).
- If the patient is able to do the exercise, give the patient the instructions and click [Launch recording](#).
- Once the activity has been completed, click on [Stop recording](#).
- You can then repeat the recording by clicking on [Perform the recording again](#).
- Click on [Next](#). The video that has just been recorded is displayed on the left and a form allows you to choose between 3 options:





← SPPB Next

---

**Full tandem stand**

🕒 Recording duration  
10.56 s

• The exercise is :

☐ Higher or equal to 10 seconds (+2)

☐ Between 3 and 10 seconds (+1)

☐ Lower than 3 seconds (0)

Figure 40 : SPPB semi-tandem validation

- Tick the option corresponding to the time that the patient stayed in full tandem position and click Next: the gait analysis recording window is displayed (See 6.1.6.2).

#### 6.1.6.2. Gait test



← SPPB Suivant

---

**Vitesse de marche**

*Demander au patient de marcher droit, de pivoter sur place, de retourner vers la caméra.*

● Lancer l'enregistrement

🕒 Durée d'enregistrement  
00:00,000

Ignorer l'étape

Figure 41 : SPPB gait recording

- Ignore the exercise if the patient is unable to do it by clicking "Ignore": the chair exercise recording window is displayed (see 6.1.6.3).
- If the patient is able to do the exercise, give the patient the instructions and click ● Launch recording.



- Once the activity has been completed, click on [Stop recording](#).
- 2 walking speeds are calculated, forward and backward, and displayed if available.
- You can perform the recording again by clicking on [Perform the recording again](#), if no speed is displayed or if they are not satisfying.

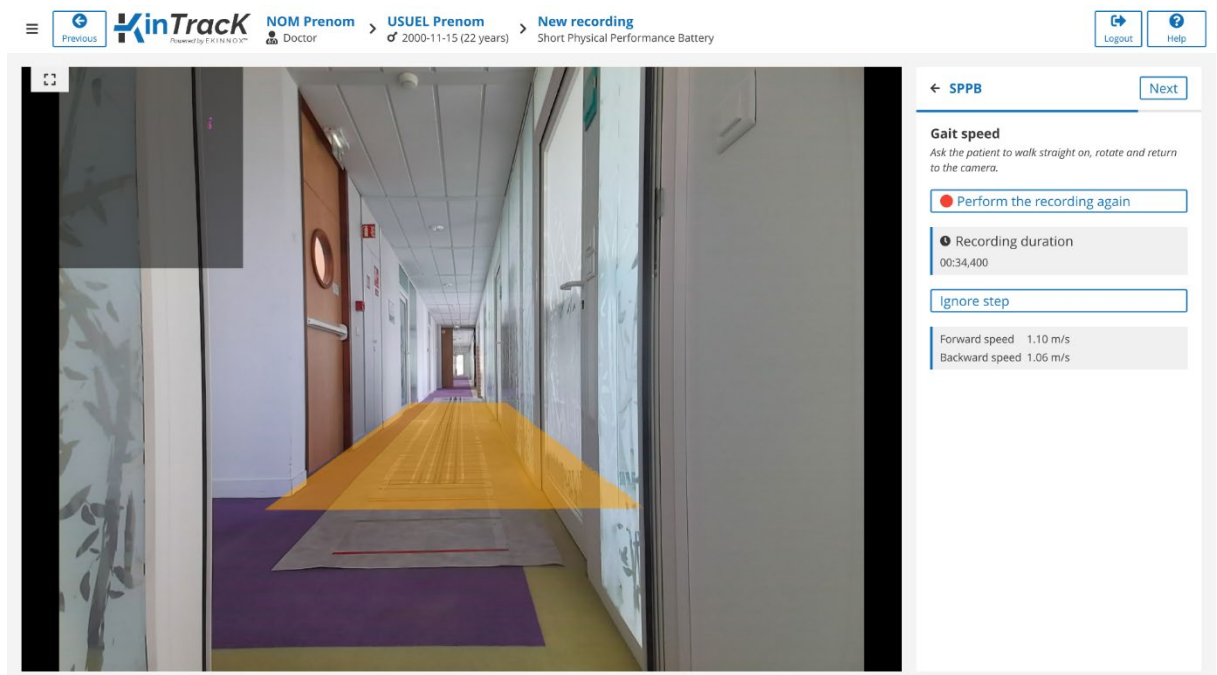
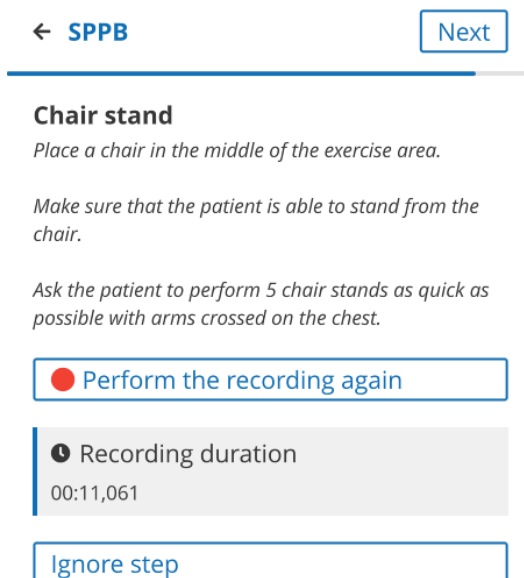


Figure 42 : Results of SPPB gait analysis

- Click [Next](#): the chair analysis recording window is displayed (See 6.1.6.3).

### 6.1.6.3. SPPB chair stand test



← SPPB Next

---

**Chair stand**

*Place a chair in the middle of the exercise area.*

*Make sure that the patient is able to stand from the chair.*



*Ask the patient to perform 5 chair stands as quick as possible with arms crossed on the chest.*

● Perform the recording again

🕒 Recording duration  
00:11,061



Ignore step

Figure 43 : SPPB chair stand recording

- Ignore the exercise if the patient is unable to do it by clicking "Ignore": the patient page is displayed with a new SPPB activity.
- If the patient is able to do the exercise, give the patient the instructions and click  when the patient starts the exercise.
- Once the activity has been completed, click on  when the patient ends the exercise.

#### Notes:

- **The exercise starts when the patient is sitting and ends when the patient is standing.**
- **The patient's back does not have to rest against the back of the chair.**
- **The height of the chair should be adapted to the patient's height, allowing them to sit with their feet on the floor and their knees bent at an angle of 90°.**

- You can then perform the recording again by clicking on .
- Click on . The video that has just been recorded is displayed on the left and a form allows you to choose between 2 options:

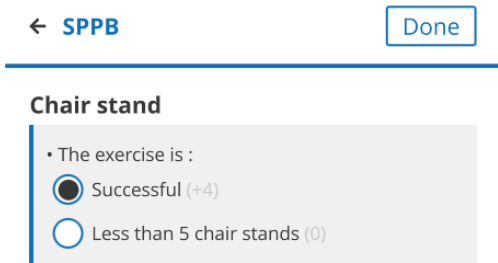



Figure 44 : SPPB chair stand validation

- If the patient has successfully completed the exercise, tick « Successful ».
- If the patient was not successful and performed less than 5 chair stands, tick "Less than 5 chair stands".
- Click on "Done": return to the patient page where an SPPB activity has been created with the total score and a score for each of the exercises.

## 6.2. Enter a comment for a patient

- To enter a comment about the patient, click on .
- Enter the text in the proposed input field:

**New comment**

 **Keyword**

Click here to enter a comment

✕ Cancel



 Save

- You can define keywords. To do so, click on "**Keyword**" at the top left, or precede your word with a # sign.
- Save by clicking on the "**Save**" button.
- Your comment appears in the list of patient activities:

 **Comment** NOM Prenom on 2023-02-17 at 15:15:36

This is a new #observation

### 6.3. *Enter annotations about the activity*

- On the patient page, for an activity, click on  Add an annotation or  . The visualization page opens with the annotation area.

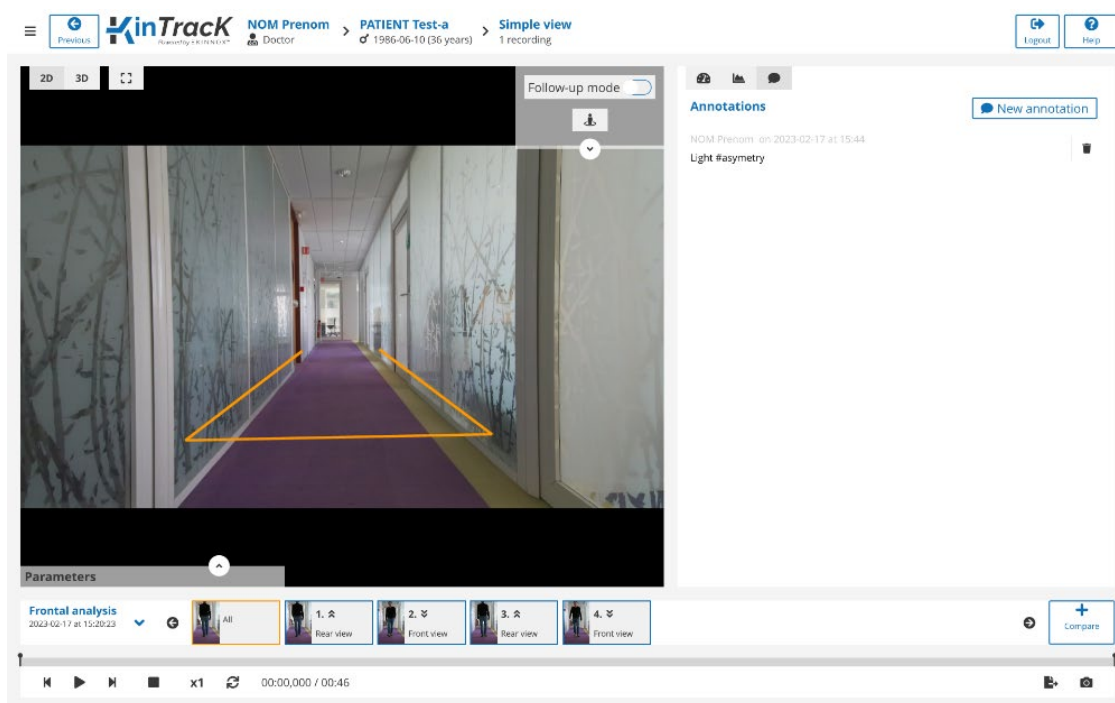
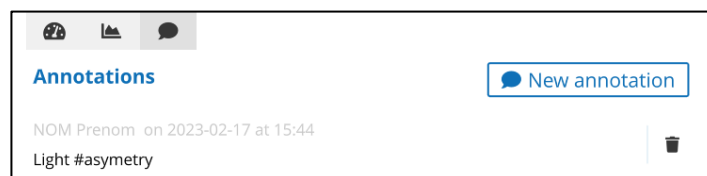



Figure 45: Visualization page with the annotation area

- Previously entered annotations appear if any:



- Click on "**New Annotation**" to write a new annotation.
- Enter the text in the proposed input field.

**New annotation**

 Keyword

Light #asymetry


✕ Cancel
Save



- You can define keywords. To do so, click on "**Keyword**" or precede your word with a # sign.
- The keywords will be visible in the patient page, in the patient information and in the activity line.

## 7. Visualize a video recording

### 7.1. Visualization tools


- From the patient page, to visualize a recording, click on  or directly on a thumbnail image.
- Depending on the type of activity, you will be taken to the corresponding viewing page and the following viewing tools are available at the bottom of the screen:

00:02,159 / 00:22    Current time/total time of the recording

 Single frame backward playback

 Play/Pause


 Single frame forward playback

 Stop the video and return to the first frame of the video.


**x1** Slow motion. There are 3 reading speeds:

- Real speed
- 0.5 x real speed
- 0.25 x real speed

 Looped playback

 Take a screenshot (see 8.1 Screenshots for the inclusion of screenshots in reports)

- Additional tools are available on the top right of the image (open the menu of possible actions by clicking on the down arrow):

Follow-up mode 

Change the visualization mode: "Follow-up mode" deactivated, the camera stays fixed, activated, the camera moves virtually at the same time as the patient.



Return to initial position: allows you to reset the video view to its default configuration.



Zoom buttons:

- With "Follow-up mode" disabled: zoom in on a fixed point in the image.
- With "Follow-up mode" activated: zoom in on the patient while virtually maintaining the distance to him/her.



Allows you to move the viewing point on the video:

- With "Tracking Mode" disabled: vertically and horizontally, on any point of the video.
- With "Tracking mode" activated: only vertically, along the vertical axis passing through the patient's center of gravity.

- Several display modes are available in the upper left corner.

**3D** 3D visualization (See 7.6 3D view)

**2D** Back to video viewing



Full screen display

- A reading thread under the image allows:
  - to place yourself at a given moment of the video by clicking on the thread,
  - to restrict the part of the video you want to visualize by moving the sliders at each end of the thread with the mouse.
  - To visualize the position of each sequence on the entire recording.



- On the right side of the screen, different information can be displayed depending on the chosen icon:



Activity summary page



Functional assessment form or details



Annotations



Visualization of graphs



**Note:** Graphs are only available for frontal analysis and functional assessment forms or details are only available for Timed up and Go, Tinetti, Static balance and SPPB assessments.

