



MedVision

USER MANUAL

Human patient simulator ADAM

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1 Startup and Shutdown

1.1 Robot startup

To turn the robot-patient **on** follow the sequence below:

- Locate the pocket with skin insert on the robot-patient's left shoulder (Pos. 1 on the Fig.1.1);
- Slightly move the skin insert to the side to locate the ON/OFF button;
- Press the ON/OFF button (the LED light should light up);

Please note: The robot-patient operates on battery power. The battery life is 4-5 hours, depending on the power usage. However, the robot-patient can be connected to the power outlet (AC) for the battery charging (connector located near the ON/OFF button) and it is possible to continue using the robot-patient during battery charge.

1.2 Teacher's tablet startup

To turn the teacher's tablet **on** follow the sequence below:

1. Press the ON/OFF button on the tablet (the LED light should light up);

Please note: The teacher's tablet operates on a battery. Make sure that the tablet battery is charged before use.

1.3 Defibrillation and ECG startup

To turn the defibrillation and ECG **on** follow the sequence below:

1 STARTUP AND SHUTDOWN

1. Press the ON/OFF button on the defibrillator imitator (Figure 11.49) (the LED should light up);
2. Press the ON/OFF button on the ECG imitator (Figure 11.50) (the LED should light up);

Alternatively (if the adapted defibrillator is present): Press the ON/OFF button located on the front panel of the adapted defibrillator. This will activate the ECG as well.

1.4 Robot shutdown

To turn the robot-patient **off** follow the sequence below:

- Locate the pocket with skin insert on the robot-patient's left shoulder (Pos. 1 on the Fig.1.1);
- Slightly move the skin insert to the side to locate the ON/OFF button;
- Press and hold the ON/OFF button for a couple of seconds (the LED should switch off);

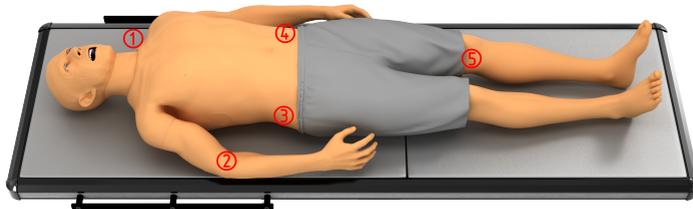


Figure 1.1. Robot-patient chart

1.5 Teacher's tablet shutdown

To turn the teacher's tablet **off** follow the sequence below:

1. Press the ON/OFF button on the tablet (the LED light should switch off);

Please note: The teacher's tablet run on battery. Make sure that tablet battery is charged before use.

1.6 Defibrillation and ECG shutdown

To turn the Defibrillation **off** follow the sequence below:

1. Press and hold the Defibrillation ON/OFF button for a couple of seconds (the LED should switch off);
2. Press and hold the ECG ON/OFF button for a couple of seconds (the LED should switch off);

Alternatively (if the adapted defibrillator is present): Press the ON/OFF button located on the front panel of the adapted defibrillator. This will activate the ECG functions as well.

2 Authentication

In order to activate the «Instructor software» follow the sequence below:

1. Switch on the Teacher's tablet;
2. Launch the «Instructor» software from the icon on the desktop;

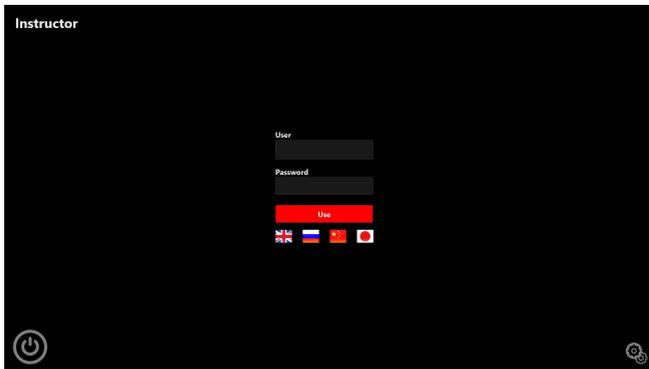


Figure 2.2. Authentication menu

After that, the **Authentication menu** (Figure 2.2) will become available. Here you can choose the language, by clicking on the icons, placed below the «Use» button and log in to the program using the appointed username and password.

3 Instructor work menu

After the authentication process is completed, the **Main Menu** will become available. Press the leftmost icon in order to open the **Mode Menu** on the left side of the window. Press the lines icon in the top left corner to open the menu modes.

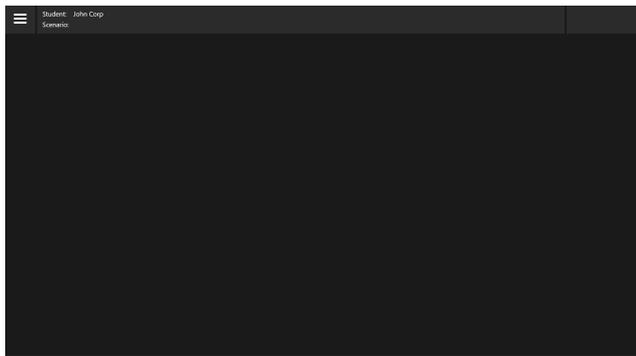


Figure 3.3. Main Menu

Here you can chose from the list of all available modes. Which are:

- **Automated scenarios:**

List of all predetermined, teaching scenarios, which can not be changed during the scenario performance;

- **Manual scenarios:**

List of all teaching scenarios which can be tampered with during the scenario performance;

- **Themes:**

List of all available learning subjects:

- **Students:**

List of all students and study groups;

- **Debriefing:**

List of all scenarios performed by students;

- **Connections:**

Graphs, showing which part of the complex are connected (on-line, working) and which are not;

- **Settings:**

The «Setting» mode in this version of the Software is not completed yet;

- **Exit:**

The «Exit» button, which allows you to exit the program

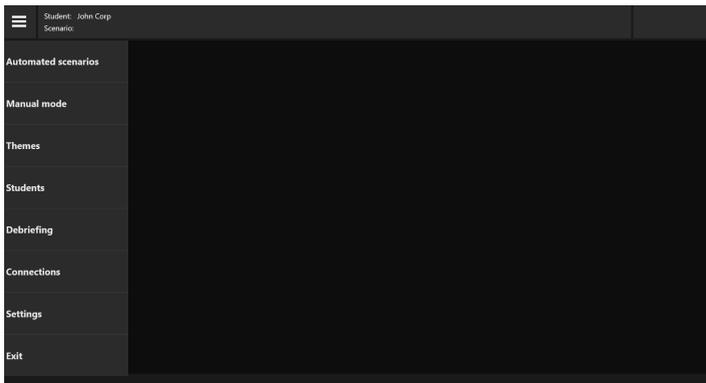


Figure 3.4. Main Menu. Modes

4 Scenario constructor

The **scenario constructor** allows the user to create their own teaching scenario or edit an existing one. In order to start working with the scenario constructor follow the sequence below:

1. Switch on the Teacher's tablet;
2. Launch the «**Scenario constructor**» software from the icon on the desktop.

4.1 Scenario constructor control panel

The control panel is located at the top of the Scenario constructor window. The following buttons are available:

- **New** - create new scenario;
- **Open** - open already existing scenario for editing;
- **Save *** - save changes to the created/edited scenario;
- **Save as *** - save changes to the created/edited scenario, but ask beforehand;
- **Actions** - summon list of actions, which can be used in «Triggers»;
- **Scenario info** - open/close tab with scenario general information;
- **Configuration** - display current version of the software and change the language of the software.

* - «**Scenario constructor**» software will offer to save all changes upon exiting it.

To close the «**Scenario constructor**» software, press the «X» button, located in the top right corner.



