



Step By Step Guide – PA Hand X-ray (Detector out of bucky/on table top)

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This tutorial will take you through the following steps.

- Selecting a projection PA Hand
- Selecting the IR/detector from the Exposure panel
- Room Preparation
- Inviting the Patient in and setting the Entry Position
- Radiographer movement relative to the patient
- Patient movement and positioning
- Setting up the Tube and Collimator
- Table movement
- Skeleton view
- Source Image Distance (SID) measure
- Side Markers
- Double check positioning and collimation
- Go to the control area
- Exposure panel
- Image display
- Compare with pre-set technical standard

Selecting a Projection

Clicking the 'Tutorial' button will display the 'Projection Selection' panel. You cannot move forward until an x-ray projection has been selected. In the following example we will be conducting a PA Hand x-ray. In the x-ray projection panel, select the " for the *Body Area*, the 'Hand' for the *Anatomy* and 'PA' for the x-ray projection. Click the 'Ok' button with your LMB.



Students can only gain access to the VR digital x-ray room if they select a projection that the medspace.VR™ administrator has created. This will enable direct comparison between the pre-set administration ideal image/standard and the image the student has performed. A user can take any image once in the room; however, the comparison will only be of the selected "technical standard".

Tutorial

Select X-Ray

| Select Body Area | Select Anatomy | X-ray Projection |
|----------------------|---------------------|------------------|
| Abdomen | Elbow | PA |
| Lower Limb | Elbow - Radial Head | |
| Pelvis | Fingers | |
| Shoulder Girdle | Forearm | |
| Skull & Facial Bones | Hand | |
| Spine | Humerus | |
| Thorax | Scaphoid | |
| Upper Limb | Thumb | |
| | Wrist | |

Ok

Cancel



The Projection Selection Panel

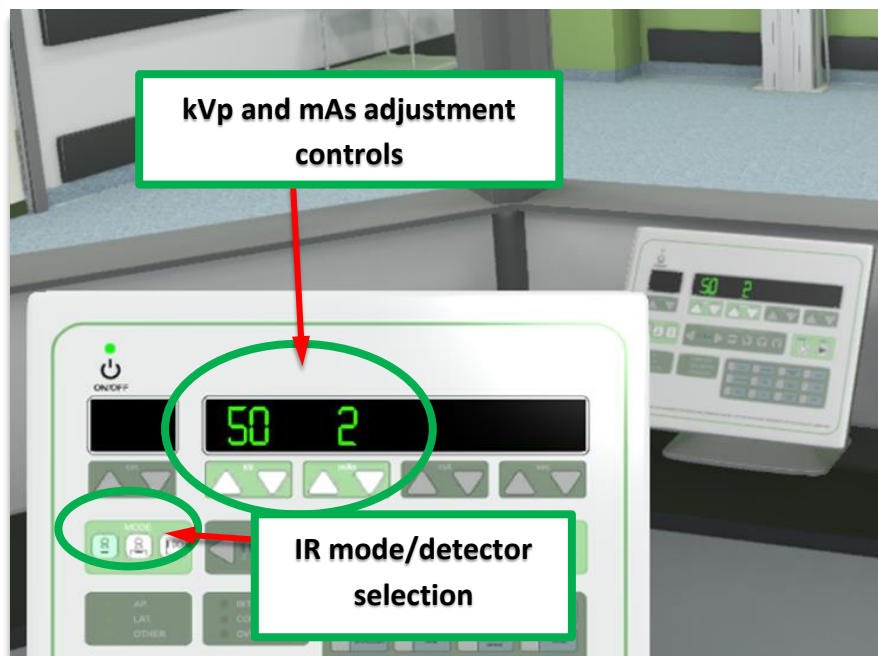
IR selection at Exposure Panel

It is good radiographic process to select the correct IR and approximate exposure factors at the start of the procedure. Select the Exposure panel either by clicking on it with the LMB (if you can see it); via the “equipment” drop down menu; or using the Shortcut key **7**.

When the exposure panel is selected it will be displayed as in the example below.



In medspace.VR™ this is an important step as the camera views and tube locks are relative to the IR selected.



The exposure control panel

Room Preparation

Clicking the 'Ok' button on the Projection Selection Panel will place you in the medspace.VR™ work environment.