## 7.2. Visualization of a frontal analysis

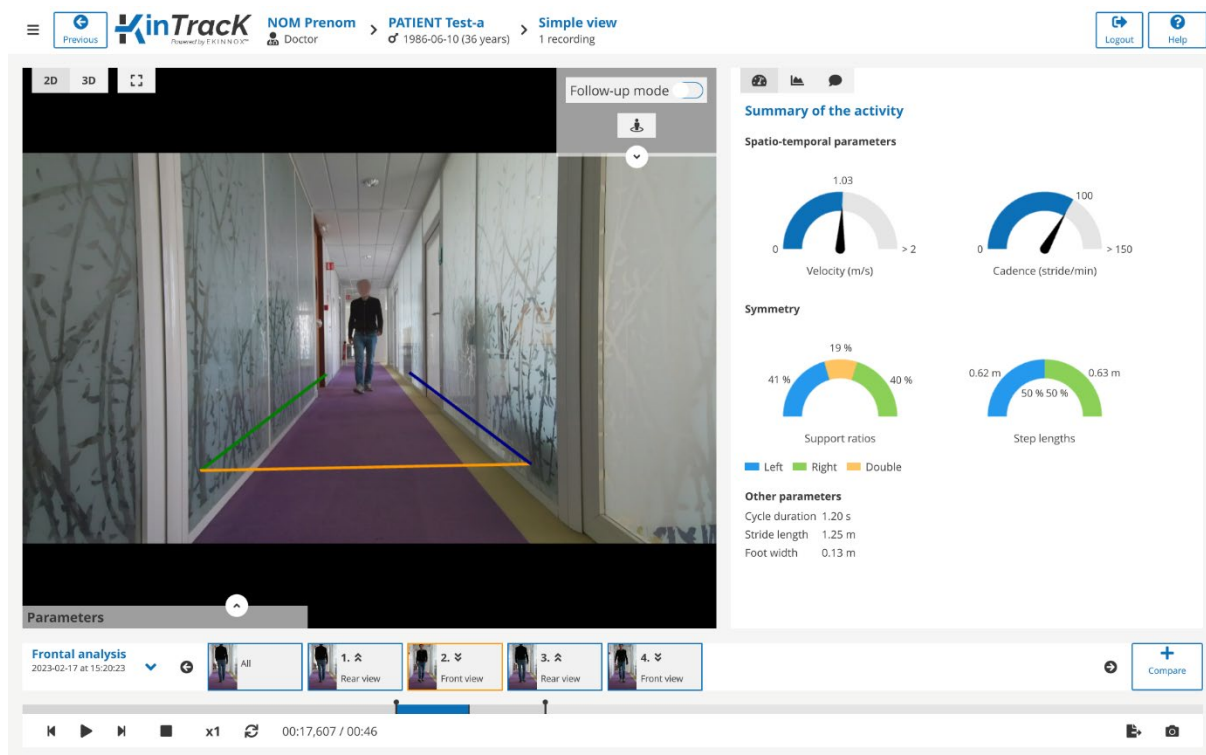



Figure 46: Visualization page, frontal analysis

- For a frontal analysis, the visualization page displays the first sequence extracted from the recording as well as the summary page of the activity, also accessible by clicking on .
- The sequences correspond to the different go and return performed by the patient, typically a trip to the camera (front view) or from the camera to the initial position (back view).
- Click on the desired sequence by clicking on one of the thumbnails at the bottom of the screen.



- For each sequence the gait parameters are calculated and displayed at the bottom left. Click on the up arrow to display them or on the down arrow to hide them.

Parameters	
Type	Front view
Duration	4.22 s
Distance	4.33 m
Velocity	1.03 m/s
Cadence	100 strides/min
Foot width	0.13 m
Step lengths	0.61 m 0.62 m
Stride length	1.23 m 1.23 m
Stance phase	59 % 0.71 s   60 % 0.72 s
Single support	40 % 0.47 s   41 % 0.49 s
Double support	20 % 0.24 s

Figure 47: Display of the gait parameters on the video

- Click on the "All" sequence thumbnail on the left to visualize the entire recording.

### 7.3. Visualization of a sagittal recording

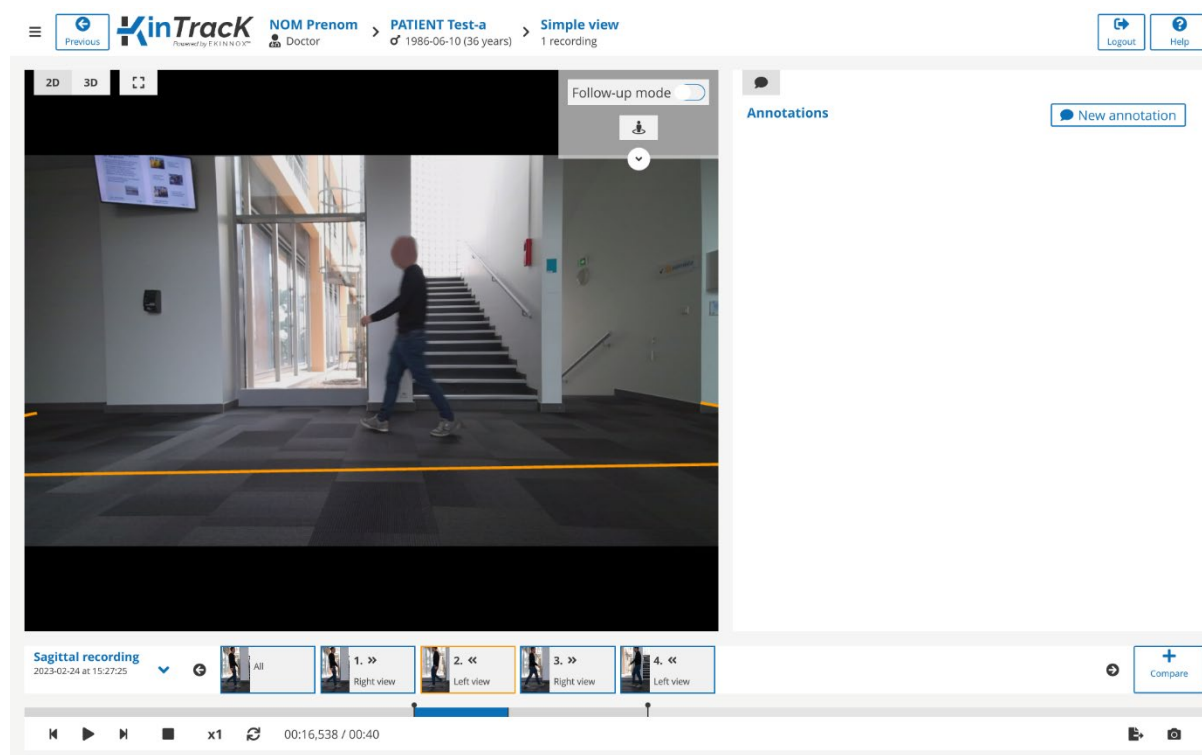


Figure 48: Visualization page, sagittal recording



- For a sagittal recording, the visualization page displays the first sequence extracted from the recording with the annotations on the right side.
- The sequences correspond to the different go and return performed by the patient, typically toward the right (right view) or toward the left (left view).
- Click on the desired sequence by clicking on one of the thumbnails at the bottom of the screen.
- Click on the "All" sequence thumbnail on the left to visualize the entire recording.

## 7.4. Visualization of a TUG evaluation

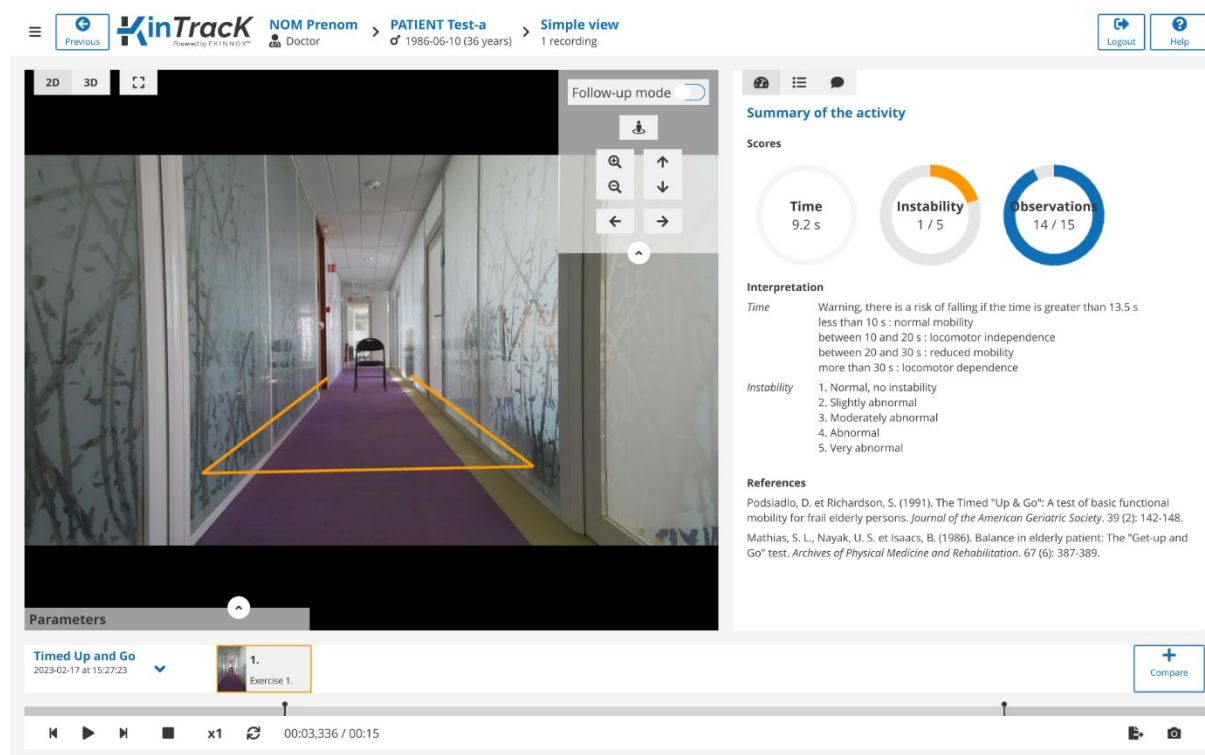


Figure 49: Visualization page, TUG summary

- For a TUG evaluation, the visualization page displays the video on the left and the summary on the right, also accessible by clicking on .
- The overall test result can be displayed in the lower left corner of the video by clicking on the up arrow.
- Click on to display the form corresponding to the video:



**Timed Up and Go**

**Form**

Ask the patient to get up from a seat with or without the help of the armrests, balance, walk straight for three metres, turn back in place, return to the seat and sit down again. The patient should begin the exercise at the "Go" signal.

- Time between the "Go" signal and the patient in sitting position  
00:09,2
- Instability
  - ☒ No instability (+1)
  - ☐ Very slightly abnormal (+2)
  - ☐ Rather abnormal (+3)
  - ☐ Abnormal (+4)
  - ☐ Very abnormal (+5)
- Observations - Standing up
  - ☐ The patient rejects him(her)self backwards (-4)
  - ☒ Leans forward normally (0)
  - ☐ Needs the armrests (-2)
  - ☐ Stands up in one go (0)
  - ☐ Needs 2 or 3 attempts (-1)
- Observations - Walking
  - ☐ No deviation (0)
  - ☒ Clear deviation (-1)

**Parameters**

**Timed Up and Go**  
2023-02-17 at 15:27:23

**Exercise 1.**

00:03,336 / 00:15

Figure 50: Visualization page, TUG form

**⚠ If the evaluation form has not been fully completed, the activity will open in Edit mode, prompting you to finalize the evaluation and the results will not be available (see 6.1.3 Timed Up-and-Go (TUG)).**



## 7.5. Visualization of a Tinetti evaluation

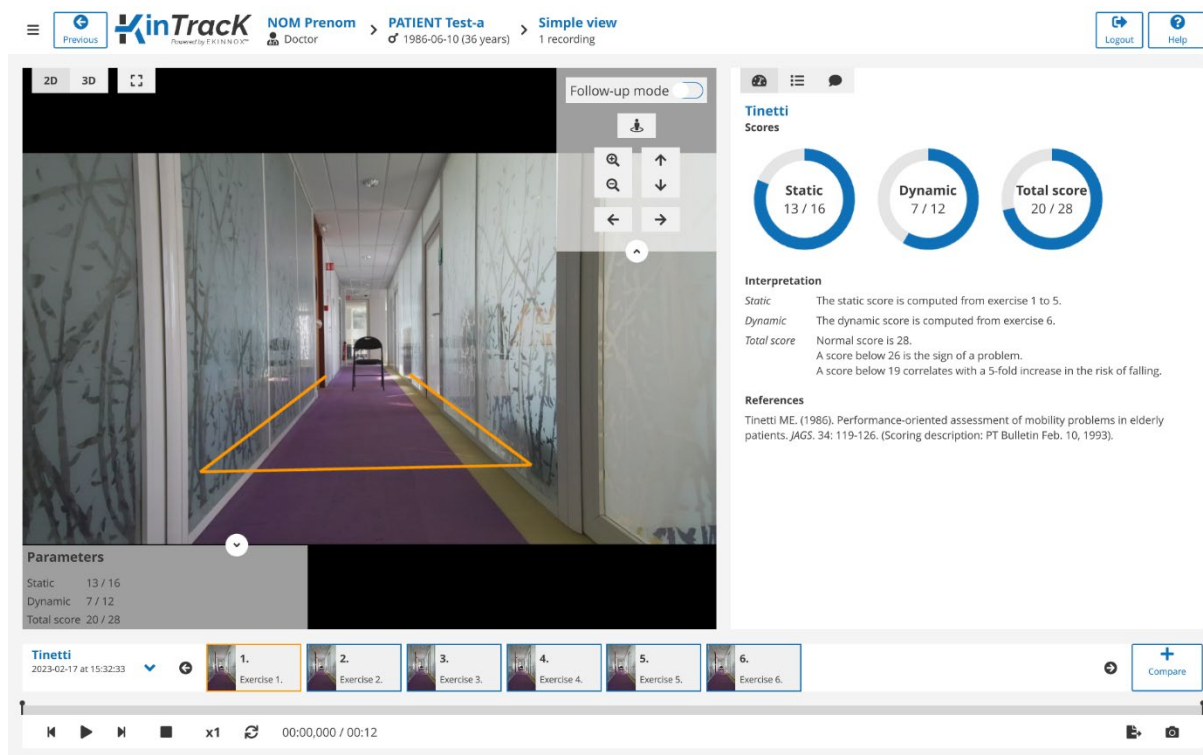


Figure 51: Visualization page, Tinetti summary

- For a Tinetti assessment, the visualization page displays the video of the first exercise performed on the left and the summary of the activity on the right, also accessible by clicking on 🕒.
- The overall test result can be displayed in the bottom left corner of the video by clicking on the up arrow.
- Click on the thumbnail of an exercise to display the corresponding video.
- Click on ☰ to display the form corresponding to the video.