Figure 4.5. Scenario constructor control panel

4.2 Scenario creation

To create a new teaching scenario press the «New» button. A pop-up window (Figure 4.6) will appear on the screen, here you can set a name and select a patient type for the scenario. Press «OK» to confirm your choice. After that the main constructor window will open (Figure 4.7) .

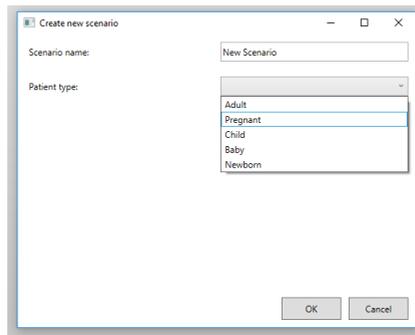


Figure 4.6. New scenario. Name and Patient select

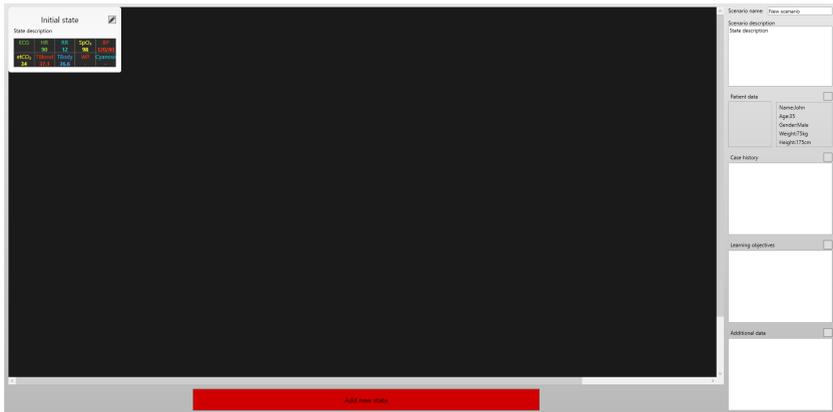


Figure 4.7. New scenario. Constructor window

The scenario constructor **control panel** is located on the top of the window, and contains overall controls of the software.

The **Scenario information section** is located on the right side of the window, and serves as the display of the scenario general information (name, description, patient data, goals, etc).

The **Scenario steps** (patient state) are located within the black field, which serves as the main working field, there all connections, triggers and patient states are displayed.

Add new state button which allow to create/add new steps to the scenario.

4.3 Scenario information section

The information section (Figure 4.8) for the created scenario is located on the right side of the constructor window (Figure 4.7) .

The screenshot shows a software interface for scenario information, divided into two main panels. The left panel contains several sections: 'Scenario name' with a text input field containing 'Can be change here'; 'Scenario description' with a large text area containing the placeholder 'Type any description for the scenario'; 'Patient data' with a small portrait photo of a man and a list of attributes: Name:Cullen, Age:22, Gender:Male, Weight:75kg, and Height:175cm; and 'Case history' with a text area containing the placeholder 'The medical history of said case'. The right panel contains 'Learning objectives' with a list of three items: Objective 1, Objective 2, and Objective 3, and 'Additional data' with an empty text area. Each section has a small square icon in its top right corner.

Figure 4.8. Scenario information section

In this section you can find and change:

- **Scenario name** field - display the name of the created/edited scenario. It is possible to change the scenario name;
- The **Scenario description** field - contains a short text description of the scenario, which is later displayed in the main menu (Figure 4.8) ,

once the scenario is selected. To add/delete/change the description select the field under the «Scenario description» inscription;

- The **Patient data** field - contain the information about the patient, such as: avatar, name, age, gender, weight and height. Those can be changed: for that press the square button located next to the «Patient data» inscription and change the desired parameters in the appointed fields. To change the patient avatar press «Change picture» and select a photo/picture from the appointed folder. After that press «OK» to save the changes;

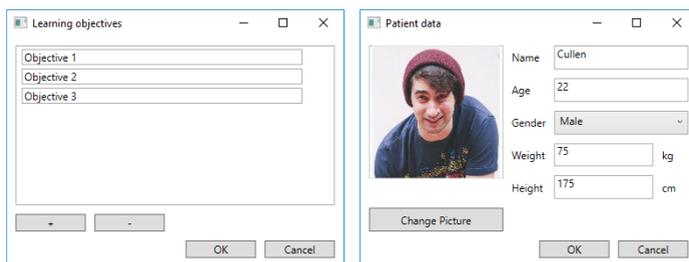


Figure 4.9. Learning objectives and Patient data fields

- The **Case history** - contain a description of the patient medical history, related to the scenario. To add/delete/change text press the square button located next to the «Case history» and type the text in the newly opened window;

- The **Learning objectives** - display the main learning objectives for the created/edited scenario. To add/delete/change objectives press the square button located next to the «Learning objectives» inscription and change the objectives in the newly opened window. Press «+» to add objective and «-» to delete it. After that press «OK» to save any changes;
- The **Additional data** - contain information about the additional(tutoring) materials which can be added to the scenario.

4.4 Scenario steps settings

The scenario runs through different steps, with different patient states, indicating the condition of the patient.

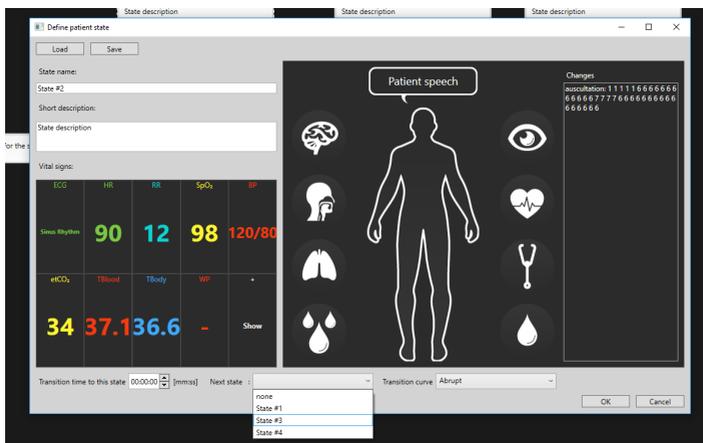


Figure 4.10. Patient state window

The first initial state is created automatically the rest are added by pressing the «Add new state» button (Figure 4.7) .

In order to define/change the patient state press the «pencil» icon. A new window will open. There it is possible to change following parameters:

- «**State name**» - contains a name of the patient state;
- «**Short description**» - contains a short text description of the patient state;
- «**Vital signs**» - contains information about the vital signs of the patient. To change vitals choose one form the list by clicking on it;