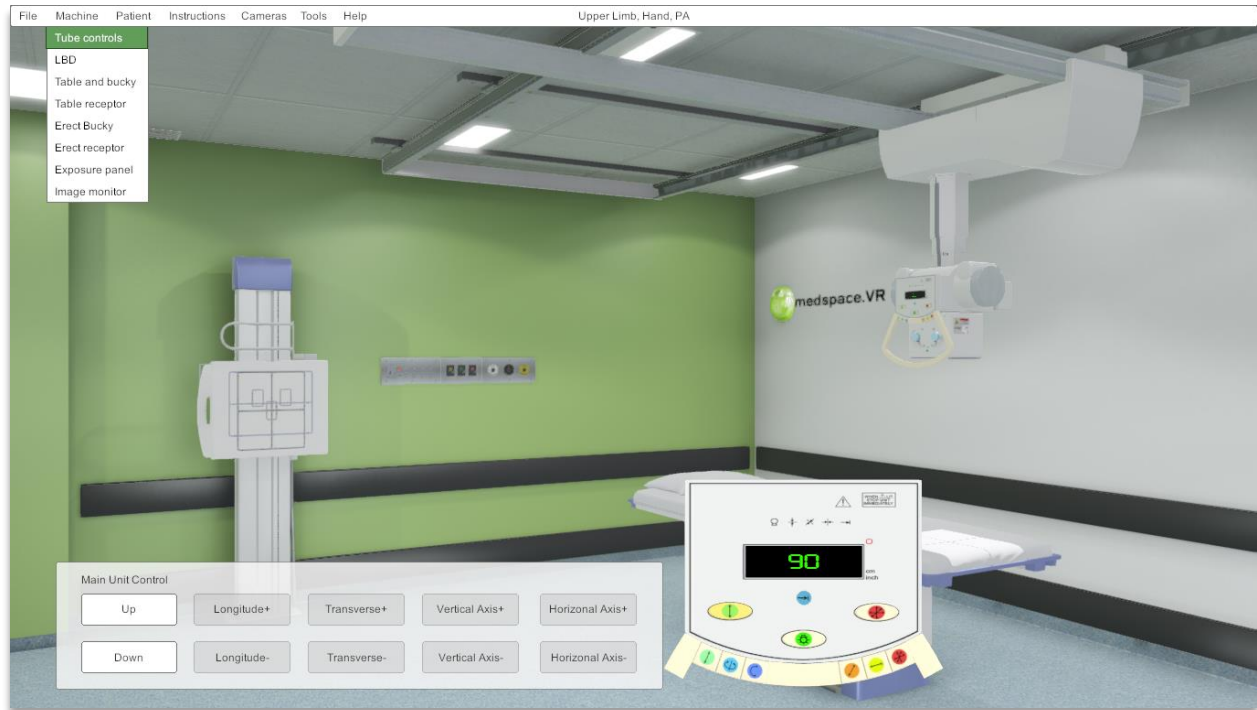


The medspace.XR environment

The first step is to position the x-ray tube roughly in the correct position, which for this example of the PA Hand, is at the end of the table. To move the tube either:

- Use the drop-down menu under *"Equipment – Tube controls"*
- Click on the tube head on the screen
- Use short cut key 1

This will provide an interface where clicking on the relevant tube locks will provide movement of the tube. Press the 'light' button to turn on the collimator light.

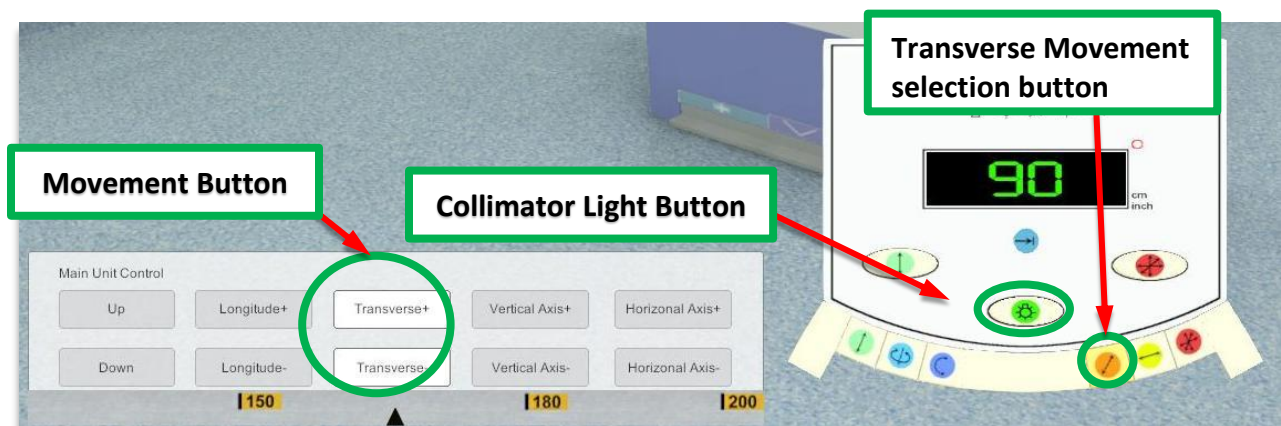


Tube Controls and approximate starting position for the tube

Tip Turning on the Collimator light will assist you in positioning the tube.

To move the tube, select a movement direction button from the controls on the tube by clicking it with your LMB. The relevant control buttons will be enabled on the 'Main Unit Control' panel. In the example below, the 'Transverse' movement button has been selected on the tube controls and the relevant '+' and '-' controls have been enabled on the 'Main Unit Control' panel.

Tip To move the tube from the original start position you will need to use the Transverse- and the Longitudinal- to move toward the console room end of the table.



