

Step-by-step for taking a PWV measurement

The following is a brief step-by-step guide to taking a PWV measurement. Refer to manual for more detailed instructions.

1. SELECT OR ENTER A NEW PATIENT

Open the 'Patient' screen by clicking on the 'Patient' Button, or pressing F2 on your keyboard function keys. This screen will allow you to create a new patient entry or select a patient that is already present in the database.

To create a new patient entry, select the 'Create New' button and enter the patient details. You can move between the fields by using the Tab on your keyboard or placing the cursor inside the field into which you wish to enter details. The following fields are mandatory: 'Last name', 'first name', 'date of birth', and 'sex'. Once you have finished entering the patient details, click on the 'Update' button to add the details of the patient to the database.

To select an existing patient from the database, you may choose the patient by **one** of the following means:

- Scroll down the list of patients and click on the row to select that patient. If you click on the heading 'Family name' at the top of the browser this will place the patients in alphabetical order. When the patient is selected the patient name is highlighted.

OR

- Place the cursor in the 'Patient Search' field and enter the patient's family name. As you do so the system selects the patient in the browser whose name best matches the characters you are typing. Ensure the patient you wish to select has been highlighted.

Note: Before creating a new patient entry, please check that the patient does not already exist in the database, as separate patient entries cannot be merged.

2. PERFORM THE STUDY (TAKE A PWV MEASUREMENT)

While still in the 'Patient Screen', select 'PWV' mode by either clicking on the arrow on the selection box (located next to the 'Analysis' button), or by pressing F6 on your keyboard to scroll through the mode options.

Open the Study Screen by clicking on the "Study" button or pressing F3 on your function keys on your keyboard. This screen will allow you enter the study details and to proceed to 'Capture data'.

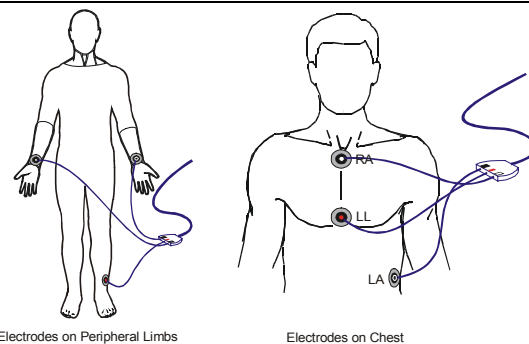
Mandatory fields to be selected or entered:

- Click in the box that corresponds to the site from where the measurement is to be taken. This is to be done for both Site A and Site B. Site A is the site at which the first measurement is to be taken and Site B refers to the site at which the second measurement will be taken.
- When carotid is selected as the first site, enter the mean and diastolic blood pressure values, that has been obtained from the cuff sphygmomanometer or automatic blood pressure device. The Mean Pressure can also be obtained from the PWA report if this has been measured immediately prior to commencing the PWV measurement.
- The Capture Time is set to a default of 10 seconds for both the Site A and Site B measurement. Alternative times can be selected for either or both Sites if required.
- The Distance should be measured and entered as follows: for carotid – femoral and carotid – radial, the distance directly between the each artery location and the supra-sternal notch are entered in the distal and proximal boxes. In the instance of femoral – dorsalis pedis (Distal Box) the actual measurement between the sites can be entered directly into the PWV box. (see note on measuring distance)
- The PWV algorithm has a default setting of Intersecting Tangents. For further information on this, please refer to the manual and the PWV Algorithm Technical Information Sheet. To select a different algorithm, click in the circle next to the corresponding algorithm of choice.
- The Medication, Notes, Operator and Anthropometric fields are optional.

Note: At present, there is no definitive way to measure the distance between the aorta and the femoral artery non-invasively. As a result there a number of methods that are used to measure the distance. If there is no existing methodology already in place, it is recommended that the measurement be taken in a direct line between the supra-sternal notch and the femoral artery.