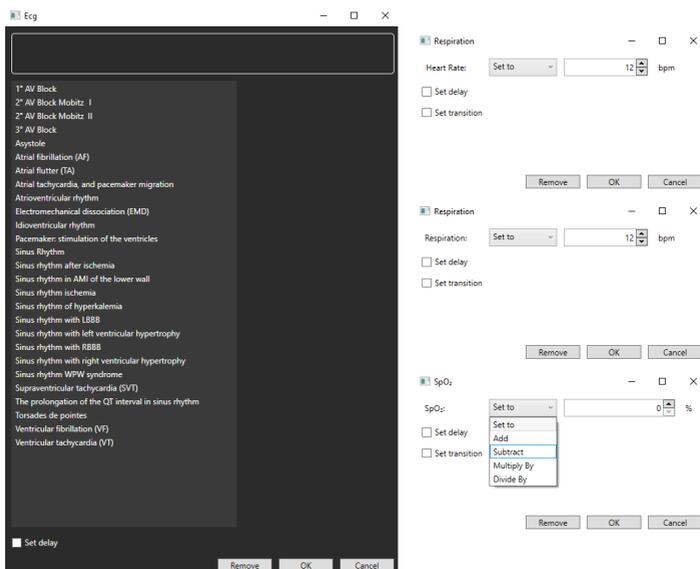


Figure 4.11. Vitals change window. Part 1

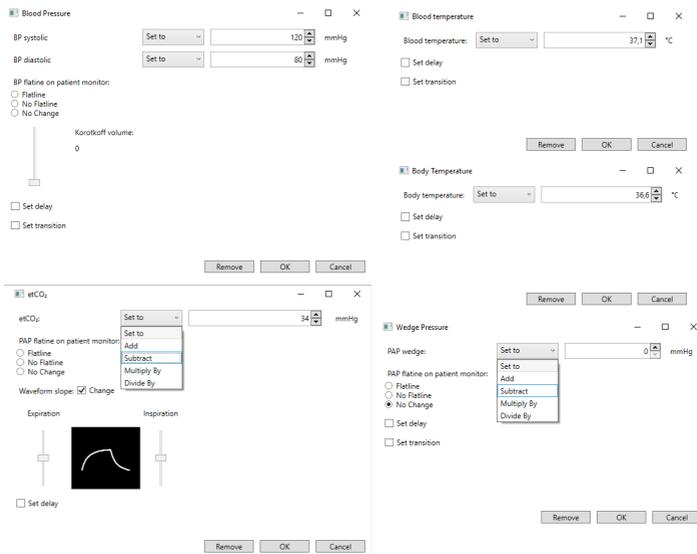


Figure 4.12. Vitals change window. Part 2

- «**Patient state**» field is located on the left side of the window. It contains settings for the bodily functions of the patient, such as pulse, blinking, secretion, etc. To change any of them select appropriate icon from around the patient figure and follow the instruction on the screen (Figure 4.13) .
- «**Transition time to this state**» field - determines the amount of time required for the transition between current and previous state;
- «**Next state**» field - selects which state will be activated after;
- «**Transition curve**» field - sets the type of transition between two patient states. Two options are available - abrupt or linear;

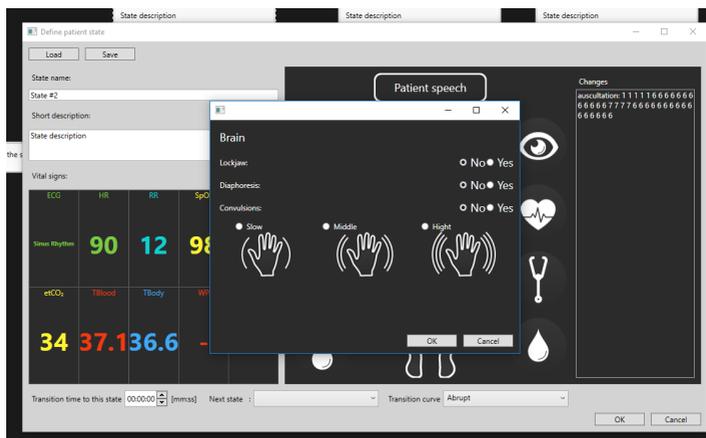


Figure 4.13. Example of patient state settings

«Patient state» settings can be saved, for that press «Save» button, located above the «State name» field. The saved «patient state» can be later loaded and used in different scenarios. To load saved «patient state» press «Load» button, located above the «State name» field, select it from the folder and press «OK» button.

4.5 Scenario steps triggers

The sequence of the scenario steps can be determined, using the «Next state» settings (see the «**Scenario steps setting**» section for more information). However it is also possible to select specific actions (triggers) which will lead to specific step and not the second one in sequence.

To create a trigger stretch an arrow-headed line from one step to the other (Figure 4.14)



Figure 4.14. Trigger creation

The screenshot shows a 'Define trigger' dialog box. It has a title bar with a close button. The 'Custom description' field contains the text 'Trigger for the state'. Below it is a 'Select action' field with a 'Browse...' button. There is an 'And' button in the center. At the bottom are 'OK' and 'Cancel' buttons.

Figure 4.15. Trigger settings

To edit the trigger press the «pencil» icon. A new window will open. Here you can add a short description to the trigger and add actions for that trigger.

To add a «defining action»: first, press the «Add» button, second, press the «Browse» (Figure 4.15) . Select «defining action» from the list (Figure 4.16) and press the «OK» button. The list can be narrowed or widened by opening the downfall menu on the right side of the window and checking/un-checking themes from it.

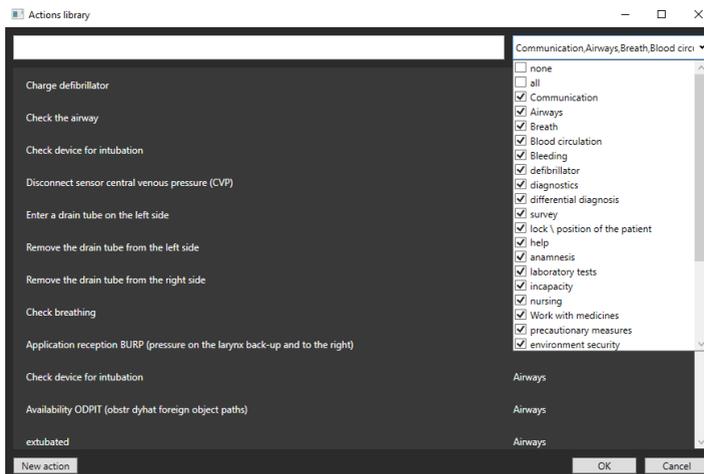


Figure 4.16. List of defining actions

It is possible to search for the specific «defining action» by typing its name in the search field. Also, a custom «defining action» can be created. For that, press the «New action» button, in the newly opened window, type the name of the new defining action and press the «OK» button. The newly created action will be sorted into «users action».

A trigger can contain several defining actions. To add more actions, while in trigger creation window, press «Add» button, located under the «select action» field and repeat the sequence from above. **Please, note:** If a trigger has several defining actions, all of them must be performed for the trigger to be activated.

After action(s) is selected, press the «OK» button to finish creating the trigger (Figure 4.17) .

It is possible to create multiple triggers between two step. The main difference between creating several triggers and triggers with multiple actions, is that the triggers aren't related to each other. Meaning that activation of either trigger will lead to the patient moving into the next step. In case of a trigger with multiple actions, all actions need to be performed in order to reach the next step.

4.5.1 Scenario steps triggers positioning

Scenario triggers can serve as connections:

- between two actions;

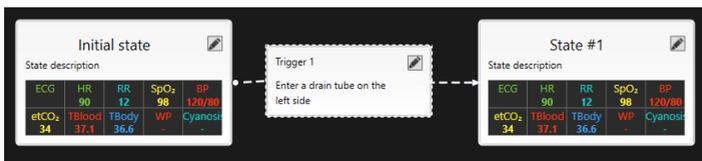


Figure 4.17. Created trigger

- from one actions to several others;



Figure 4.18. Created trigger

- from several actions to one;



Figure 4.19. Created trigger

4.6 Step-by-step scenario creation

The **scenario constructor** enables the the user to create their own teaching scenario or edit an existing one. The sequence for the scenario creation/editing is below:

1. Switch on the Teacher's tablet;
2. Launch the «**Scenario constructor**» software from the icon on the desktop;
3. Press «New»/«Open» (for editing) button;
4. If **New**- Enter the scenario name and choose the patient type (see the «**Scenario creation**» section for more information);
5. Fill the «Scenario information section» (see the «**Scenario information section**» for more information);
6. Set the patient initial condition (initial state)) parameters (see the «**Scenario steps settings**» section for more information);
7. Add and set the required number of patient states (see the «**Scenario steps settings**» section for more information);
8. *If required:* Add and set patient state triggers (see the «**Scenario steps triggers**» section for more information);
9. Press «Save» or «Save As» to finish the scenario creation.