Tube Movement Controls

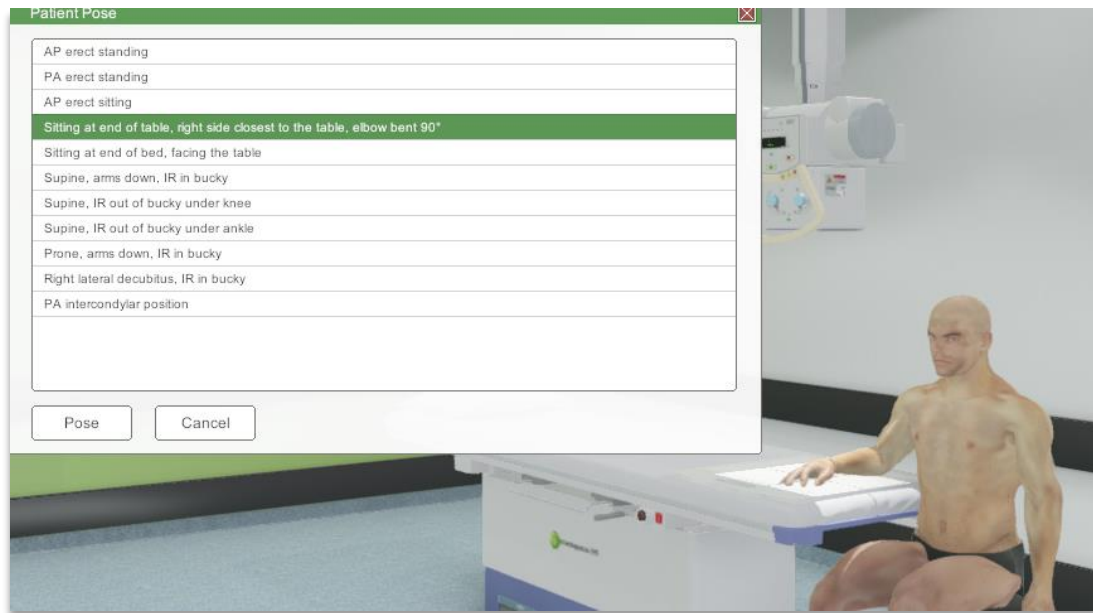
Note The Tube will lock into the Bucky providing the correct receptor selection has been chosen on the operator console. All camera angles and locks are relevant to this selection.

Tip

*To speed movement up, press and hold the 'Shift' key whilst holding the desired movement key.
To close any opened menu, click elsewhere in the screen with the LMB.
It is easier to position the tube correctly with the light on.*

Inviting the Patient in and setting the Entry Position

Once the tube has been placed in roughly the correct position, the patient can be 'invited' into the room. Go to the 'Patient' menu and select 'Entry Position'. A panel list of starting positions for the patient will be displayed, select the appropriate position by clicking on an option with the LMB. Click 'Pose' with the LMB once the desired Patient Pose has been selected.



Patient pose starting position

Your patient will now appear in the basic starting position for you to make fine adjustments.

Patient in initial pose



For lower extremities, select an option with IR out of Bucky. In this system, the IR cannot be moved – the patient and/or the table needs to be moved.

| Patient Pose |
|--|
| AP erect standing |
| PA erect standing |
| AP erect sitting |
| Sitting at end of table, right side closest to the table, elbow bent 90° |
| Sitting at end of bed, facing the table |
| Supine, arms down, IR in bucky |
| Supine, IR out of bucky under knee |
| Supine, IR out of bucky under ankle |
| Prone, arms down, IR in bucky |
| Right lateral decubitus, IR in bucky |
| PA intercondylar position |

Patient pose starting position for lower extremities

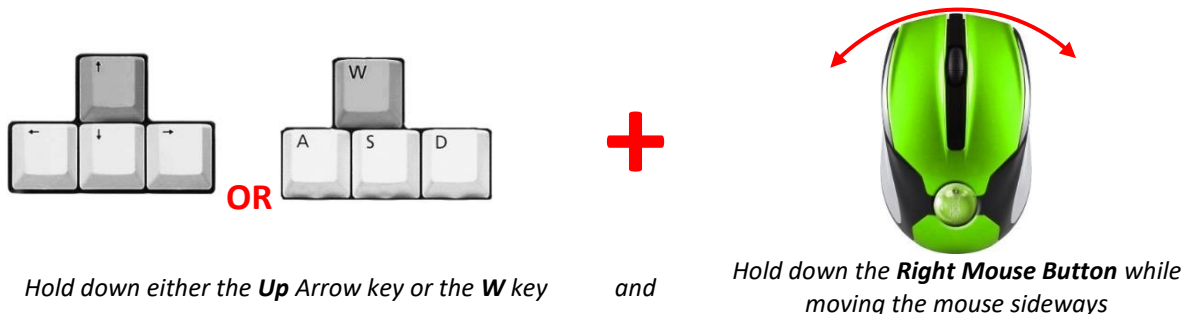
Radiographer movement relative to the patient

There are a few methods for interacting and moving around inside the medspace.VR™ 3D environment. For detail movement instructions, see the user guide.

A combination of keystrokes and mouse buttons should be used to navigate.

Moving and Turning

Use either the **arrow keys** or the **W,S,A,D** keys to move forward, backwards or pan sideways. Use the RMB in combination with the directional keys to turn corners and look around. The images below demonstrate moving forward in the 3D environment while using the mouse to steer.