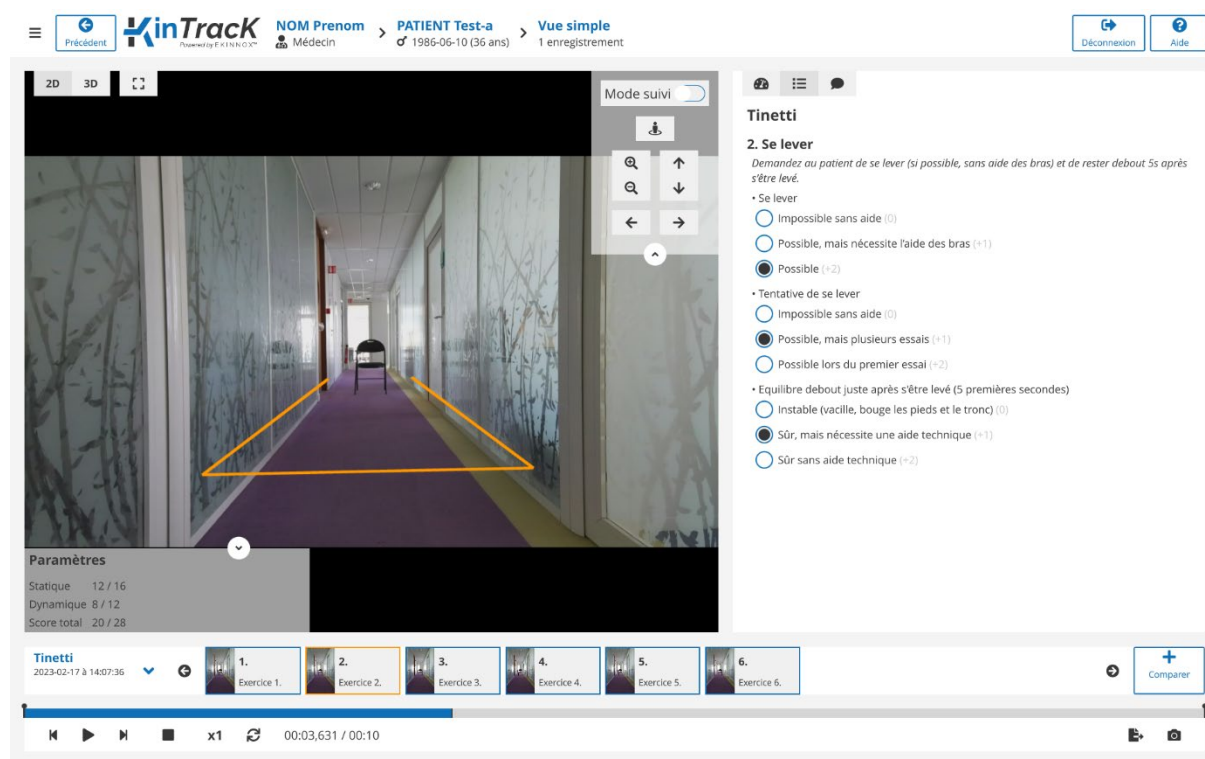


Figure 52: Visualization page, Tinetti form

**⚠ If the evaluation forms have not been fully completed, the activity will open in Edit mode, prompting you to finalize the evaluation and the results will not be available (see 6.1.4 Tinetti).**



## 7.6. Static balance activity visualization

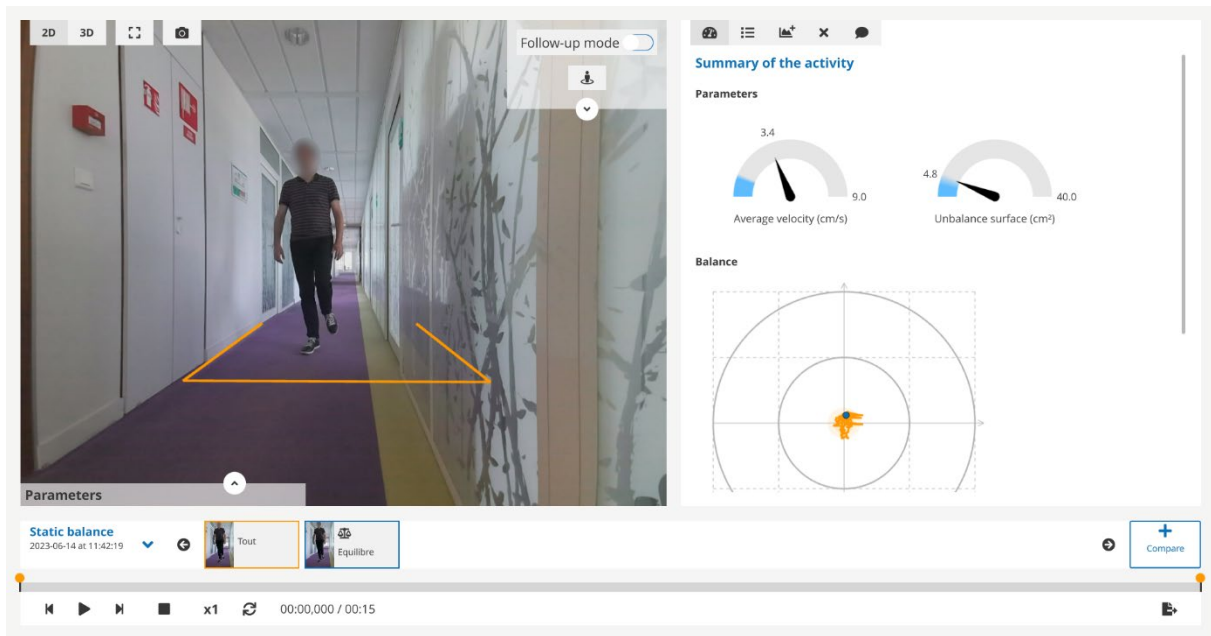


Figure 53 : Static balance visualisation page

- For a static balance assessment, the viewing page displays the video on the left and the summary on the right, which can also be accessed by clicking on 🕒.
- Click on the thumbnail of an exercise to display the corresponding video: either the whole video, or just the balance section.

## 7.7. SPPB activity visualization

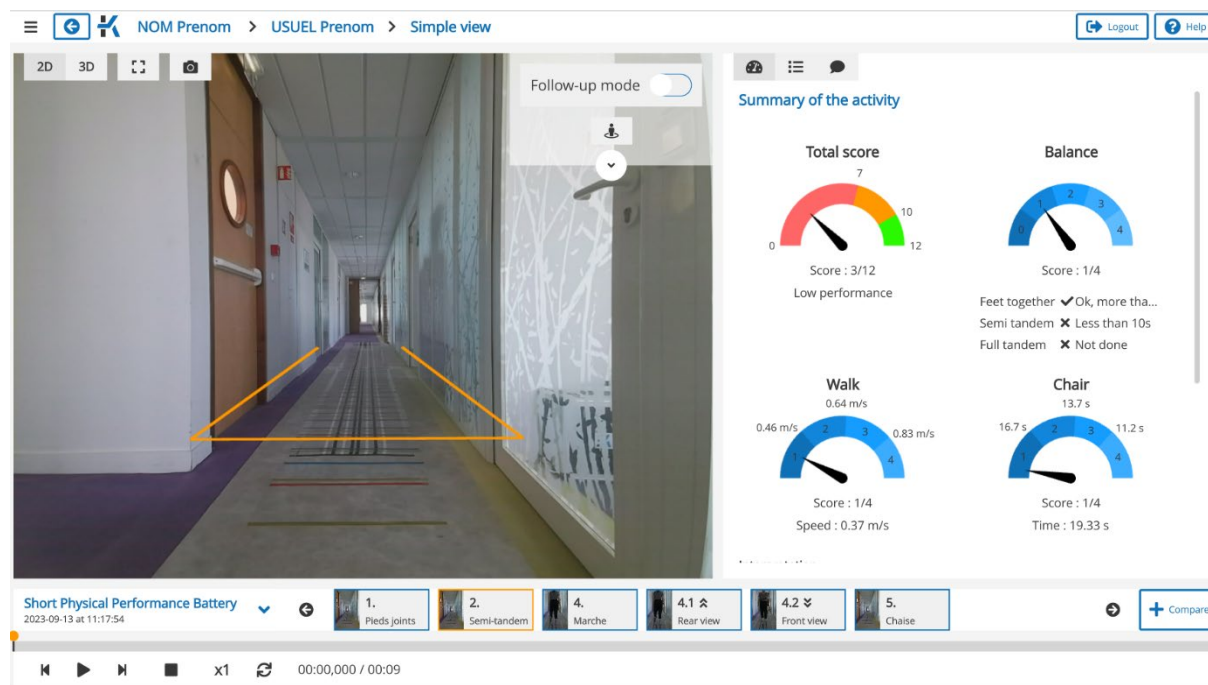




Figure 54 : SPPB activity visualisation page

- For an SPPB assessment, the viewing page displays the video on the left and the summary on the right, which can also be accessed by clicking on .
- Click on the thumbnail of an exercise to display the corresponding video.
- Click on  to display the results corresponding to the displayed video.



## 7.8. 3D view

- To get a 3D view click on the button **3D**.
- Click on the **2D** button to return to the video mode.

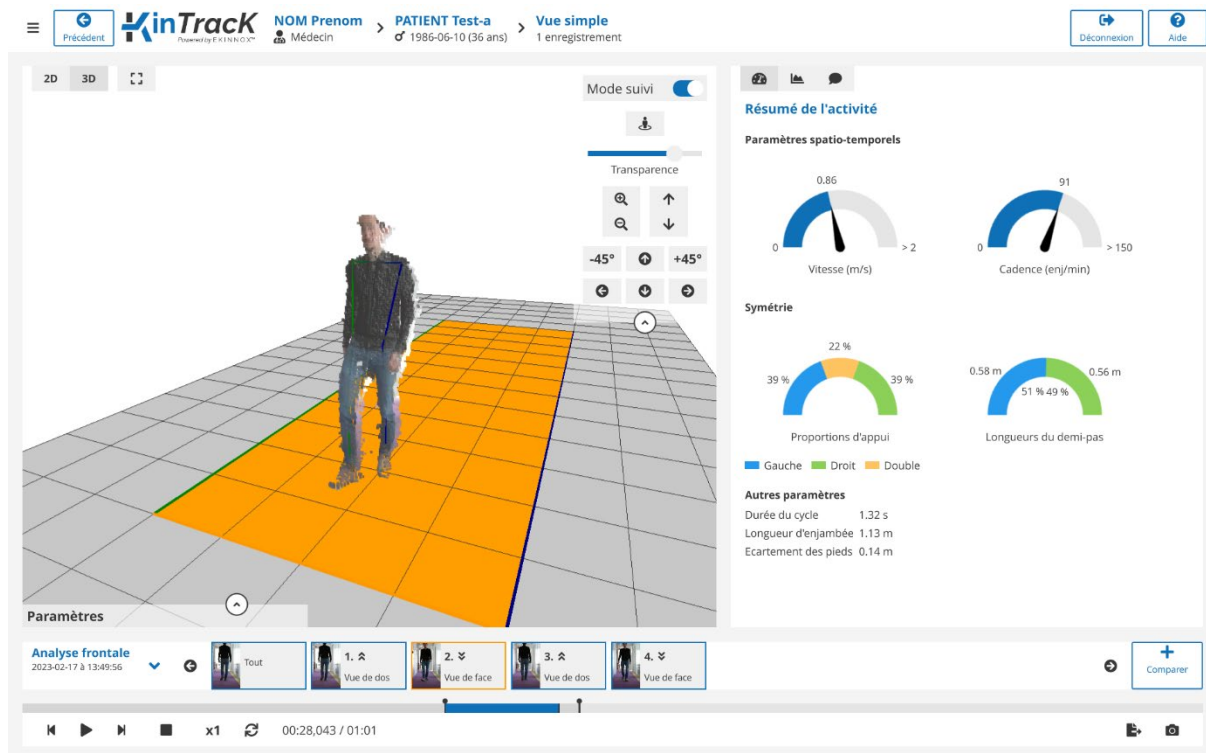


Figure 55: 3D view

- In 3D view, the patient is represented as a cloud of points.
- The possible interactions with this view are given by the buttons on the right of the view (open the menu of possible actions by clicking on the down arrow):

**Note:** Hovering over these buttons with the mouse shows how to do the same actions with the keyboard and mouse.

Follow-up mode ☐

Change the visualization mode: "Follow-up mode" deactivated, the camera remains fixed and follows the patient visually, activated, the camera moves forward at the same time as the patient.