5 ECG constructor

The **ECG constructor** allows the user to create their own ECG graphs, which can later be used during scenario performance (see the «**Function description**» section for more information about the «**CPR**» field functions). In order to start working with the scenario constructor follow the sequence below:

1. Switch on the Teacher's tablet;
2. Launch the «**ECG constructor**» software from the icon on the desk-top;



Figure 5.20. ECG constructor window

There are three main tabs:

- Parts;
- Series;
- Test.

- The «Parts» (Figure 5.20) tab allows the user to, create parts of graphs, which can later be used as building parts for the complete ECG-graph. In the «Parts» menu you can select a part of the ECG from the library, located on the left side of the window. Select a part, by clicking on it and it will be displayed on the screen. Here you can alter it, by dragging the points (one in circles) across or changing its scale. Press «Save» button to save changes or press «Delete» to delete all changes and start anew.

The field on the right side of the window is responsible for points coordinates. You can transfer between points using the first two buttons - «+P» and «P+». The «-» deletes the point.

You can also create a completely new entry. Click on the arrow, under the buttons on the left side of the menu to open pulldown menu. Choose a shape from it and change it to create new part.



Figure 5.21. ECG series constructor window



Figure 5.22. ECG series testing window

- The **«Series»** (Figure 5.20) tab allows the user to create new ECG graph, which can later be used in the Instructor software. See the **«Function description»** section for more information on the **«CPR»** field functions). In the **«Series»** menu you can select a sample from the library, located on the left side of the window. Select a sample, by clicking on it and it will be displayed on the screen. Here you can alter it. Press the **«Save»** button to save changes or press **«Delete»** to delete all changes and start anew.

The field on the right side of the window is responsible for the parts coordinates. You can transfer between parts using the first two buttons - **«+P»** and **«P+»**. The **«-»** deletes the point.

- The **«Test»** (Figure 5.22) tab allows the user to perform a running test for the created ECG parts and series in order to preview them before using them in the actual scenario performance. This is so you can correct mistakes early on. .

6 Scenario modes

There are three main scenario modes: automated, manual, subjects; these modes share same basic menu window, with different specific functions. Scenarios (Figure 6.23) modes tabs are located at the very top of the **Mode Menu**.

A list of all available scenarios is located in the «**List of scenarios**» field. By selecting one scenario you will activate the «**Description**» field, there the general information for the selected scenario can be found. Information such as:

- **Description**
 - A short but detailed account of the certain aspects and subject matters of the scenario;
- **Case History**
 - A medical history of the virtual patient, related to the selected scenario;
- **Learning Objectives**
 - List of the main learning objectives for the selected scenario;

On the right side of the window the «**List of action**» field is located. Here users can find the list of all the steps which are to be performed during the scenario course.

Please, note: Not all fields can be present in all scenarios modes. For example, in the «**Manual**» mode all actions are controlled by the teacher, so the «**List of action**» may be left empty.

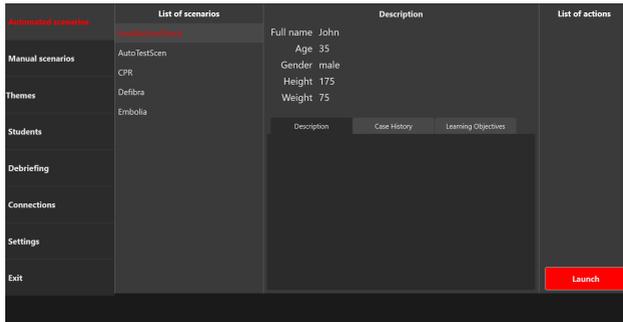


Figure 6.23. Automatic scenario information tab

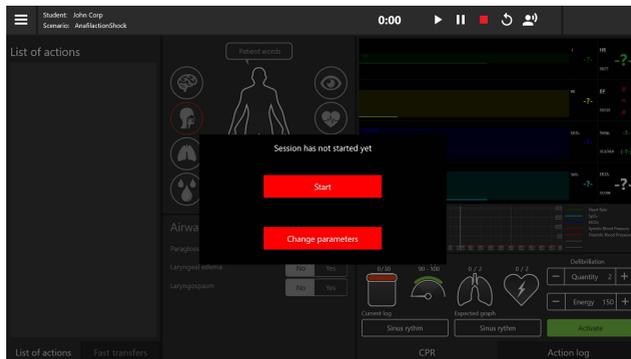


Figure 6.24. Confirmation window for the scenario start

6.1 Scenarios launch

General sequence for the scenario launch is:

1. Log in to the program (see «**Authentication**» section for more information);

-
2. Select the «**Automated scenarios**»/«**Manual scenarios**»/«**Themes**» tab from the «**Main menu**» (Figure 3.4) ;
 3. Select one of the scenarios, listed in the «**List of scenarios**» field (Figure 6.23) ;
 4. Press the «**Launch**» button, located at the right corner of the window;
 5. In the new window (Figure 6.24) press «**Start**» button to activate the selected scenario;

6.2 Function description

The scenario performance window consists of 5 main fields:

1. List of actions;
2. Patient state;
3. Control means;
4. Bedside monitor menu;
5. CPR.

All scenario modes has the same appearance as this window, however not all of its functions are available for in each mode. For example, in the «**Automated scenarios**» mode patient state are already predetermined and cannot be affected by teacher. Thus the «**Patient state**» field functions will inaccessible for interaction (Figure 6.38) .

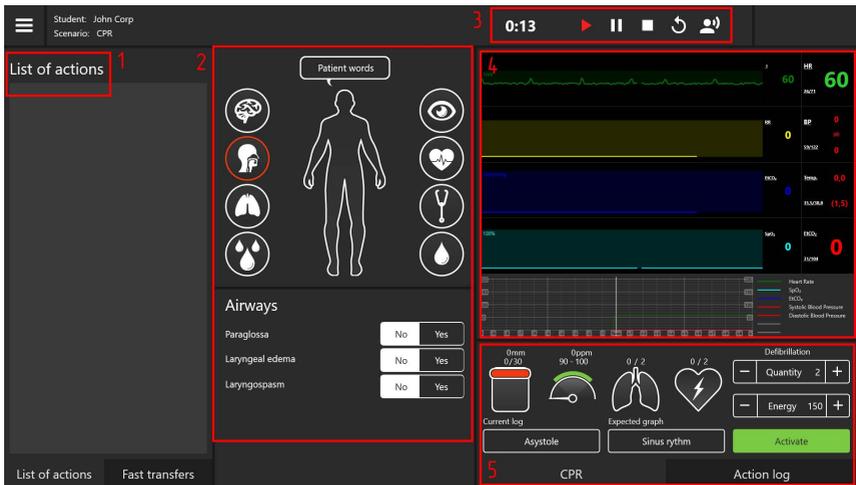


Figure 6.25. Scenario performance window

6.2.1 List of actions

This field is dedicated to the listing of all actions (stages) that need to be undertaken during the scenario performance. This is list of **predetermined** actions, which are supposed to be performed - This shouldn't be confused with the **Action Log** (located in the CPR field), which lists all actions actually performed by the students/users.

It is possible to fast-transfer between the actions (steps). To do that - open the «**Fast transfers**» (Figure 6.26) by pressing the appointed tab at the bottom of the «**List of actions**» field. Choose a step, to which you want to fast forward and press «**Activate**».