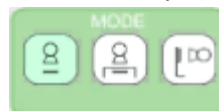


Alternatively, you can select “Camera” to position yourself in one of the options there, or the short cut camera keys “**Ctrl + 1 - 7**”



*You must select the receptor from the exposure panel (Shortcut key **7**) and select the correct IR. Then the camera view will be relative to this particular IR.*

Camera shortcut keys



| Ctrl + | Camera View <i>(relative to selected IR from exposure panel)</i> |
|--------|--|
| 1 | Radiographer |
| 2 | Light Beam Diaphragm (LBD) |
| 3 | Left <i>(relative to selected IR)</i> |
| 4 | Right <i>(relative to selected IR)</i> |
| 5 | Front <i>(relative to selected IR)</i> |
| 6 | Top <i>(relative to selected IR)</i> |
| 7 | Control Panel |

Patient movement and positioning

Click on the anatomy of the patient you wish to position (in this example the hand and fingers). Alternatively, use the drop down menus under “Patient” to isolate a particular body area. The movement options will be presented.

To position the hand flat, you will need to “abduct” the thumb and straighten out the fingers. You may even need to slightly flex the wrist by selecting or clicking on “hand” and “flex”.

You can choose to move the entire patient or the specific anatomical area following the presented movement options. (In the example below the view is from the “LBD” camera (**Ctrl + 2**)



View through the LBD (Shortcut: Ctrl + 2)



To speed movement up, press and hold the ‘**Shift**’ key whilst holding the desired movement key. It is important to change your angle to view the patient to ensure your Object Image Distance (OID) is correct.

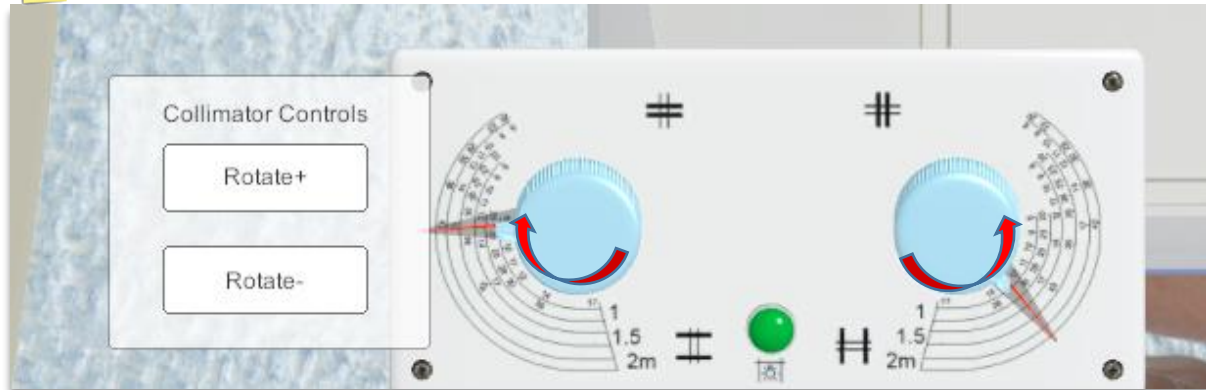
Setting up the Tube and LBD (Collimator)

Click with the LMB on either the tube or collimator to activate it, alternatively, use the drop down menus or selecting **keys 1** (tube) or **2** (collimators).

Click and hold left mouse on the collimator dial and rotate accordingly to manipulate the field of view (FOV).

You can use the 'Collimator Control' buttons to angle the FOV and use the dials to reduce or increase the collimated area.

Note Rotate+ and rotate- allows for an angled/rotated FOV



Collimator FOV adjustment using the Collimator controls

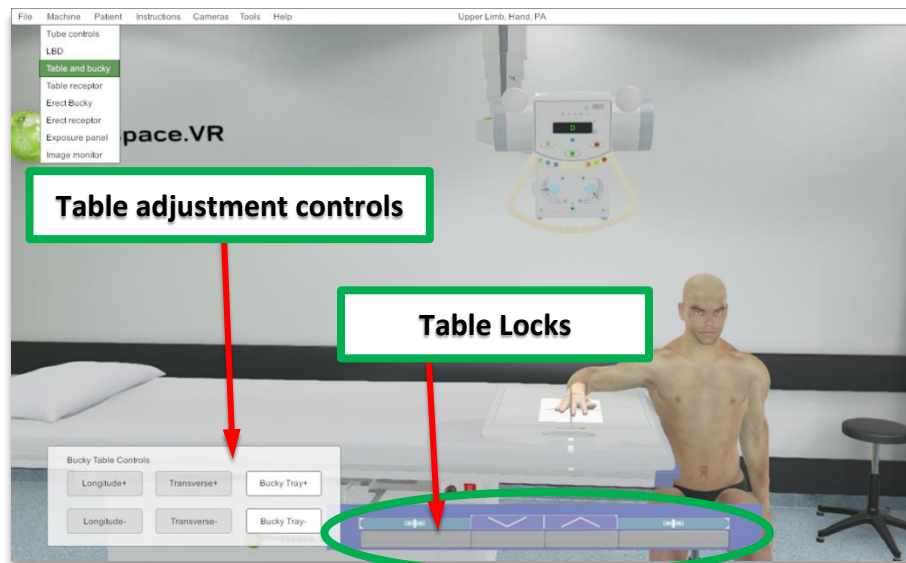
Table movement

To adjust the table height and position click on the tabletop with the LMB; select Table from the equipment drop down menu or use Shortcut key 3.

A foot switch menu will appear as in the example below.

Press on the grey area below the arrow keys to adjust the height of the table.