Return to initial position: resets the 3D view to its default configuration.

**Transparency**

For frontal analysis, the 3D view also includes a representation of the skeleton. This slider allows you to modify the opacity of the point cloud to better see the skeleton. This skeleton is composed of:

- 3 segments for each side of the body, green for the right side, blue for the left side:
  - 1 shoulder - hip segment
  - 1 hip - knee segment
  - 1 knee - ankle segment
- 4 segments for the upper body:
  - A segment representing the shoulders
  - A segment representing the hips
  - A segment representing the trunk
  - A segment representing the neck

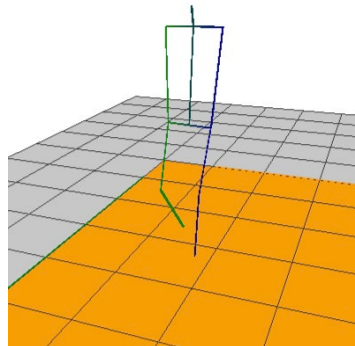


Figure 56: 3D view with representation of the skeleton

**-45°** and **+45°** : Move the point of view around the patient, to the next cardinal position among the 8 positions 45° apart. Caution, this button is not recommended in follow-up mode.



Zoom in/out by clicking. Warning: do not keep the mouse button pressed. With the keyboard and the mouse: Ctrl + Wheel.




Move the image up or down on the screen. With the mouse, right click and move the mouse up and down.



Rotate the 3D view around the patient. With the mouse, left click and move the mouse from top to bottom or from right to left.

## 7.9. Comparison

- Click on . The same record with the same visualization will open on the right side of the screen. To select a different record on the right or left, click on the bottom left of the visualization to open the drop-down menu to select a different record.

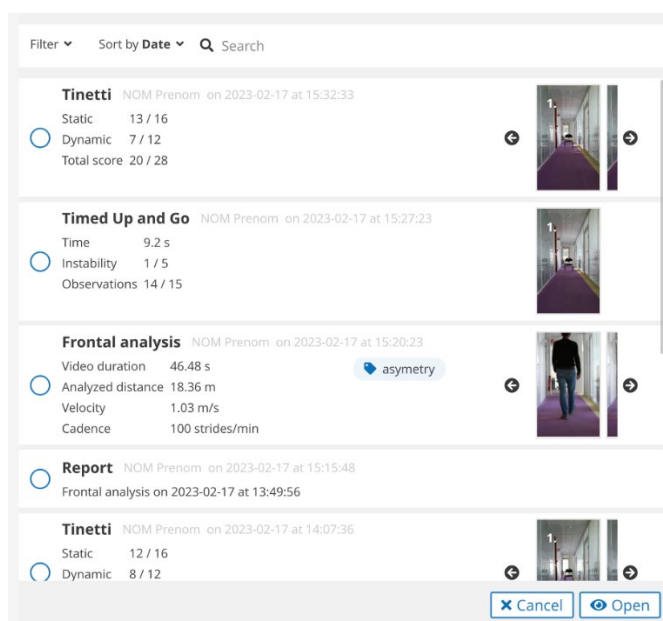


Figure 57: Selection of activities to be compared

- The video displayed on the other view is indicated by an orange bar.
- Check the corresponding box to select the desired record and click on the "Open" button.
- The comparison page is displayed.

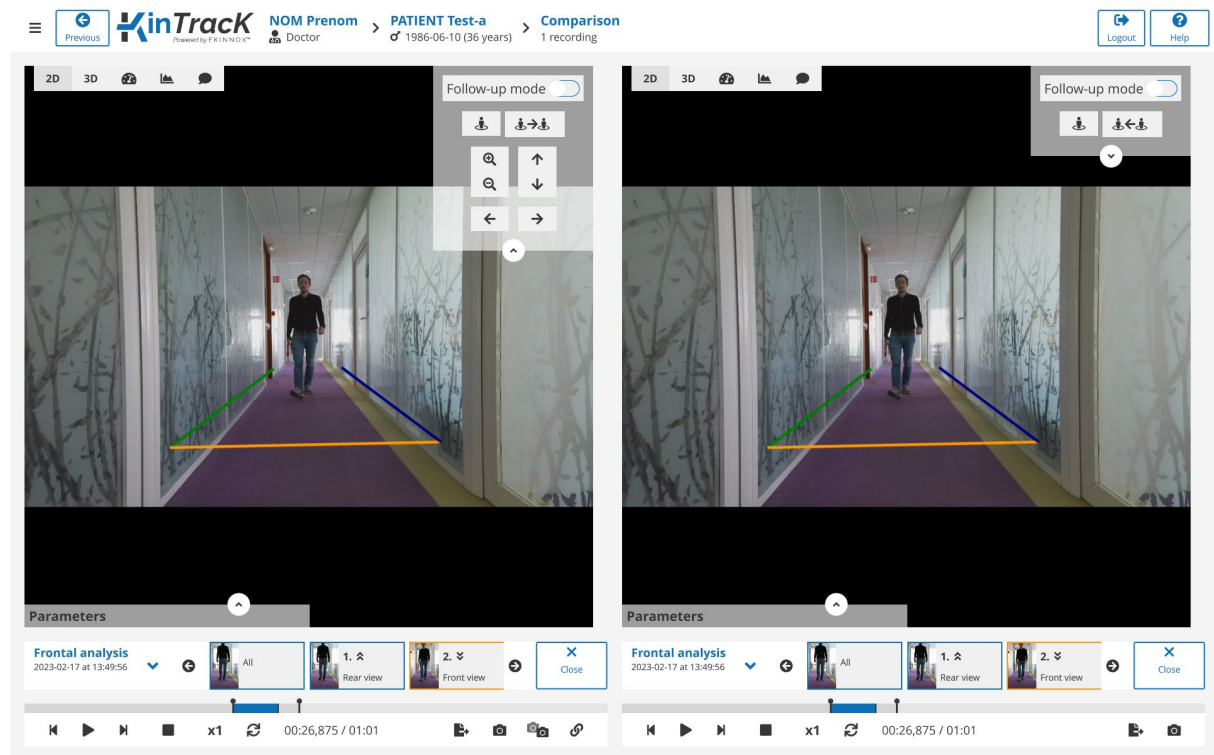








Figure 58: Comparison page

- Click **"Close"** to close one of the views and return to the simple visualization page.



- Click on  to choose another activity.
- On each of the displayed activities, it is possible to display:
  - The 2D video,
  - The 3D video,
  - The summary of the activity,
  - The forms (in the case of a Tinetti or a Timed Up and Go),
  - The graphs (in the case of a frontal analysis).
- To visualize 2 sequences in a synchronized way:
  - Choose a starting point for each video.
  - Click on  and choose "Synchronisation".
  - Start playback or scroll frame by frame.
- To view 2 sequences automatically synchronized to the gait cycles:
  - Click on  and select "Cycle synchronization".
  - Play the video: the 2 videos are synchronized on a gait cycle.



- Click on  to choose another walking cycle, on the left or right screen.
- The following buttons are used to synchronize the viewpoints:
  - Click on  on the right view to change the left view to the same viewpoint as the right view.
  - Click on  on the left view to change the right view to the same viewpoint as the left view.

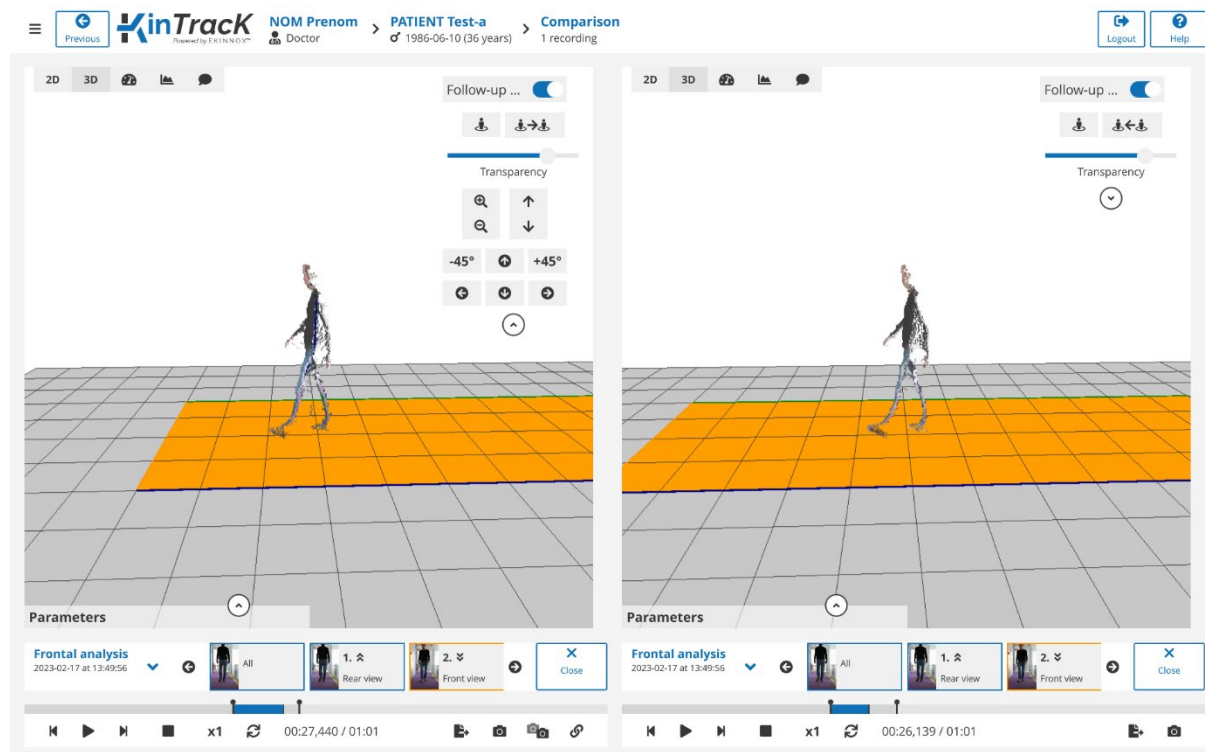



Figure 59: 3D view comparison

## 7.10. Graphs

The device allows to automatically generate several types of graphs, accessible by clicking on .

### 7.10.1. Stride length

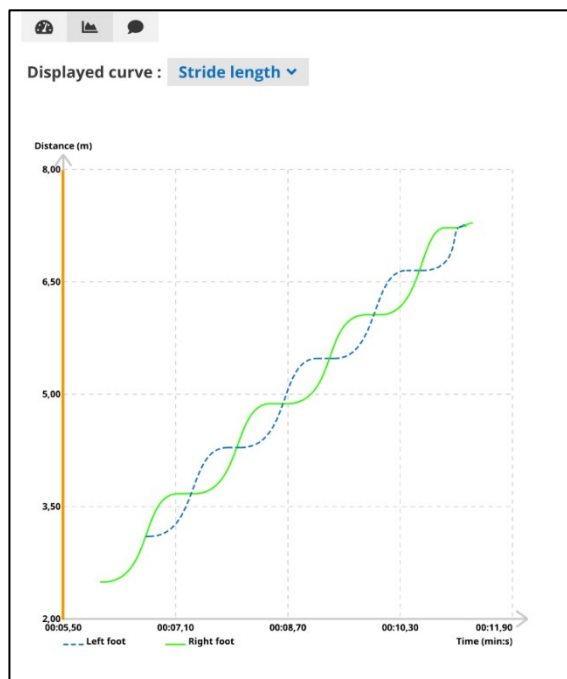


Figure 60: Stride length graph

The graph for the stride length represents:

- In green: the distance covered by the right foot as a function of time.
- In blue: the distance covered by the left foot as a function of time.
- The vertical orange line corresponds to the moment of the video represented on the left of the screen. A click on the curves allows you to position the video at a given moment.

### 7.10.2. Foot width

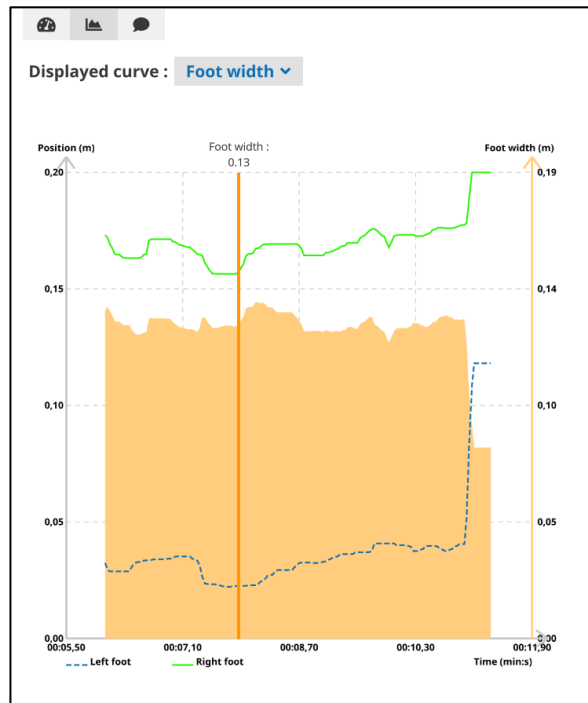


Figure 61: Graph for the lateral distance between the feet

The graph of the foot width represents:

- In green: the lateral position of the right foot as a function of time.
- In blue: the lateral position of the left foot as a function of time.
- In orange, the value of the lateral distance between the feet (foot width).
- The vertical orange line corresponds to the moment of the video represented on the left of the screen.
- Clicking on the curves allows you to position the video at a given moment and the corresponding foot width value is displayed at the top of the line.