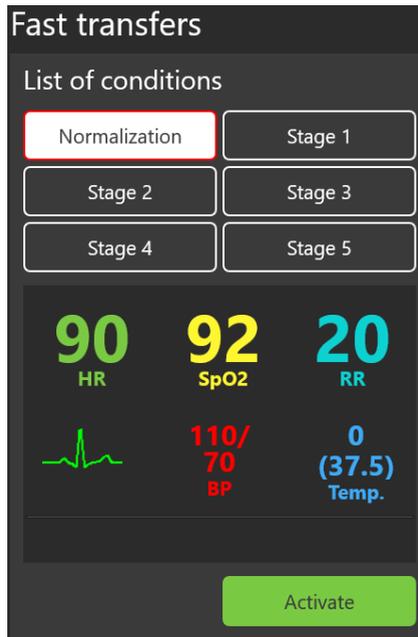


Figure 6.26. Fast transfers window

Please, note: List of actions may not be present in the manual mode, since all actions in there are determined by the teacher.

6.2.2 Patient state

The «**Patient state**» field (Fig. 6.25-2) has controls for the patient state, which allows the user to modify and introduce different features during the scenario performance. Select a feature from the list by clicking on the appointed icon and the sub-menu will open in the field below. The following features are available:

- **Patient words** (Figure 6.27) :

A set of pre-recorded words and short phrases which patient can pronounce. To activate the articulation of the word or phrase - select «**Patient words**» button in the newly open window select a word/phrase from the list by clicking on it. After that the patient will «**pronounce**» the selected word/phrase. It is also possible to use custom words/phrases. More on that will be discussed in the «**Control means**» section below.

- **Airways** (Figure 6.28) :

This controls for possible obstructions in the airways. To activate the selected obstruction/state check the «**yes**» box. To deactivate - check the «**no**» box.

- **Light** (Figure 6.29) :

This controls for the light setting. There are two separate scales, determined by the bar. Move the bar to set the level of light.

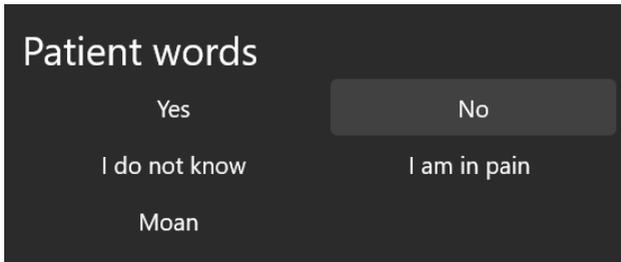


Figure 6.27. Patient words submenu

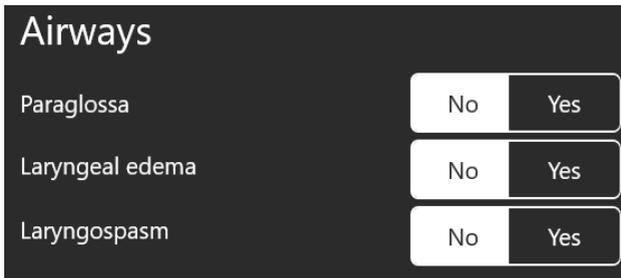


Figure 6.28. Airways submenu

- **Bloodloss** (Figure 6.30) :

This controls for the bloodloss. Two separate scale for right and left arms. Move the bar to set the selected level of bloodloss to set it.

- **Eyes** (Figure 6.31) :

This controls for the blinking rate, pupil size and eyelid position. Check the appointed section in order to set one. The «lock» icon allows to set either separate or simultaneous changes. If the «lock» is closed, the changes are simultaneous, if not - separated.

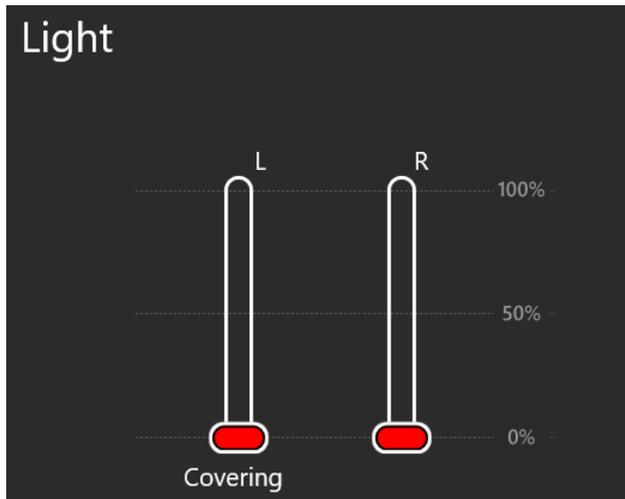


Figure 6.29. Light submenu



Figure 6.30. Bloodloss submenu

- **Pulse strength** (Figure 6.32) :

This controls for the strength of pulses. Despite the separated scales for settings, all changes will be simultaneous. The «cyanosis» feature can be activated by pressing the «yes» box in the appointed field.

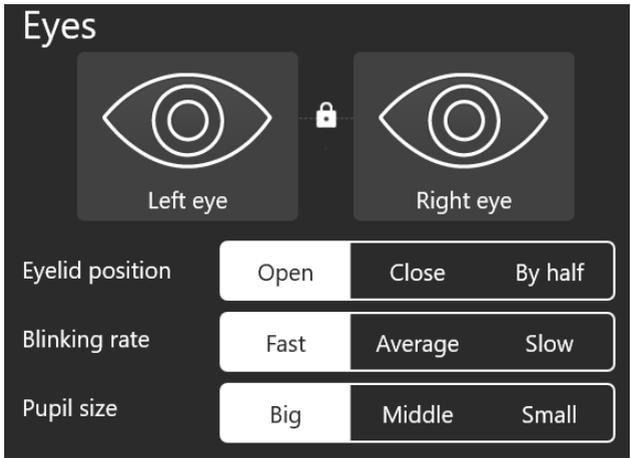


Figure 6.31. Eyes submenu

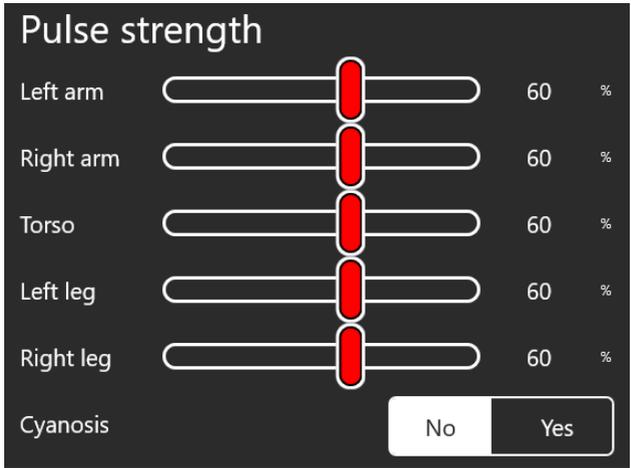


Figure 6.32. Pulse strength submenu

- **Auscultation** (Figure 6.33) :

This controls for the auscultation. Check the little arrow in the appointed field to open a pulldown menu, there you can choose a specific breathing sounds/conditions. The «lock» icon allows to set either separate or simultaneous changes. If the «lock» is closed, the changes are simultaneous, if not - separated. Korotkoff's sound bar is responsible for setting the strength of the sound.

- **Secretion** (Figure 11.48) :

This controls for the different secretions. Check the «yes» box in order to activate it. For the urine, however, use the bar, to determine the amount.