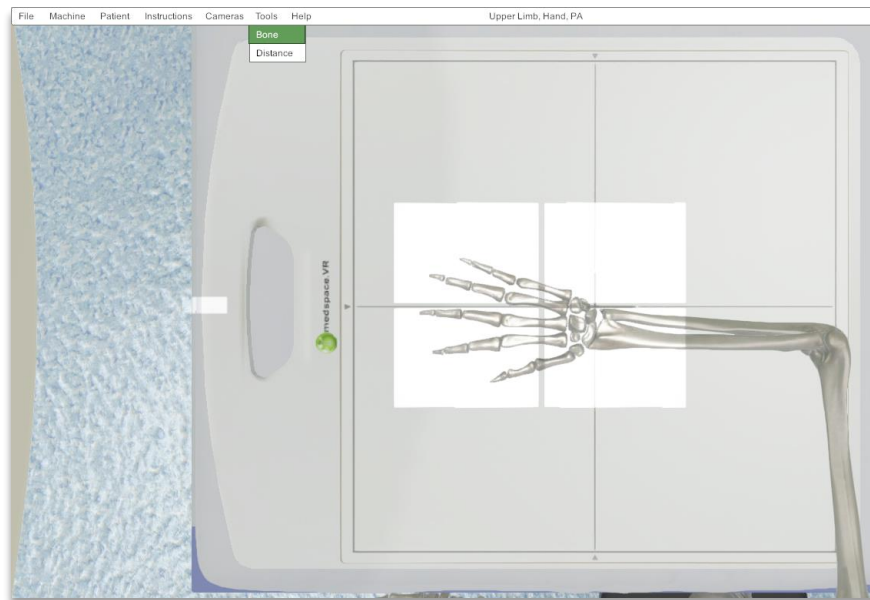
Press on the grey area on either end button to unlock the table movement foot switch to allow longitudinal and transverse movement using the Bucky Table Controls.



Bucky Table Controls

Skeleton view

Under the “Tools” menu you can enable a ‘bone view’. (Alternatively, **Ctrl + 8**)
This allows you to interact with the bony landmarks that are normally palpated.

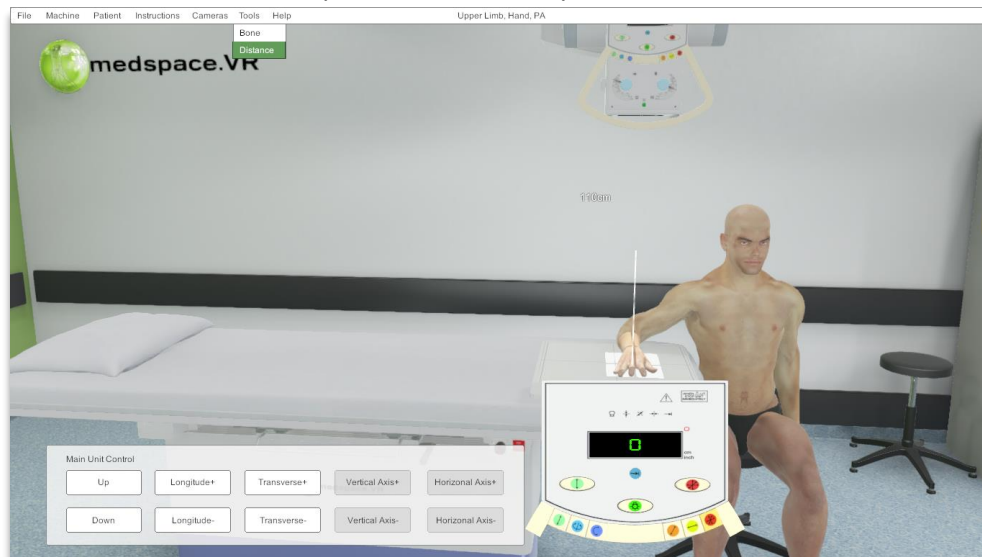


Bone view looking through the collimator

Source Image Distance (SID) measure

Access the SID through the “Tools – Distance” menu or **Shortcut key Ctrl+7**

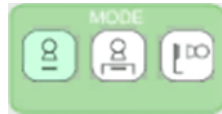
The SID is useful in measuring the correct distance between the x-ray tube and the selected IR. Enabling the SID displays the measuring line with distance (*in cms*). As the tube moves closer to, or further from the receptor, the SID measurement updates automatically in real-time.



The Source Image Distance measure enabled



The measure distance is from the tube head to the selected IR. If you are not getting a read out, make sure your tube is over the IR and that you have selected the correct IR from the exposure panel.