### 7.10.3. Mean knee angle on a cycle

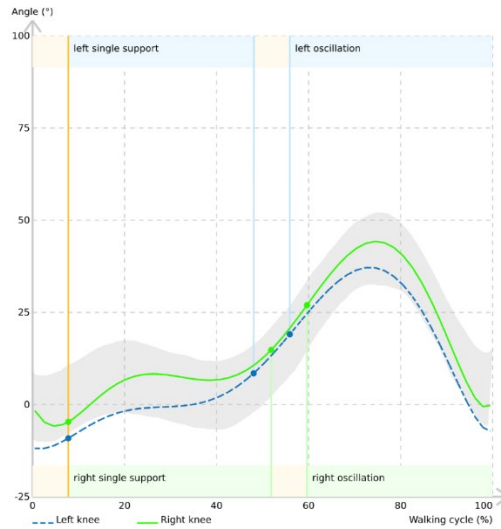


Figure 62: Mean knee angles on a cycle

The graph for the mean knee angle represents:

- In green: the average flexion angle of the right knee on a walking cycle.
- In blue: the average flexion angles of the left knee on a walking cycle.
- These curves give the average angles over the whole activity.

At the top and bottom of the graphs, different colored areas indicate the support phases of the gait cycle:

- In light orange, the double support phases.
- In light green, the right support and oscillating phases.
- In light blue, the left support and oscillating phases.

The grey area represents 80% of the curves obtained with KinTrack on a healthy population, see **14: Appendix 2 KinTrack reference data**.



#### 7.10.4. Mean hip angle on a cycle

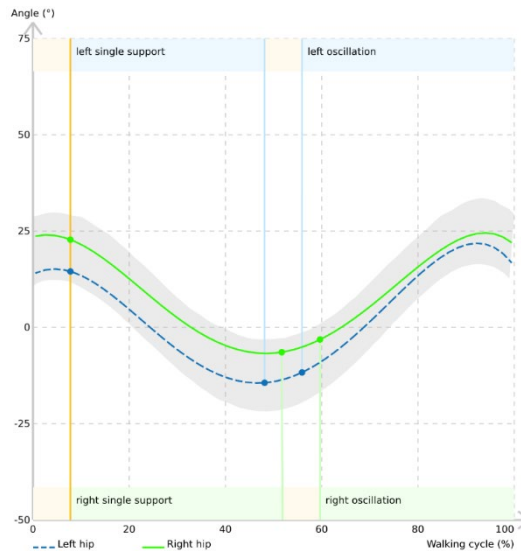


Figure 63: Average hip angle over one cycle

The graph for the mean hip angle represents:

- In green: the average flexion angle of the right hip on a walking cycle.
- In blue: the average flexion angle of the left hip on a walking cycle.
- These curves give the average angles over the whole activity.



At the top and bottom of the graphs, different colored areas indicate the support phases of the gait cycle:

- In light orange, the double support phases.
- In light green, the right support and oscillating phases.
- In light blue, the left support and oscillating phases.

The grey area represents 80% of the curves obtained with KinTrack on a healthy population, **see 14: Appendix 2 KinTrack reference data.**

## 8. Generate an analysis report

### 8.1. Screenshots

- Click on the  button on the viewing pages to create a screenshot or click on the button  at the bottom of the screen to take a full screenshot, containing the 2 images of the 2 activities on the screen.

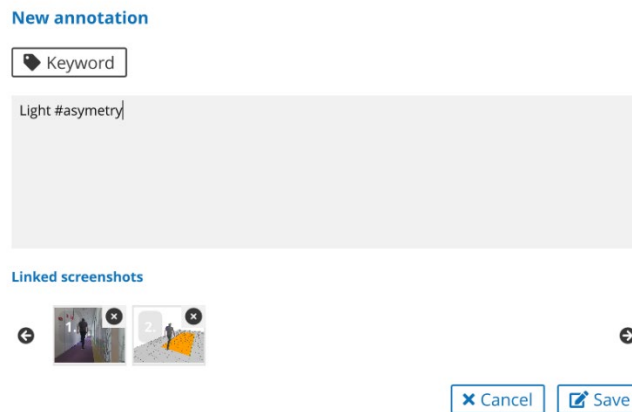



Figure 64 : Screenshot window

- The generated screenshot is displayed in a "New annotation" window.
- Enter an annotation to be linked to the screenshot and click "Save" to display the screenshot in the list of annotations (see 6.3.).
- Click on the thumbnail of a screenshot in the annotations list to display the video or the curves like when the screenshot was taken.

### 8.2. Sequences selection

- You can generate a report about an activity and select the sequences you want to include in this report:
  - On the patient page, for an activity, click on  to get an overview of the activity sequences.

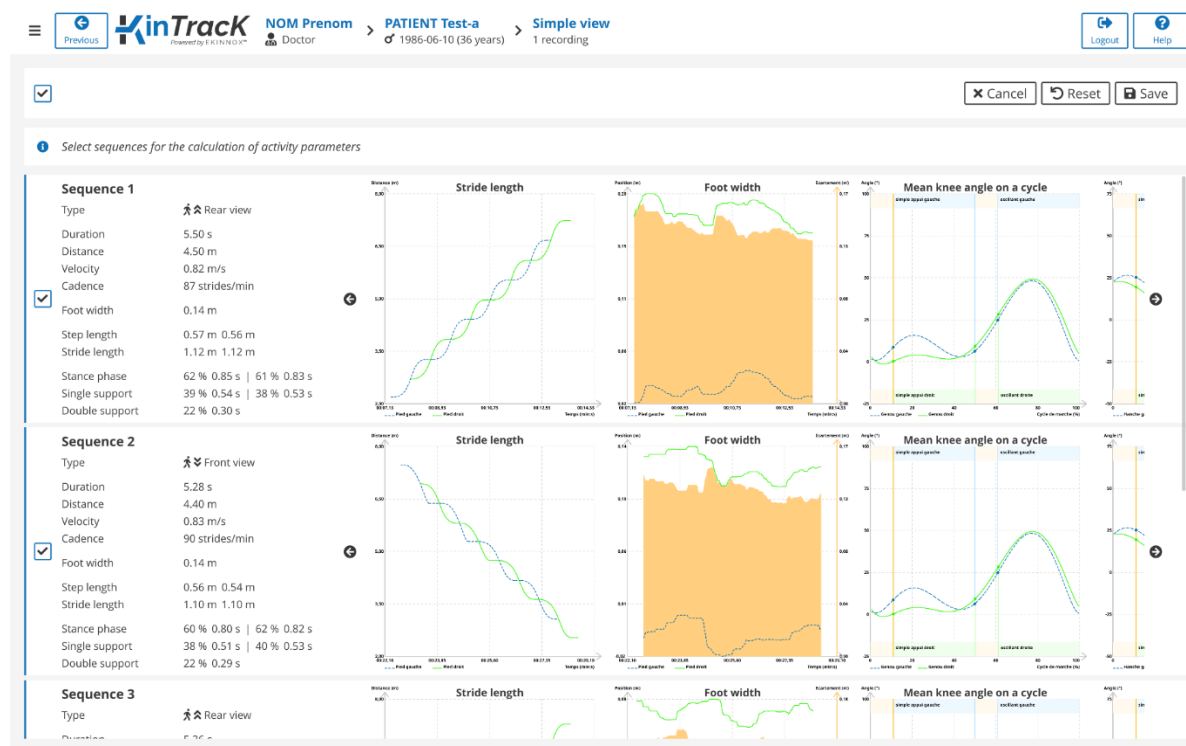
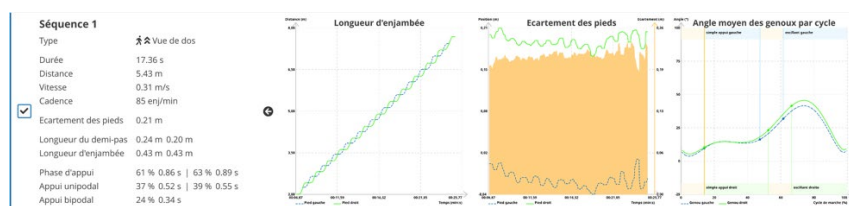
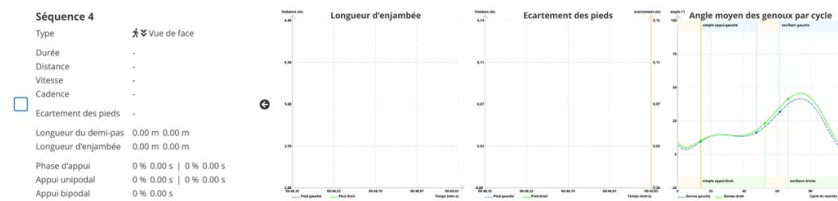


Figure 65: Overview of the sequences of an activity

- For each sequence, the graphs are displayed, and a box indicates whether the sequence is selected. By default, only sequences with enough correctly detected gait cycles are selected.
- The graphs show the number of gait cycles:

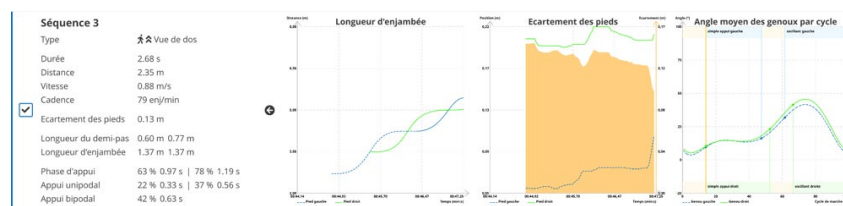


- ⇒ Example 1: Sequence with sufficient gait cycles
- the graphs have many points.
  - the sequence is selected.



⇒ Example 2: Sequence without gait cycle

- the graphs are empty.
- the sequence is not selected.



⇒ Example 3: sequence with insufficient number of cycles to calculate all parameters:

- the graphs have few points.
- the sequence is selected but special attention must be paid to the data.

- You can change the default selection:

- Clicking on ☐ to keep a sequence even if not all parameters have been calculated.
- Clicking on ☒ to deselect a sequence that you do not want to have in the report, even if all parameters are calculated on this sequence.
- Clicking on ☐ to select or deselect all sequences.

### 8.3. Create a report

- You can generate a report for a patient and select the activities you want to include in that report.
- By default, no activities are selected. You can select all the patient's activities and comments by ticking the box ☐ at the top of the patient page (See Chapter 5).
- You can select certain activities to be included in the general report by ticking the corresponding activity box ☐.

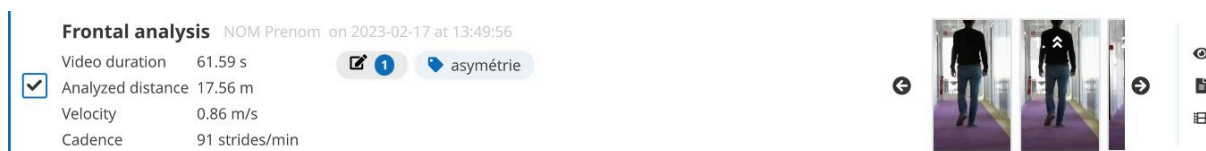


Figure 66: Selected activity

- To generate a report, select one or more activities on the patient page and click on "Generate a report".

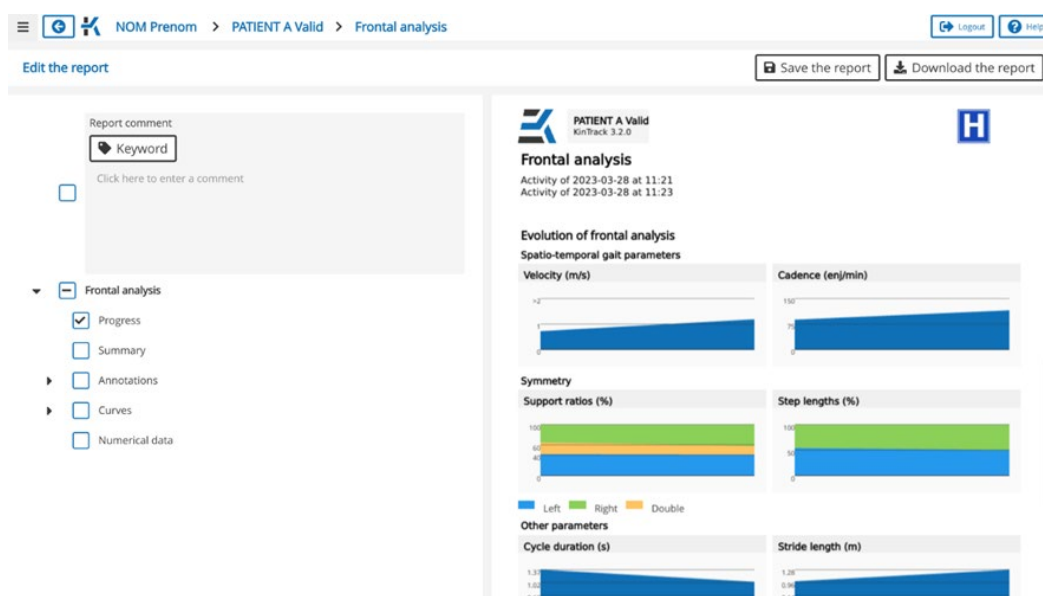


Figure 67 : Create a report



- A page is displayed with report editing on the left and a preview of the report on the right.
- In the editing section, select the elements you wish to have in the report and then click on "Refresh" to see a preview on the left.