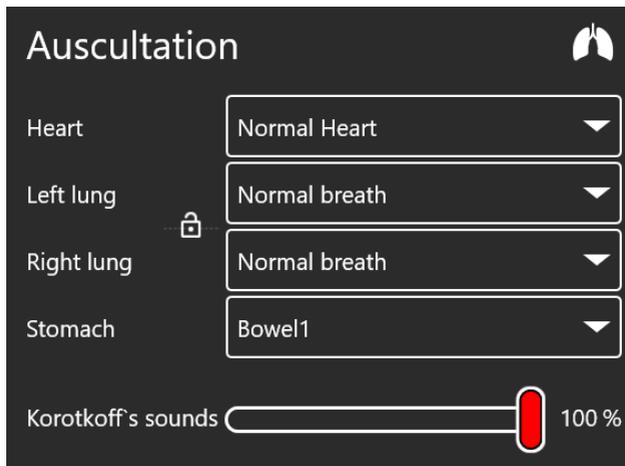


Figure 6.33. Auscultation submenu

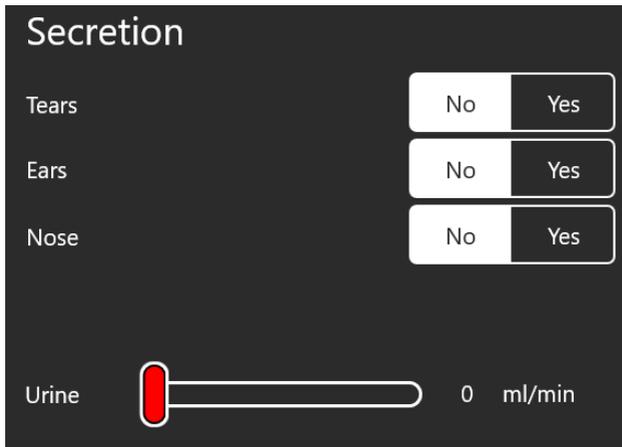


Figure 6.34. Secretion submenu

6.2.3 Control means of the timetable

This field (Fig. 6.25-3) is dedicated to the main controls of the scenario timetable and work. The icons (in following order) are:

- Play:
This functions indicates that the scenario performance is active and in effect.
- Pause:
This functions pauses the performance of the scenario. In order to continue press the play button.
- Stop:
This functions stops the scenario performance and exit to the main menu.
- Re-start:
This function restarts the scenario performance.

- Microphone:

This function is available if you have a connected microphone. Its allows user to implement the custom word/phrases and transmit them directly to «**communicate**». Click on the icon and speak in the microphone.

Please, note: «Active» icon is red-coloured, while the domain one is white.

6.2.4 Bedside monitor menu

This field (Fig. 6.25-4) mirrors the patient bedside monitor.



Figure 6.35. Bedside monitor menu

Following physiological parameters are displayed:

- Heart Rate (HR);
- Respiratory Rate (RR);
- SpO₂ (saturation)
- etCO₂ (capnometer, CO₂ at the end of exhalation);
- Systolic and diastolic blood pressure;
- Body temperature.

The field itself can not be directly interacting with, but it allows to observe the changes in the characteristics on a time scale. The time scale is located directly under the main menu, it also has a pictorial cue on the right side. Effects of any changes introduced to the patient state (via the «Patient state» field or «CPR» filed) can be previewed on the time scale before they take place.

6.2.5 CPR menu

This field (Fig. 6.25-5) is dedicated to the CPR controls and indicators. It is also has the «Action Log» menu, there you can find list of all actions performed during this scenario.

The CPR menu allows the user to edit the heart rhythms (Figure 6.36) and set the sequence for them. The rhythm-controlled buttons located at the bottom of the CPR field. Click the «**Current log**» to set the current heart rhythm and click the «**Expected**» in order to set the sequence.

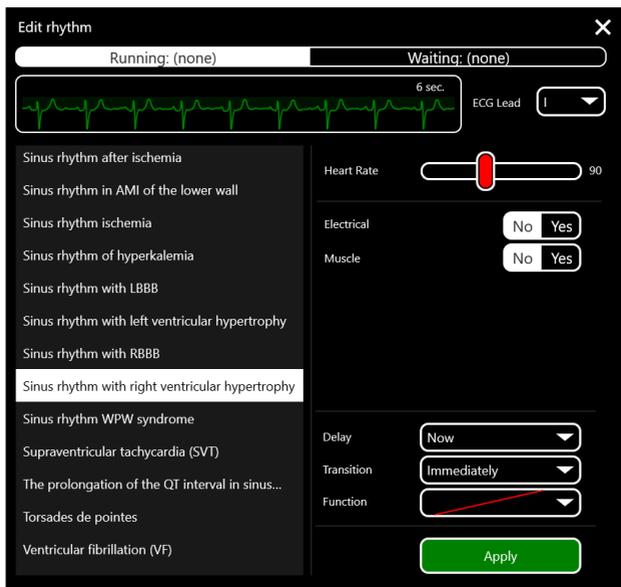


Figure 6.36. Heart rhythm edit

Here you can choose a heart rhythm from the list on the left side. A preview of the selected rhythm will be displayed on the top of the list. Here you can also find information about the current heart rhythm and the next one in the sequence (if there is any). You can also choose to which ECG lead transmits the selected rhythm.

The right side of the heart rhythm edit menu allows you to make additional changes, such as: select a heart rate, set a delay to the transitioning, choose a function etc. Once all desirable changes are made - click the **«apply»** button.

The CPR-menu icons (Figure 6.37) are as follows:

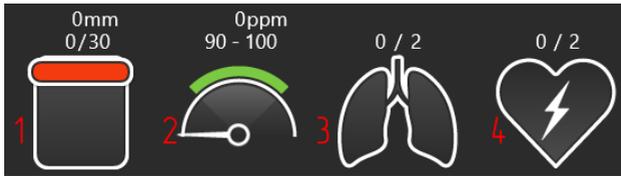


Figure 6.37. CPR icons

The first two are graphic depictions of the CPR performance. The first indicates the **depths and number of compressions** the second - the **rate of compressions**. The third indicates the lungs state, which is determined by the changes made in the «**Patient state**» field (see the «**Patient state**» section for more information about lungs states).

The fourth icon serves as an indicator for the defibrillation performance. You can chose the quantity in the «**quantity**» field. Press «+» to increase it and «-» to decrease. The «**Energy**» field allows you to set the power level. Press «+» to increase and «-» to decrease it. Once all parameters are set - press «**Activate**» button to discharge it once. The number of performed discharges will be displayed as the left number on top of the fourth (Figure 6.37) icon.

6.3 Scenarios menu

6.3.1 Automated scenarios menu

After the initial launch, the **Automated scenarios main menu** (Figure 6.38) will become available.

In the **«Automated scenarios»** mode all actions (steps) and patient state are already predetermined, and in most cases cannot be affected by teacher. Therefore - the **«Patient state»** field functions are grey, inaccessible for interaction (see the **«Function description»** section for more information about the **«Patient state»** field functions).



Figure 6.38. Automated scenarios main menu

It is, however, possible to make small, temporary changes, using the «CPR» field. For example: change graph in the ECG-chart, using the «Current log» and «Expected graph». The timeline of the changes will depend on the time period, determined by the user (see the «Function description» section for more information about the «CPR» field functions).

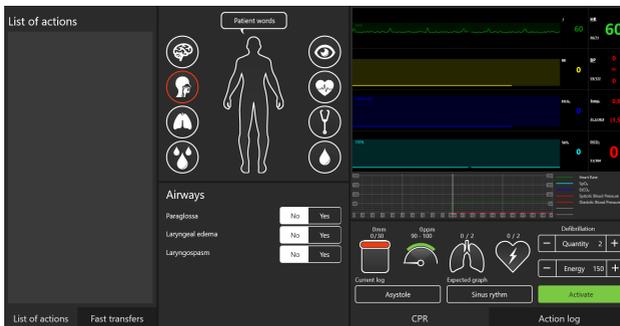


Figure 6.39. Manual scenarios main menu

6.3.2 Manual scenarios menu

After the initial launch, the **Manual scenarios main menu** (Figure 6.39) will become available.