Placement of ECG leads:

To ensure a stable, artifact free ECG, the skin should be properly prepared (hair removed at electrode site and skin cleaned with an alcohol wipe), and the electrodes positioned correctly. The ECG leads should be positioned as shown in the diagram below. This is a Lead II configuration. The leads can be placed either on the limbs or on the chest area if required for stronger QRS levels).



To proceed to the capture data screen, click on the 'Capture Data' button or press 'enter' on your keyboard.

Once the ECG trace is shown along the screen and is steady, proceed as follows:

- The tonometer should be placed at Site A location and adjustments to the position of the tonometer made until a strong, accurate and reproducible waveform is displayed in the 'Signal Detail' window. This signal will be automatically re-scaled and zoomed to fit the waveform within the signal detail window every 5 seconds.
- When you are satisfied that you have a good reading, press the 'Space Bar' on your keyboard or click the 'OK' button at the top of the screen.
- You must have a minimum of 12 seconds of signal for the data to be captured (minimum of 22 seconds or 32 seconds if you have selected a capture time of 20 or 30 sec in the Study Screen). The last 2 seconds of waveforms will be deleted, allowing sufficient time to remove the tonometer from the wrist to activate the capture of data.
- A prompt window will appear confirming that the signals have been captured successfully. When you are ready to proceed to take the reading at Site B, click the OK button or press 'enter' on your keyboard. If you wish to take the reading again, click No and repeat the reading at Site A.
- Repeat the process by placing the tonometer at Site B and proceed with the capture when you have obtained a signal of satisfactory quality. A prompt box will appear to confirm that the signal was captured successfully. If you are satisfied with the reading at Site B and wish to proceed to the report, click OK. If you wish to repeat the reading at Site B, click No and repeat the reading at Site B.

Note: Remember that the signal representing the tonometer waveform for Site A should be the artery selected in the 'Study Screen'.

3. EXAMINE THE REPORT FOR QUALITY CONTROL

After you have completed the data capture, the 'Report Screen' will automatically be displayed. This can also be recalled at any time by selecting the patient in the 'Patient Screen' and pressing the 'Report button'.

Before proceeding with the interpretation of results it important to check the quality control to ensure that your measurement has been recorded with sufficient quality. Therefore the Quality Control parameters suggested here are to provide a guide to the quality of the reading rather than provide a cut-off value to accept or reject data. Measurements that are of an unacceptable quality should be repeated.

Quality Control checks:

- It is important that the foot of the wave is easily identified. The preferred algorithm uses this part of the waveform for locating the onset points used in calculating the time differences between the ECG and tonometer waveforms at each site
- The software requires a minimum of 3 pairs of data to calculate the result, if it rejects too many pairs with less than 3 left, the software will not calculate a PWV reading.
- The SD(ms) in the statistical table should be below 6% of the mean time. If this is above 6% the number will appear in red.
- It is recommended that PWV should have a SD 10% or less. Between 10% and 15%, is borderline and careful examination of the waveforms should be done before making a decision as to whether to repeat the reading. For SD above 20% a repeat reading is recommended. The SD of the PWV and mean time provide an indication of how consistent the data is, and this may include some biological variation that is inherent in the reading.

If you have performed more than one reading on a patient, the studies are listed chronologically in the 'Study Time' window and the most recent report will be at the bottom of the list. Each of the reports may be viewed by clicking on the study you wish to view. The report being displayed will correspond to the highlighted study in the 'Study Time' window.

Additional comments on performing carotid and femoral measurements:

Carotid measurement: The patient should be lying on a bed. The patient's head should be tilted slightly to the back and to one side (either left or right). This is best achieved in the absence of a pillow. The operator should feel for the position for the strongest pulse and place the tonometer directly on the top of the skin at this point. The operator can be standing either behind the patient's head or to one side. A pillow may be placed across the shoulder of the patient to allow the operator to rest their forearm to ensure that the tonometer and wrist remain steady during the measurement.

Femoral Measurement: The patient should be lying on a bed. The femoral pulse is best felt by pressing directly backward at a point that is midway between the anterior superior iliac spine and the front of the pubic bone, with the thigh flexed at the hip joint, moved away from the midline of the body and rotated away from the body.