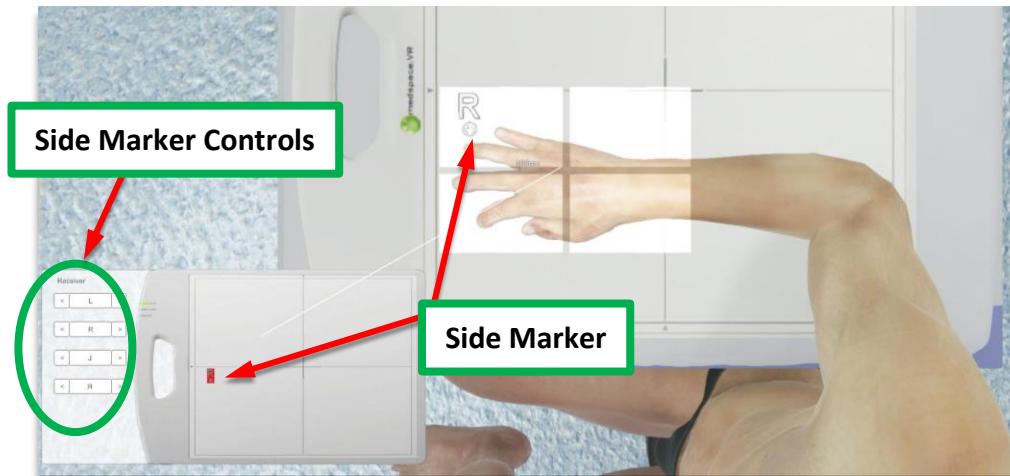


Side Markers

To place a side marker, click anywhere on the IR with the LMB.

The IR control panel will be displayed.

Click with the LMB on one of the 4 side marker options in the control panel to select the appropriate marker.



LBD view showing side marker position

When a side marker is selected it will appear at the end of your mouse cursor.

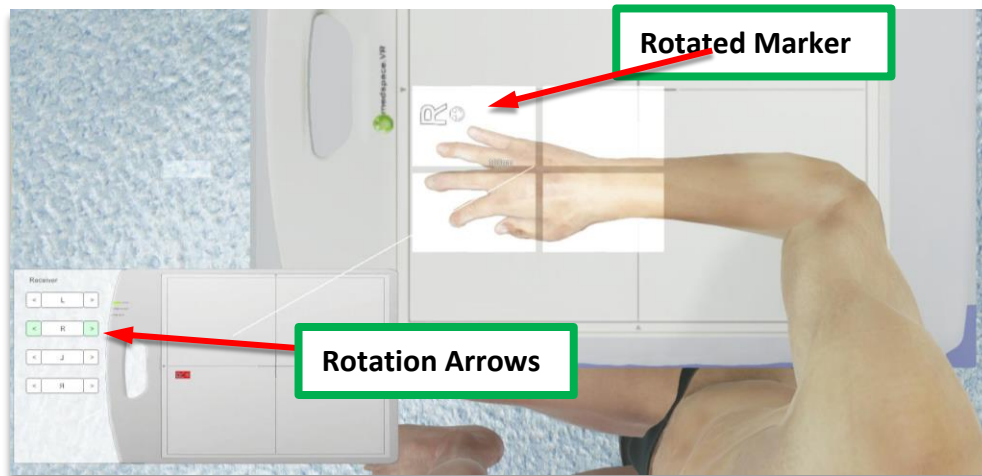
The marker will be visible on the IR out of the Bucky as well as on the menu IR

Move the cursor to the position that you want to place the marker (**on the menu receptor**) and click with your LMB.

The marker will be placed in the position that you clicked.

To rotate the marker to the correct orientation, click on the arrows either side of the marker button in the control panel with the LMB.

The marker will rotate clockwise for the right arrow and counter-clockwise for the left arrow.



LBD view showing rotated marker



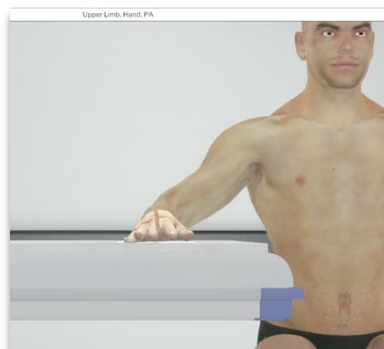
Do not try and drag the marker across to the IR in the room. It needs to be placed on the pop up receptor in the menu screen.

Double check positioning and collimation

Change the camera angles to make sure all dimensions are correct.

Use Shortcut keys **3** and/or **4** to get a view from the left or right of the IR.

Check side view – the hand could be 10 cm away from the table, and from the collimator view you will not be able to tell.



Use multiple views to be sure that the patient is positioned correctly



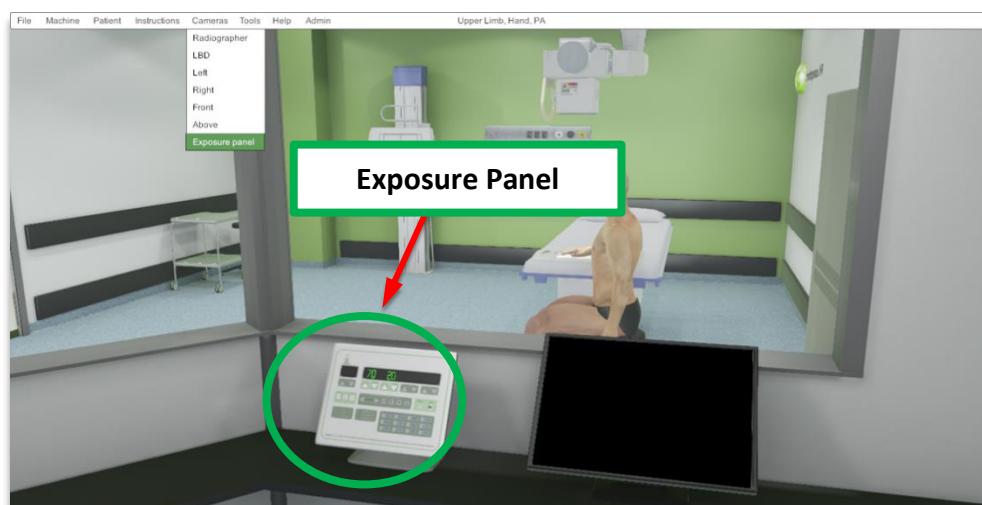
Camera angles are relative to the IR selected on the exposure panel. Ensure you have selected the correct receptor.