## 8.4. Saving the report



- You can save a report by clicking on  from the report viewing page.
- The saved report will appear in the list of activities:




Figure 68: Saved report

## 8.5. Export to USB key and download

On the hardware version:


- Connect an EKINNOX USB key to the device.
- From the report visualization page, click on .
- A message indicates that the export has been completed.

On the web version:

- From the report visualization page, click on .
- The report will then be downloaded to your browser's download folder.

## 9. Export data

### 9.1. Selection and Export

- In the patient page, or in the patient list, you can choose to export data by clicking on .

**Note:** The exported data will correspond to the selected activities or patients. If no activities or patients are selected, the export data button is grayed out and disabled.



**Note:** Only gait analysis data (frontal analysis) are exported.

- Connect an EKINNOX USB key directly to the computer.
- Click on **"Export data"**, a message will appear asking you to choose the data to be exported:


What do you want to export ?

Anonymized data :

- analyses (CSV format) ☐

Unanonymized data :

- analyses (CSV format) ☒

 - videos ☒

**Attention:** KinTrack user and healthcare professional, if I export **un anonymized** personal data of my patient, I guarantee that the patient (or, where applicable, his/her legal representative) (i) has been informed of the collection and processing of his/her personal data, as well as of the capture of his/her image, if any, and of the use that will be made of it, and (ii) that he/she has not objected.

☒ I certify that I have implemented all necessary measures to ensure the protection of my patient's personal data and image in connection with the intended use of the exported data.

**Note:** Video export is only available when you export data from a patient page.

- If you choose to export anonymized data, the data will be exported directly to the USB key:

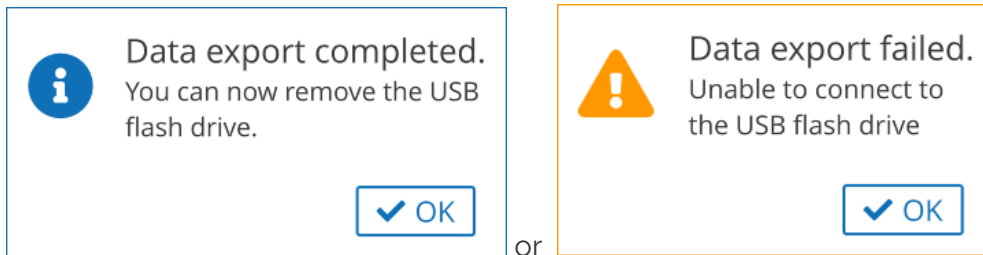


- If you choose to export non-anonymized data:
  - You can choose to export either the data of the spatiotemporal analysis in CSV format, or the videos of your patient, or both.
  - A message will appear. You must agree to protect the exported personal data by checking the corresponding box.

☒ I certify that I have implemented all necessary measures to ensure the protection of my patient's personal data and image in connection with the intended use of the exported data.

**Note:** You will not be able to export non-anonymized data without checking this box.

- A message will indicate that the export was successful or that the USB key is not connected:



## 9.2. Data format .CSV


**Note:** The .CSV files are spreadsheet type files that can be opened with Excel. The .CSV files produced by KinTrack use a specific separator to identify the columns (semicolon) and the data they contain are coded according to UTF-8. To correctly read all the characters they contain, it may be necessary to import the files rather than open them directly.

In the .CSV files, the data is sorted by column. Note the meaning of the following columns:

- Sequence\_number: number of the sequence in the activity in chronological order
- Sequence\_type:
  - 0 : front view
  - 1 : back view
- Sequence\_selected:
  - 1 : selected activity (taken into account)
  - 0 : not selected activity (ignored for parameters computation)

## 9.3. Export of video portions

From the visualization page, you can export the video of a sequence or a portion of a sequence:

- Adjust the video delimiters on the playback thread to select the portion of the video to be exported
- Click on  at the bottom right of the screen and follow the instructions related to personal data.





## 10. Data synchronization and web application

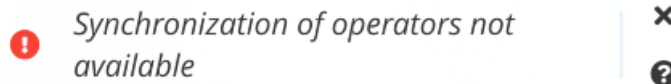
If you have chosen the Web App option for KinTrack, and if your machine is connected to a WIFI network, then you benefit from a synchronization of your data with a remote database, which allows you to:

- Save your data,
- Archive your data remotely to free up disk space on KinTrack,
- Have access to the data via a simple compatible web browser with a user license.  
For the web application, the recommended configurations are:
  - Operating system: Windows 10 or MacOS 12 minimum
  - Explorer: Chrome or Edge version 110 minimum
  - Display: between 14" and 24"
- Access data from different KinTrack installations at your facility, if applicable.

### 10.1. At the start

When KinTrack starts, an automatic synchronization of the KinTrack users is done. A message indicates on the connection page the status of this synchronization.

If the following message appears:



- Your machine is not connected to the Internet.
- Please check your machine's internet connection or contact your facility's network administrator.

### 10.2. At login

As soon as you are connected to KinTrack, a complete synchronization of the database is automatically launched in the background.

- The progress of this synchronization is indicated on all pages of the software.
- When the synchronization is complete, you can refresh the display to possibly access new data from the remote database.
- You can voluntarily force the synchronization if you want to save or retrieve data from the remote database.



### 10.3. At disconnection or extinction

When you disconnect from KinTrack, or when you turn off the machine, a message will ask you if you want to synchronize before disconnecting.

- If you choose not to synchronize, you are disconnected immediately. Synchronization will be done automatically the next time you connect.
- If you choose to synchronize, the disconnection will only take place once the synchronization is complete.

 **For data protection, you should not leave the machine unattended during this synchronization phase.**

### 10.4. Archiving

If you have the Web App option, when you archive, the data is stored on the remote database only. This allows you to free up disk space.

If you have more than one KinTrack in your facility, the archive status of a patient is the same on all machines.

When the available disk space of your machine becomes too low (<15%), a message will prompt you to archive data to continue using KinTrack:

 Disk space is low. Do you want to archive the oldest recordings?

If the disk space is so low (<10%) that it prevents the system from working, you will get the following message:

 The available disk space is insufficient for the system to work properly. Archive the oldest recordings or contact the EKINNOX customer service.

If you choose to archive, you will be able to select the records you wish to archive, and the space freed up by the records will be indicated.



☒

*Select/deselect the recordings you want to archive*

*The selected records date from 1900-01-01 to 2023-02-23. Freed disk space is 1 Go.*

**PATIENT Test-c** 0 Mo on disk  
☒ Date of birth 1956-02-05 (67 years)  
 Gender ♀ Woman  
 Referring doctor

**PATIENT Test-b** 0 Mo on disk  
☒ Date of birth 1975-07-23 (47 years)  
 Gender ♂ Man  
 Referring doctor

**PATIENT Test-a** 1 Go on disk  
☒ Date of birth 1986-06-10 (36 years)  
 Gender ♂ Man  
 Referring doctor

Figure 6g: Archiving to free disk space

### 10.5. Delete patients

With the Web App option, if you delete a patient, he or she will completely disappear from your local database as well as from all machines in your facility.

However, if you recreate a previously deleted patient, you will find the deleted data.

### 10.6. Access to data via the web application

To access the data via the web application, in your browser, connect to the web address provided during the installation of KinTrack or contact the KinTrack system administrator.


You can then access the same functionalities as on KinTrack, except for the recording of new activities.



**Since no data is stored locally, the download of data (to access the login page or the videos) is done on demand and may require some waiting time.**

 **For security and data protection, please ensure that:**

- You use a secure and up-to-date computer and browser,
- You use a secure connection,
- You log out of the software and close your browser after use.

 **Use a reduced zoom factor (70-80%) on small screens (Laptop type) for better visibility of controls.**


 **Video playback may be slowed down depending on the performance of the hardware.**

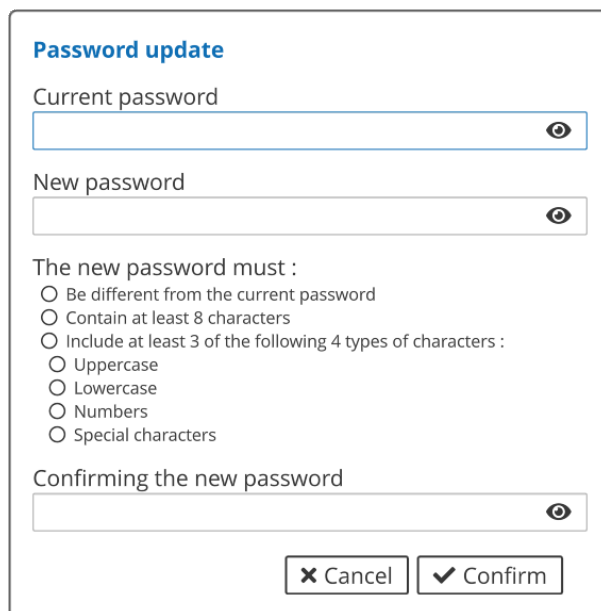
## 11. Administration

### 11.1. Synchronization

As an administrator, when I am connected to KinTrack, all the changes I make to the database are automatically and immediately synchronized.

### 11.2. Change your password

- Once connected to the application (See Login page), any operator can change his password by clicking on  and then **"Update your password"**:
- To change the password, enter the current password and choose a new password according to the instructions in the window.



The screenshot shows a 'Password update' dialog box. It contains three input fields: 'Current password', 'New password', and 'Confirming the new password'. Each field has a toggle icon (an eye) to the right, indicating password visibility. Below the 'New password' field, there is a section titled 'The new password must :' followed by four radio button options: 'Be different from the current password', 'Contain at least 8 characters', 'Include at least 3 of the following 4 types of characters :', and 'Special characters'. The 'Include at least 3 of the following 4 types of characters :' option is selected. Below this, there are four sub-options: 'Uppercase', 'Lowercase', 'Numbers', and 'Special characters'. At the bottom of the dialog box, there are two buttons: 'X Cancel' and '✓ Confirm'.

Figure 70: Update of the password

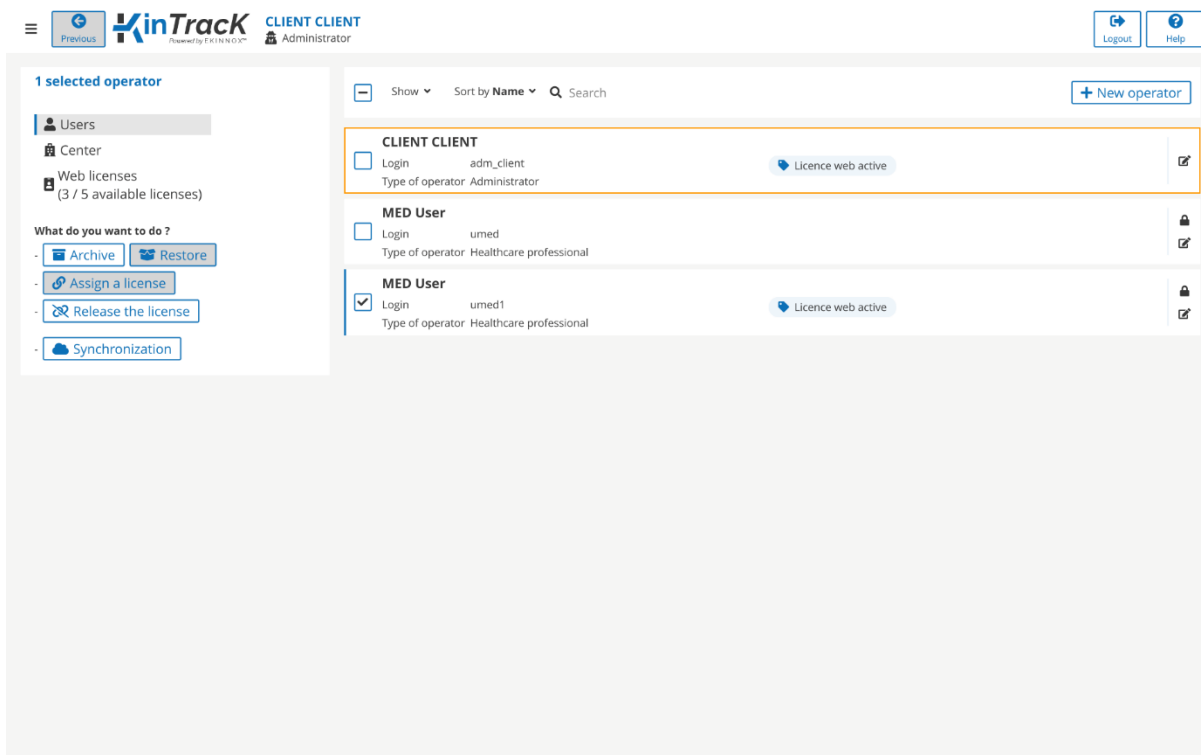
- Confirm.

### 11.3. Operators management

If you have an administrator account on the machine, you can manage user accounts.

#### 11.3.1. Create an operator

- Log in with your username and password.
- You have access to the list of operators.