In the «**Manual scenarios**» mode all actions (steps) and patient state are determined and controlled by the teacher, who has complete control over the «Patient state» and «CPR» fields functions (see the «Function description» section for more information about the «CPR» and «Patient state» fields functions).

6.3.3 Themes menu

After the initial launch, the **Themes main menu** (Figure 6.40) will become available.

Automated scenarios	List of scenarios	List of conditions	Description
123	Anesthesia		Heart Rate: HRState
Manual mode	AnaflationShock		HR Type: Label3
Themes	CPR		Breath Rate: Label3
	Defibra		Blood Pressure: Label3
Students	Embolia		SpO2: Label3
Debriefing	Themes AnaflationShock		
Connections	Cardio Theme		
Settings			
Exit			

Figure 6.40. Themes main menu

In the **«Themes»** mode a number of the physiological parameters are already predetermined (in accordance with the selected «theme») but otherwise can be set and controlled by teacher. They can be changed at the **«Patient state»** and **«CPR»** fields (see the **«Function description»** section for more information about the **«CPR»** and **«Patient state»** fields functions).

6.4 Scenarios pause and exit

In an automated scenario the **«exit»** window will show up automatically, after the final stage of the scenario is completed. In case of Manual and Themes the exit is performed manually, by pressing the **«Stop»** button.

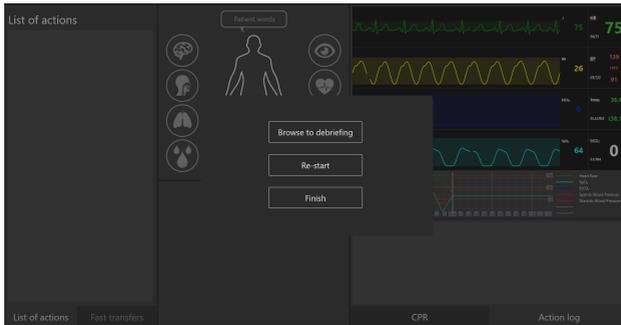


Figure 6.41. Scenarios exit menu

User can stop and exit from any scenario at any time, manually by pressing the «Stop» button, located on the top of the field in the «**Control means**» panel (see the «**Function description**» section for more information about the «**Control means**» panel functions).

It is possible to pause the scenario performance by pressing the «**Pause**» button, located on the top of the field in the «**Control means**» panel (see the «**Function description**» section for more information about the «**Control means**» panel functions). To continue with the scenario performance just press the «**Pause**» button again.

7 Debriefing

After the scenario is finished (or closed) the «**Debriefing window**» will become active (Figure 7.42) .

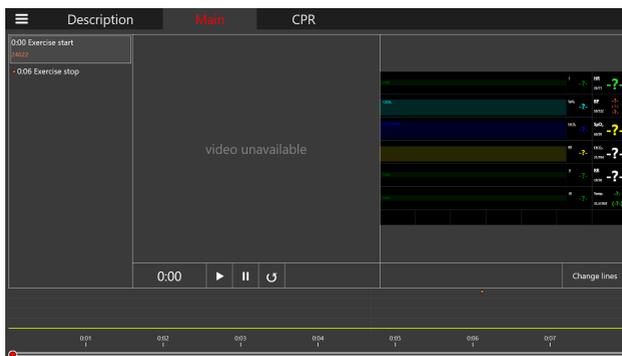


Figure 7.42. Debriefing window

There are three main tabs:

- **Description tab:**

The short description of the performed scenario, similar to the one listed at the start in the main menu window (Figure 6.23) .

- **Main tab:**

This tab consist of three fields: time scale, video of the exercise performance and bedside monitor. The time scale is located at the bottom of the screen and indicates the amount of time taken for the scenario performance. Steps on the scale are set according to the time passed. The «video» field is shows the video recording of the scenario performance. Video is recorded by the external camera, which should to be connected beforehand.

If the camera connection is not established, no video will be recorded.

- **CPR tab:**

The CPR tab consist information regarding the details of performed CPR-related actions as well as a general score for each of the performed actions.



Figure 7.43. Debriefing window. CPR tab

The debriefing window opens automatically after the completion (closure), but it can be opened from the **main menu** (Figure 3.4) as well. However, from the **main menu** it is possible to access the debriefing window of any performed exercise and not just the last one (Figure 7.44) .

To open the debriefing window from the main menu follow the sequence below:

- Open the main menu;
- Select the «**Debriefing**» tab;
- Select the exercise from the «**Files**» field;

- Check the «**Description**» field for the information;
- Press the «**Launch**» button.

After that the same debriefing (Figure 7.42) window will open.

	Files	Description
Automated scenarios	gtyju_fgju_24624	04.04.2017 14:48:45
	gtyju_fgju_24625	04.04.2017 14:48:47
Manual scenarios	gtyju_fgju_24627	04.04.2017 14:48:45
	gtyju_fgju_24621	04.04.2017 14:43:07
Themes	gtyju_fgju_24622	04.04.2017 14:43:07
Students	gtyju_fgju_24623	04.04.2017 14:43:07
	gtyju_fgju_24620	04.04.2017 14:37:30
Debriefing	gtyju_fgju_24618	04.04.2017 14:31:52
	gtyju_fgju_24619	04.04.2017 14:31:52
Connections	gtyju_fgju_24612	04.04.2017 13:58:07
	gtyju_fgju_24611	04.04.2017 8:48:45
Settings	gtyju_fgju_24610	04.04.2017 8:20:37
	gtyju_fgju_24609	04.04.2017 8:20:37
Edit	gtyju_fgju_24608	01.04.2017 18:05:37

Figure 7.44. Debriefing tab

To exit from the Debriefing window select the «main menu» icon in left upper corner of the window.

8 Students menu

The students menu consist of two fields: «**List of groups**» and «**List of students**».

The «**List of groups**» field allows the user to create, re-name and delete study groups.

- To create a new group:
press the «**Create**» button, enter the name of the new group and confirm it.
- To re-name a group:
select it from the main list, press the «**Edit**» button, edit the name of the group and confirm it.
- To delete a group:
select it from the main list, press the «**Delete**» button and confirm it.

The «**List of student**» field allows the user to select, create, re-name and delete students.

- To select a student:
select a study group from the «**List of groups**» field, select the student from the «**List of students**» and press the «**Use**» button. If all is correct the student name will be displayed in the top left corner of the window, near the «**Student**» inscription.

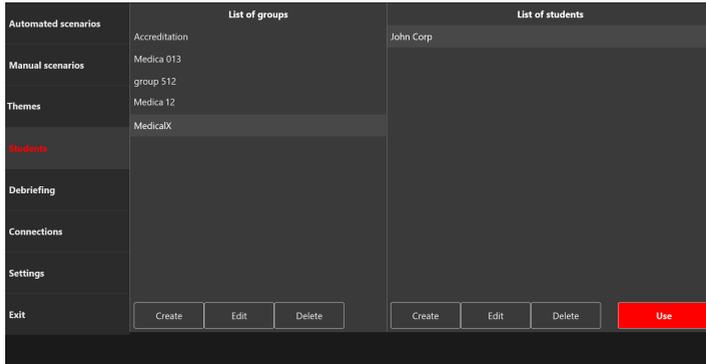


Figure 8.45. Students and groups menu

- To create a new student:
select a study group from the «**List of groups**» field, press the «**Create**» button in the «**List of students**» field, enter the name for a new student and confirm it.
- To re-name a student:
select a study group from the «**List of groups**» field, select a student and press the «**Edit**» button in the «**List of students**» field, edit the name of the student and confirm it.
- To delete a student:
select a study group from the «**List of groups**» field, select a student press the «**Delete**» button in the «**List of students**» field and confirm it

9 Connections menu

The «**Connections**» menu serves as an indicator of which elements are connected to the robot-patient simulator complex and which are not.