Go to the control area

When the patient and tube have been correctly positioned, move into the control area.

Access the control area using the 'Camera' drop down menu and select 'Exposure Panel'; or shortcut key **Ctrl + 7**

As a radiographer, you are now able to see the patient and manipulate the exposure panel as in the example below.

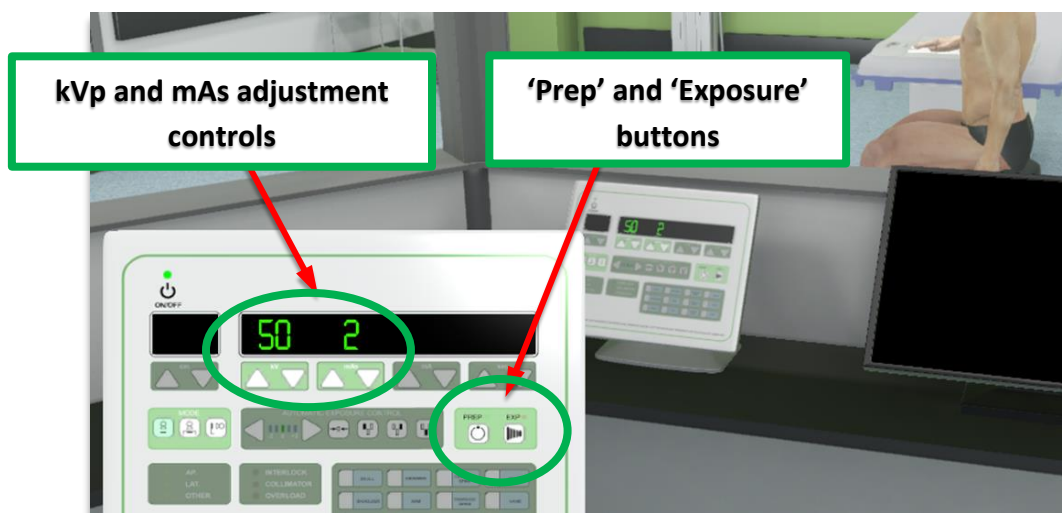


Radiographer view from the control area

Exposure panel

Clicking anywhere on the operator console with the LMB will display the console controls. The operator console gives the user access to a variety of controls including exposure, mode, and trigger controls.

When the exposure panel is selected it will be displayed as in the example below



The exposure control panel

Set the **kVp** and **mAs** by clicking on the 'up' and 'down' arrows with the LMB. Double check the correct IR is selected (i.e., IR on table; IR in table bucky; IR in erect bucky) Once you are happy with your settings you can proceed to exposing an x-ray.

To take an x-ray image the 'Prep' button must be activated first by clicking on it with the LMB. When the 'Prep' light turns green the exposure can be taken.

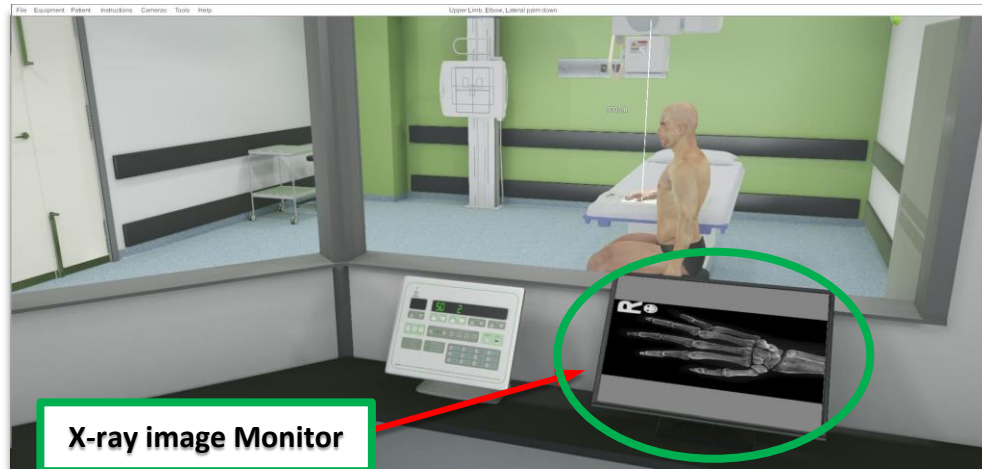
To take the x-ray click the 'EXP' button on the exposure panel with the LMB.

The x-ray will be taken, and a sound will be heard to indicate that the x-ray was successful.

The resulting x-ray image will be displayed in the Image monitor.