The screenshot displays the 'Operators' page in the KinTrack application. The top navigation bar includes the KinTrack logo, 'CLIENT CLIENT', and 'Administrator' role. On the right, there are 'Logout' and 'Help' buttons. The main content area shows a table of operators with the following details:

Selection	Login	Type of operator	Licence web active	Action
<input type="checkbox"/>	adm_client	Administrator	Yes	Edit
<input type="checkbox"/>	umed	Healthcare professional	No	Edit
<input checked="" type="checkbox"/>	umed1	Healthcare professional	Yes	Edit

The left sidebar, titled '1 selected operator', contains the following sections:

- Users**: A link to the Users page.
- Center**: A link to the Center page.
- Web licenses**: A link to the Web licenses page, showing '3 / 5 available licenses'.
- What do you want to do ?**: A section with several action buttons:
  - Archive
  - Restore
  - Assign a license
  - Release the license
  - Synchronization

Figure 71: Operators page

- Click on **+ New operator**
- Fill in the operator form:

**Operator file**  
\* Required information

Name \*

First name \*

Type of operator \*

☒ Healthcare professional

☐ Administrator

Professional category \*

☐ Doctor


☐ Paramedic

Login

Figure 72: Operator's file

- If you select "Health professional", also fill in the professional category, doctor, or medical assistant.
- Validate: the connection identifier is automatically created, and a temporary password is generated.

**Note:** Keep a note of this temporary password and give it to the operator so that he can log in.




**Operator**  
Login: **umed1**  
Password: **7775**


Figure 73: Creation of an operator, login, and password

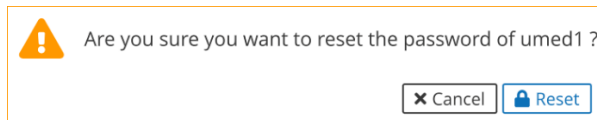
- Confirm.

### 11.3.2. Modify an operator

- To modify an operator, on the line of the concerned operator, click on  : you have access to the operator file (see 11.3.1 Create an operator).

### 11.3.3. Reset an operator's password

- To reset the password of an operator, on the line of the concerned operator, click on . The following message appears:

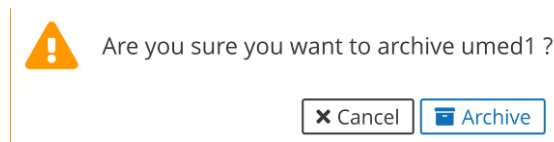


- Click on Reset: a new temporary 4-digit password is generated.

**Note:** Keep a note of this temporary password and give it to the operator so that he can log in.

### 11.3.4. Archive an operator

- To archive an operator, click on . The following message appears to confirm the archiving of this operator:



- Archive: the operator appears grayed out in the list of operators, just like an archived patient (see Archive and delete a patient).
- You can filter operators in the same way as patients (see 4.7), as well as according to the license allocation for the web application.

## 11.4. License management for the web application

If you have chosen the Web App option for KinTrack, then you will benefit from user licenses for the connection to the web application. The number of available web licenses is displayed on the left panel of the administration interface.

To assign/remove a license to a user:

- select the user using the checkbox,
- click on "Assign license"/"Release license" on the left panel.


You can assign/release multiple licenses simultaneously by selecting multiple users at once.

To see the list of assigned licenses, click on **"Web licenses"** on the left panel. The list of licenses appears, with the name of the operator to whom it is assigned. You can also



release licenses from this list by selecting the license(s) and clicking on **"Release license(s)"** on the left panel.

### 11.5. Other administrator actions

If you have an administrator account on the machine, you can perform various actions by clicking on .

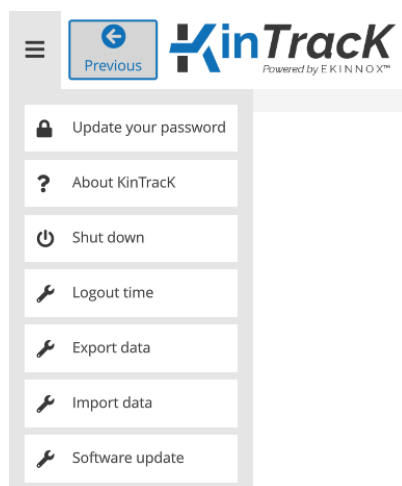


Figure 74: Other administrator actions

#### 11.5.1. Update

You can update the KinTrack software.


- Insert the USB key provided by EKINNOX that contains the update.
- Click on  and then on **"Software Update"**.
- Enter the update key sent to you by EKINNOX and click on **"Update"**.

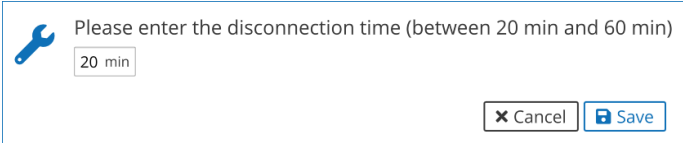
**Software update**  
Please enter the update key

Figure 75: Update software window

### 11.5.2. Change the automatic logout time

Depending on their clinical practice, operators may want to change the automatic disconnect time, which is set to 20 minutes by default.


- To change the automatic logout time, click on  and then on **"Logout time"**.
- Enter the desired automatic logout time (between 20 and 60 minutes).

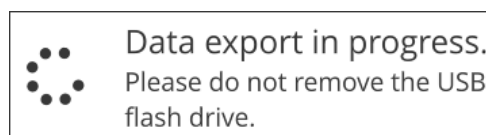


- Click on **"Save"**.

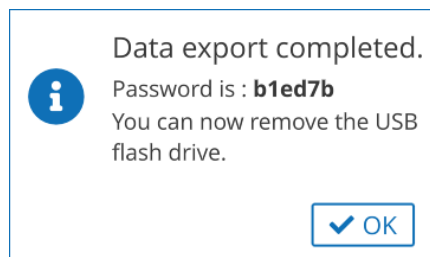
### 11.5.3. Exporting data

During important software or hardware updates, it may be necessary to export the data present on the machine in order to reimport them later.


- To export all the data on the machine, connect a USB hard disk to the machine
- Click on  and then on **"Export Data"**.
- Wait while the data is exported (this may take several minutes):



- Note the password provided at the end of the export, it will be requested when importing the data.



### 11.5.4. Importing data

- Click on  and then on **"Import data"**.
- Enter the password obtained during the data export.

**Data import**


Please enter the password obtained during the data export

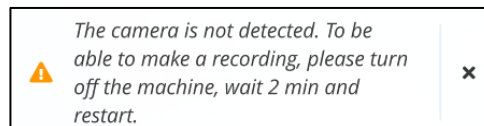
✕ Cancel 📄 Import


- Click on **"Import"**.
- Wait for the data to be imported (this may take several minutes)

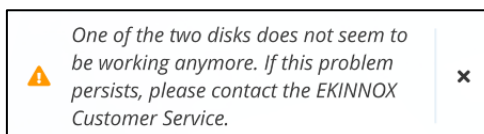
## 12. Assistance

 **KinTrack is a medical device. Any serious incident related to its use should be reported to EKINNOX and the relevant health authorities.**

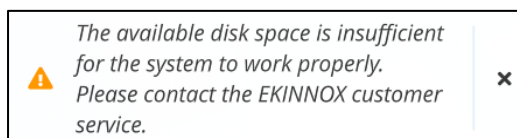
- A help module is available in the application: to access it click  on the top right of the screen.
- In the login page you may encounter the following error messages:



- This message indicates that the camera is not detected by the device, the **"New recording"** button will be grayed out and inactive. To solve the problem:
  - Turn off the device by clicking on  and then "Shut down". Wait 2 minutes and restart the computer by pressing the start button.
  - If the problem persists, contact support.



- This message indicates a default on one of the hard drives that store data. You may lose data, please contact support.



- This message indicates that your machine no longer has enough disk space to work properly (less than 5%). Please contact support to add more disk space.
- Contact:

**EKINNOX**

Bioparc - 2400 route des Colles  
06410 BIOT  
FRANCE  
Phone: +33 (0) 6 37 74 03 38  
[support@ekinnox.com](mailto:support@ekinnox.com)



## 13. Appendix 1: Quantitative performance

For more information on KinTrack performance, please contact EKINNOX :

Phone: +33 (0) 6 37 74 03 38

[support@ekinnox.com](mailto:support@ekinnox.com)

### 13.1. Success rate

KinTrackK was evaluated on 155 healthy individuals who performed 4871 walking sequences. A total of 4673 of these sequences produced gait parameters, giving a **success rate of 96%**.

### 13.2. Cadence, step lengths and foot width

For these spatiotemporal parameters, measurement accuracy was assessed on 29 healthy people who performed constrained walking sequences (3059 in total):

- Fixed foot spacing (5, 15, 25 and 35 cm respectively)
- Fixed step length (17, 31 and 59 cm respectively)
- Metronome-set cadence (35 and 140 steps per minute respectively)

Walking parameters under these conditions were calculated by KinTrackK, and the following results were obtained.

(For each setpoint on the graduated mat or metronome, the mean value and the 95% standard deviation of the measurements obtained with KinTrack on all individuals are given).

#### 13.2.1. Step length

Set point (cm) Measurements (cm)	17	31	59
Average left step	17,00 +/- 0,87	30,73 +/- 1,04	58,25 +/- 1,31
Average right step	17,31 +/- 0,85	31,20 +/- 1,04	59,16 +/- 1,28
Average stride	34,21 +/- 0,47	61,91 +/- 0,60	117,31 +/- 0,78

### 13.2.2. Speed

Setpoint	140 strides/min	35 strides/min
Measures		
Average	<b>137,64 +/- 4,33*</b>	<b>35,45 +/- 0,92</b>

\*The difference with the setpoint, and the greater standard deviation for cadence 140 can be explained by the difficulty people have in complying with a fast target cadence.

### 13.2.3. Foot width



Foot width values were measured while people were observing a set distance of 5, 15, 25 or 35 cm, corresponding to the distance between the inner edges of each foot during the stance phase, as shown in the diagram above.

KinTrack calculates the distance between the 2 ankles from the point cloud and optimizes this value to match the set values.

The value given by KinTrack therefore represents the distance between the insides of the feet at ankle level during the stance phase, and not the step width as conventionally defined and represented above.

Setpoint	5 cm	15 cm	25 cm	35 cm
Measures				
Average	<b>6,02 +/- 1,43</b>	<b>14,14/- 1,95</b>	<b>24,97 +/- 2,34</b>	<b>35,09 +/- 3,11</b>



### 13.3. Spatiotemporal parameters: comparison with the GAITrite system

Spatiotemporal parameters were assessed in comparison with the GAITrite system. This comparison was carried out on 39 healthy individuals who completed 427 gait sequences. For each sequence, gait parameters were assessed using the GAITrite and KinTrack systems.

On all participants, the mean of each parameter, as well as the variance, were calculated with KinTrack and GAITrite. For all participants, the mean differences between KinTrack (KT) and GAITrite (GR) for each parameter were also calculated.

The results obtained are shown in the following tables: KinTrack and GAITrite have comparable variances, with a mean deviation lower than the variance, demonstrating that the 2 systems perform similarly for the studied population.

	Unit	Average value KinTrack	Average value GAITrite	KinTrack variance	Variance GAITrite	Mean deviation
Speed	cm/s	123,71	124,59	14,29	13,95	3,51 (2,9%)
Speed	enj/min	111,13	111,64	8,44	7,95	2,5 (2,3%)
Stride length	cm	133,49	133,8	10,64	10,84	2,75 (2,1%)
Double-press time	ms	229	223	55	39	41 (18%)
Percentage of double support	%	21	20,6	4,2	2,7	3,6 (18%)
Cycle duration	ms	1086	1079	88	82	25 (2,3%)

	Left						Right				
	Unit	Average KT	Average GR	Variance KT	Variance GR	Average deviation	Average KT	Average GR	Variance KT	Variance GR	Average deviation
Step length	cm	67	67,08	5,87	5,57	2,08 (3,1%)	66,5	66,74	5,84	5,62	1,83 (2,8%)
Single support time	ms	429	427	41	31	28 (6,5%)	428	428	39	32	27 (6,3%)
Support phase time	ms	658	651	69	56	33 (5%)	657	651	67	58	34 (5,2%)
Percentage single support	%	39,5	39,6	2,8	1,6	2,5 (6,2%)	39,5	39,7	2,9	1,5	2,4 (6%)
Percentage of support phase	%	60,5	60,4	2,9	1,7	2,5 (4,1%)	60,5	60,3	2,8	1,7	2,5 (4,2%)



Mean differences between GAITrite and KinTrack in spatial and spatio-temporal parameters, as well as in cycle duration, are around 2-3%.

The mean differences between GAITrite and KinTrack for support times are slightly greater than for the other parameters: around 5-6% for single support times and 18% for double support times. This is due to KinTrack's intrinsic limitation in terms of frame rate. Indeed, with an image every 33 ms, KinTrack has a precision of  $\pm 33$  ms for duration measurements, which has a strong impact on low values, around 400 ms for single support times and 200 ms for double support times.

### 13.4. Kinematics

KinTrack provides curves of knee and hip flexion angles over one cycle. These curves represent the average knee flexion/extension angles over a cycle, during a walking activity.