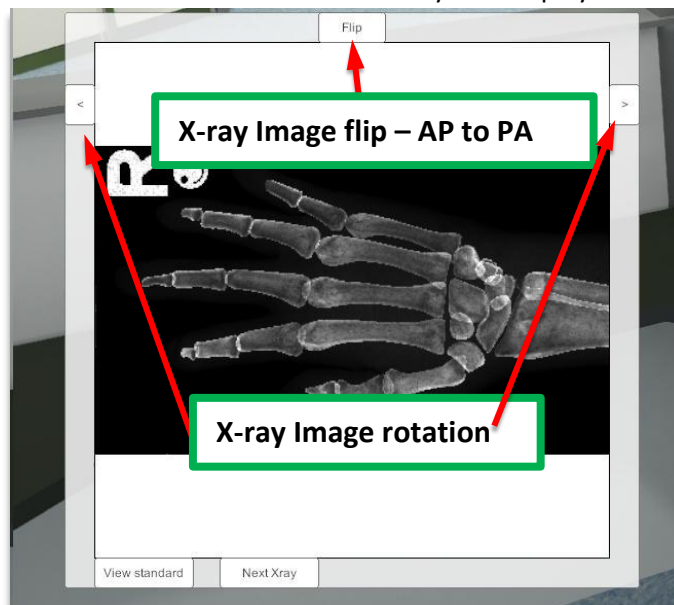
Image display

The resulting x-ray image will be displayed on the image monitor as in the example below.



X-ray image displayed on the image monitor

Click on the image monitor with the LMB or the Shortcut key **8** to display the image viewing panel.



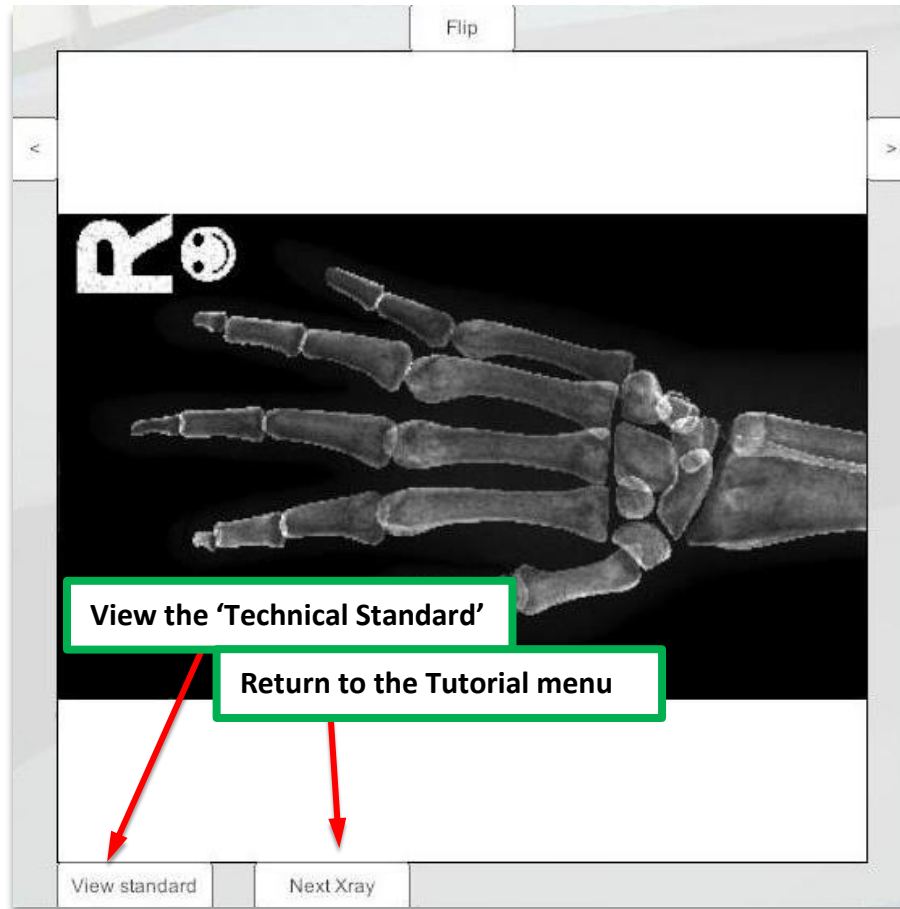
The X-ray viewing panel

The image can be flipped (no automatic PA flip) by clicking on the 'Flip' button located at the top of the Image display panel.

The side arrows on the display are for 90° rotation of the x-ray image.

Compare with pre-set technical standard

Clicking on the "technical standard" button will allow you to compare your image with a pre-set "technical standard".



The X-ray image display panel.

In addition to the 'Technical Standard' image being displayed the tube position and parameters will also be updated in real-time. Users can compare their x-ray setup to that of the 'Technical Standard' The student can not only compare images, but by changing the camera angle, can compare technical factors and positioning.

You can 'walk' around the machine and compare differences.

The 'Next X-ray' button returns you to the tutorial menu to select a new projection.



The patient will remain in position for the previous projection, thus replicating true practice

Once the "next Xray" is pressed you cannot go back. If a student wants to save the image or room set-up, they should save the image of the screen (PrtScr next to F12 on the key board) and save it to a word document or other.

Help and Support

Support Options:

Website: <http://medspacevr.com>

Email: support@medspacevr.com

User Forums: <http://www.medspacevr.com/forum/>

Please allow 24 hours for support requests to be answered.

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