The comparison with the VICON system was made on 39 healthy people who completed 427 walking sequences. For each walking activity, the average curves over a cycle were established with the 2 systems, and the average difference between the points on the KinTrack curve and the points on the VICON curve is given in the following table:

	Average deviation (degrees)
Knee angle	5,15 $\pm$ 1,38
Hip angle	3,75 $\pm$ 1,59

In addition, the angle measurements given by KinTrack and VICON are calculated from the detection of skeletal points. The following table compares the position of these points across all gait cycles:

Skeleton point	KinTrack-VICON position difference (cm)		
	Lateral	Front	Vertical
Left ankle	1,6	1,5	2,6
Right ankle	1,8	1,7	2,7
Left knee	2,3	1,0	1,7
Right knee	2,3	1,0	1,8
Left hip	2,4	0,9	1,4
Right hip	2,4	0,9	1,5
Left shoulder	2,5	0,6	1,0
Right shoulder	2,5	0,6	1,0



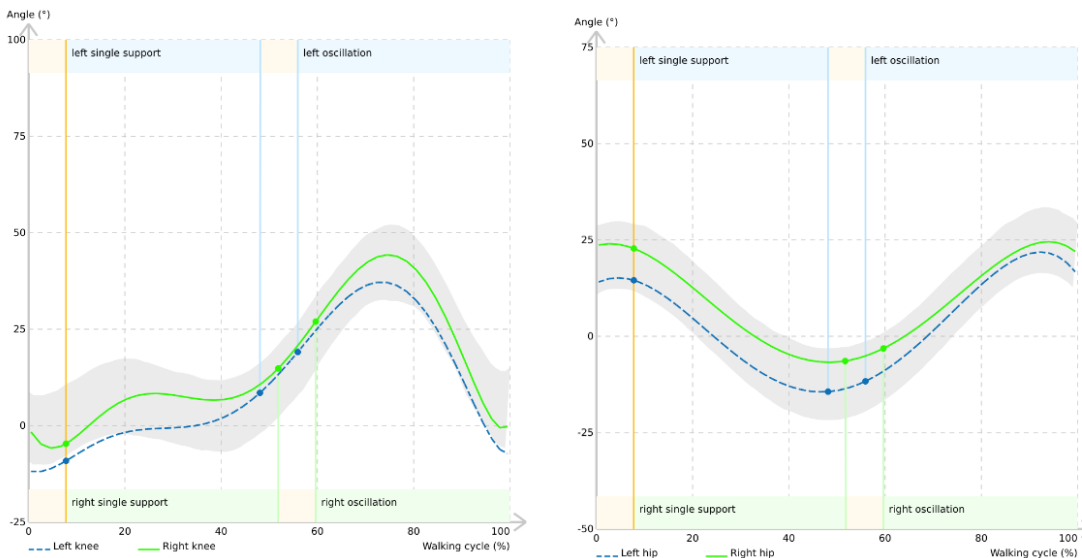
## 14. Appendix 2: KinTrack reference data

### 14.1. Mean angles on a gait cycle

#### 14.1.1. KinTrack data

The grey reference zones represented on the graphs of average knee and hip angles over one cycle were defined by superimposing the curves obtained for 68 healthy people, who completed 700 walking activities in natural walking.

These reference zones contain 80% of the curves, with extreme curves excluded. They make it possible to situate a person undergoing rehabilitation in relation to a population of healthy people.





### 14.1.2. Literature data

The standard curves provided by KinTrack are used to assess normal knee and hip flexion as described in the literature<sup>1</sup> :

	Initial contact and double support reception	Unipodal support	Double support propulsion	Oscillating phase	Typical curve
<b>Hip</b>	30° flexion	Switch to a 10° extension	Return to neutral position	30° flexion	<p>D'apré Perry, J. Gait analysis, SLACK Incorporated, USA, 1992</p>
<b>Knee</b>	Extension 0° then flexion 20°.	Back to full extension	Flexion from 0° to 30	Flexion from 30° to 60° then back to extension	<p>D'apré Perry, J. Gait analysis, SLACK Incorporated, USA, 1992</p>

<sup>1</sup> Physiologie et évaluation de la marche Dr David GASQ, cours de DES national MPR 2022



## 14.2. Spatiotemporal parameters

### 14.2.1. KinTrack data

Several studies have been carried out with KinTrack on healthy people performing natural walking sequences. The characteristics of these studies are given in the following table:

	All studies	Study 1	Study 2	Study 3
<b>No. of participants</b>	113	45	26	42
<b>No. of sequences analyzed</b>	736	169	253	314
<b>Walking sequences/person</b>	7,2	3 or 4	9 or 10	7 or 8
<b>Median age</b>	37 11 - 80	36	37	38
<b>M/F breakdown</b>	53 M / 60 F	20 M / 25 F	17 M / 9 F	16 M / 26 F
<b>Median height (cm)</b>	170 142 - 190	170	170	170



These studies led to the following results, the values given being:

- Mean value +/- standard deviation for all participants
- The 90% confidence interval

The results obtained for each population are consistent, with comparable mean values, standard deviations, and confidence intervals.

Parameters	All studies	Study 1	Study 2	Study 3
Speed (cm/s)	<b>118,0 ± 16,8</b> 91,3 - 145,3	<b>113,5 ± 16,0</b> 87,8 - 139,6	<b>115,0 ± 18,8</b> 88,9 - 149,3	<b>122,3 ± 14,6</b> 97,6 - 145,4
Cadence (/min)	<b>109,0 ± 8,3</b> 94,6 - 121,5	<b>107,5 ± 9,0</b> 93,1 - 122,3	<b>109,8 ± 7,6</b> 97,3 - 123,0	<b>109,2 ± 8,0</b> 93,5 - 118,7
Stride length (cm)	<b>129,2 ± 15,1</b> 108,8 - 154,9	<b>126,9 ± 14,7</b> 106,2 - 152,5	<b>122,6 ± 16,2</b> 106,5 - 155,6	<b>136,7 ± 12,4</b> 114,3 - 154,9
Left step length (cm)	<b>64,8 ± 8,0</b> 52,8 - 78,2	<b>63,2 ± 7,8</b> 51,7 - 77,8	<b>61,0 ± 8,7</b> 51,0 - 79,2	<b>67,9 ± 6,5</b> 55,7 - 77,8
Right step length (cm)	<b>64,7 ± 7,6</b> 54,4 - 77,4	<b>63,4 ± 7,6</b> 52,9 - 77,0	<b>61,8 ± 7,9</b> 52,5 - 77,2	<b>68,4 ± 6,3</b> 58,5 - 77,7
Foot width (cm)	<b>6,1 ± 2,6</b> 2,9 - 10,5	<b>7,6 ± 3,3</b> 3,0 - 13,5	<b>5,54 ± 2,17</b> 2,95 - 9,6	<b>6,2 ± 2,4</b> 2,8 - 9,8
Left single support (in %)	<b>42,0 ± 3,5</b> 37,1 - 48,6	<b>43,3 ± 3,7</b> 38,6 - 49,2	<b>43,2 ± 3,9</b> 36,8 - 49,5	<b>41,4 ± 2,5</b> 37,6 - 45,1
Right single support (in %)	<b>41,8 ± 3,7</b> 37,3 - 48,9	<b>42,8 ± 4,3</b> 38,5 - 48,6	<b>42,6 ± 4,2</b> 37,1 - 50,2	<b>41,1 ± 2,5</b> 37,5 - 45,4
Double support (in %)	<b>15,9 ± 6,3</b> 4,2 - 23,9	<b>13,4 ± 6,7</b> 4 - 21,7	<b>14 ± 7,2</b> 2 - 24	<b>17,6 ± 4,4</b> 11,2 - 23,6
Left support phase (in %)	<b>58,2 ± 3,7</b> 51,0 - 62,6	<b>57,2 ± 4,3</b> 51,4 - 61,5	<b>57,4 ± 4,2</b> 49,8 - 62,9	<b>58,9 ± 2,5</b> 54,5 - 62,5
Right support phase (in %)	<b>58,0 ± 3,5</b> 51,3 - 62,9	<b>56,7 ± 3,7</b> 50,8 - 61,4	<b>56,8 ± 3,9</b> 50,5 - 63,2	<b>58,7 ± 2,5</b> 54,9 - 62,4
Cycle duration (s)	<b>1,1 ± 0,1</b> 0,99 - 1,3	<b>1,1 ± 0,1</b> 0,99 - 1,3	<b>1,1 ± 0,1</b> 0,98 - 1,2	<b>1,1 ± 0,1</b> 1,01 - 1,3



### 14.2.2. Comparison with literature data

If we consider all the KinTrack studies (113 participants), we can compare the mean values and ranges obtained in this population with the literature data for "normal" values:

Parameters	KinTrack	Normal value <sup>2</sup>	Normal value <sup>3</sup>
<b>Speed (cm/s)</b>	<b>118,0 ± 16,8</b> 91,3 - 145,3	<b>120</b>	<b>120-160</b>
<b>Cadence (/min)</b>	<b>109,0 ± 8,3</b> 94,6 - 121,5	<b>110</b>	<b>100-130</b>
<b>Stride length (cm)</b>	<b>129,2 ± 15,1</b> 108,8 - 154,9	<b>130</b>	<b>160</b>
<b>Left step length (cm)</b>	<b>64,8 ± 8,0</b> 52,8 - 78,2	<b>65</b>	<b>80</b>
<b>Right step length (cm)</b>	<b>64,7 ± 7,6</b> 54,4 - 77,4	<b>65</b>	<b>80</b>
<b>Step width (cm)</b>	<b>6,1 ± 2,6</b> 2,9 - 10,5	<b>15*</b>	<b>Not available</b>
<b>Left single support (in %)</b>	<b>42,0 ± 3,5</b> 37,1 - 48,6	<b>40</b>	<b>40</b>
<b>Right single support (in %)</b>	<b>41,8 ± 3,7</b> 37,3 - 48,9	<b>40</b>	<b>40</b>
<b>Double support (in %)</b>	<b>15,9 ± 6,3</b> 4,2 - 23,9	<b>20</b>	<b>20</b>
<b>Left support phase (in %)</b>	<b>58,2 ± 3,7</b> 51,0 - 62,6	<b>60</b>	<b>60</b>
<b>Right support phase (in %)</b>	<b>58,0 ± 3,5</b> 51,3 - 62,9	<b>60</b>	<b>60</b>
<b>Cycle duration (s)</b>	<b>1,1 ± 0,1</b> 0,99 - 1,3	<b>1</b>	<b>1</b>

\* Step width value: it is normal for this value to be greater than the foot width given by KinTrack, given the definition of step width, see 13.2.3.

- The values obtained with KinTrack on a healthy population are in line with literature data for "normal" walking.
- Normal" values may vary according to age, sex, and walking speed, but they constitute benchmarks for interpreting results. Similarly, the values obtained with KinTrack can be used to evaluate a person requiring rehabilitation in relation to a healthy person.

<sup>2</sup> L'Analyse Quantifiée de la Marche (AQM) : caractéristiques de la marche " normale " plateforme Mouvement et Handicap 2015 Pr Yves Rossetti, Patrice Revol, Pr Sophie Jacquin-Courtois, Pr Gilles Rode, Pr Jacques Luauté

<sup>3</sup> Physiologie et évaluation de la marche Dr David GASQ, cours de DES national MPR 2022

### 14.3. Static balance

#### 14.3.1. Results on healthy people

KinTrack evaluated 45 healthy people, aged 14 to 63, for 10s of static balance with feet together, eyes open and eyes closed. 95% of surface and speed measurements were below the following values:

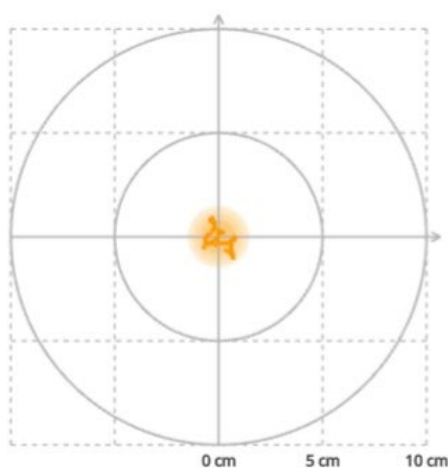
	Open eyes	Eyes closed
<b>Surface</b>	3 cm <sup>2</sup> (1.5 in <sup>2</sup> )	9 cm <sup>2</sup> (2.5")
<b>Speed</b>	0.8 cm/s	1.36 cm/s

These values are graphically represented in orange on the speed and area counters, as well as on the center of gravity curve, so as to situate a patient in relation to a healthy population.

#### Parameters



#### Balance





#### 14.3.2. Comparison with Normes 85<sup>4</sup> standards

By way of information, in comparison with Normes 85, the study carried out with KinTrack on 45 people shows the following results, the values given being :

- Mean value +/- standard deviation
- The 90% confidence interval

		Surface (mm <sup>2</sup> )	Speed (mm/s)
Open eyes	KinTrack	170 +/- 98 [120 - 180]	5,8 +/- 1,3 [5,4 - 6,2]
	Normes 85	91 [39 - 210]	10,6 +/- 3,7 [3,4 - 17,7]
Eyes closed	KinTrack	414 +/- 324 [190 - 388]	9,0 +/- 2,9 [7,5 - 9,3]
	Normes 85	225 [79 - 638]	11,5 +/- 3,4 [4,8 - 18,2]

The results given by KinTrack are consistent with those of Normes 85 :

- KinTrack, like the Normes 85 standards, shows a difference in balance surface between eyes open and eyes closed of a factor of 2.5.
- Speed values are comparable, around 10 mm/s, and for KinTrack as for Normes 85, we observe a greater dispersion of values in the case of closed eyes.
- However, there is a factor of 2 between the average surfaces measured by KinTrack and those given by Normes 85.
  - This is due to the way the surface is calculated: KinTrack multiplies the lateral imbalance by the frontal imbalance, whereas Normes 85 considers an ellipse containing the majority of measurement points.
  - This may also be explained by the difference in protocol: the KinTrack results were obtained with the feet together, whereas the Normes 85 standards required a stable position with the feet open and apart.
- Confidence intervals are wider for Normes 85 standards: this can be explained by a longer balance time (51s vs. 10s).

End of document

<sup>4</sup> « Etudes statistiques des mesures faites sur l'homme normal à l'aide de la plate-forme de stabilométrie clinique normalisée. I) Paramètres spatiaux. Association française de posturologie. Agressologie. 1986 Jan;27(1):69-72. »