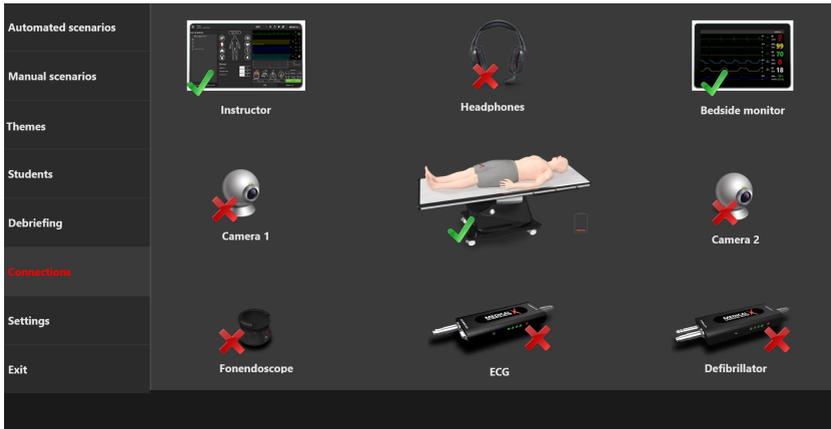


Figure 9.46. Connections menu

It also has a battery charge indicator for the robot patient (located near the robot patient icon).

10 Exit

Press the «**Exit**» button in the main menu (Figure 3.4) in order to close the «**Instructor software**» and return to the desktop.

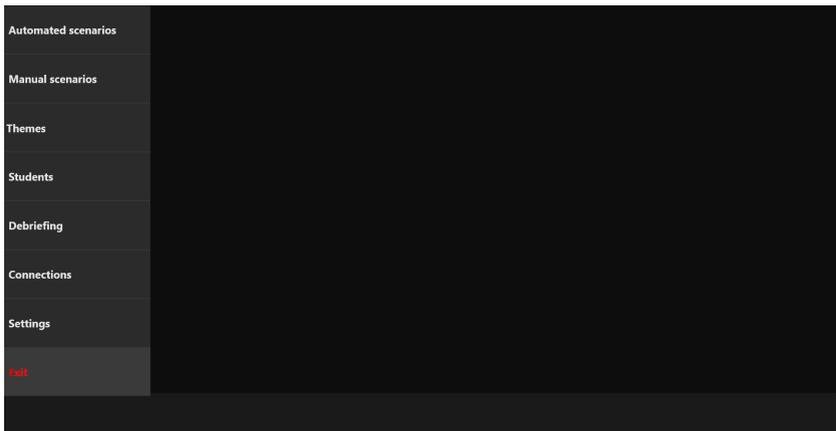


Figure 10.47. Exit button

11 Vital function simulation

11.1 Robot-patient body

The robot-patient can be put in the sitting position, turned on its sides or stomach. Body mobility is similar to human in the spine, neck, waist and joints. This is result of the **musculoskeletal system**, which fully corresponds to one of the human, including:

- imitation of bones in the fingers;
- palpation of the ribs;
- palpation of blades;
- palpation of pelvic bones;
- mobility of the patella.

The **Precise motion detailing** which includes:

- Blinking of the eyelids occurs automatically and depends on the physiological status of the patient, (for example, whether the patient is conscious or not);
- Pupils automatically respond to light and reflect the physiological status of the patient at the given moment;
- Imitation of body trembling, such as convulsions or spasms;
- Realistic mobility in all major joints;
- Tracking the angles of the head tilt;
- Tracking the excision of the lower jaw;

-
- Aschner reflex.

The robot-patient body also has a highly realistic, similar in appearance and tactile sensations, silicone skin, with easily replaceable skin modules (such as: throat for intubation, arms and legs for intravenous injection and intraosseous infusion). Depending on the model, the robot patient face can have additional realistic features, such as: age marks, scars, beauty marks, wrinkles etc.

11.2 Breathing system

The robot-patient has a realistically modelled breathing system, which includes right and left lungs with an independent ventilation for both. During spontaneous breathing, ADAM-X breathes with an automatically controlled respiratory volume and respiratory rate, which helps to maintain virtual eucapnia and normal oxygen saturation.

The robot-patient **airways** (mouth, mouth, pharynx, larynx, esophagus and trachea) are modelled after real patient CT data, which provides the realism of the anatomy. This ensures that ventilation of any of the lungs will automatically leads to the corresponding sounds of breathing and chest excursions. In addition, it is also possible to change the size of the glottis and set a tongue swelling in order to make intubation more complex.

Due to this realism there is immediate feedback to improper intubation and ventilation. For example: when the ventilation tube is inserted with an incorrect depth, only one of the lungs will be ventilated and only one side of the ADAM-X will rise and fall.

11.3 Auscultation and Palpation

Lung auscultation is performed with an imitation stethoscope, in 4 points, front or back (two on the upper lobe of the lung, two on the lower lobe of the lung). Breathing sounds can be specifically set for different clinical cases or exercises scenarios. **Please, note** that breathing sounds are independent for each lung in case of spontaneous breathing.

Heart beat auscultation is performed in 4 points - **aortic valve, pulmonary valve, tricuspid valve and the mitral valve**. Heart sounds are dependent on and related to the heartbeat. In case of ineffective chest compression and general negative changes in patient condition, the heart beat will change as well.

The **pulse** depends on the patient “vital signs” and is activated by pressing on the appropriate points: bilaterally on the carotid, radial, popliteal, femoral, brachial, tibial arteries and dorsal arteries.

The robot patient has a **compressions mechanism** installed into its chest. Effective compression during exercise will lead to simulation of cardiopulmonary bypass, cardiac output, heart rate and oxygen saturation at the exhalation. Parameters can be viewed on the bedside monitor screen. An ineffective compression will lead to irregularities in the simulation of cardiopulmonary bypass and a dropping of patient vital signs.

11.4 Secretion

The robot-patient is able to have different kinds of secretion such as sweat (diaphoresis), tears, saliva, ear secretions, urine and blood using actual liquids. The secretion settings can be predetermined and change

in the Instructor software to specifically simulate different conditions or to serve as a marker for them.

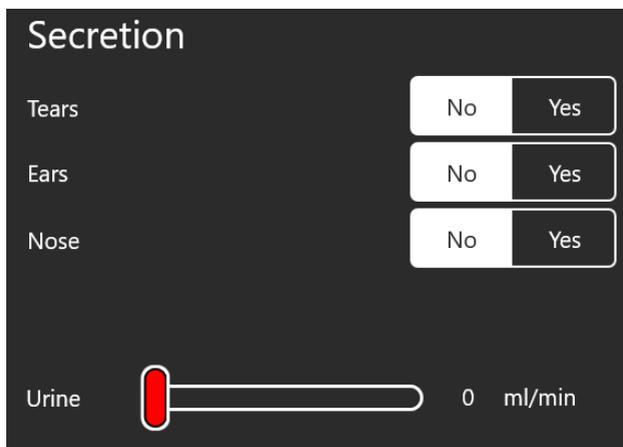


Figure 11.48. Secretion settings

The robot-patient has two liquids reservoir, located in robot-patient just above the pelvic area (Pos. 3 and Pos. 4 on the Fig.1.1). The reservoir on the right side (Pos. 3 on the Fig.1.1) is used for the «blood» liquids, and the reservoir on the left side (Pos. 4 on the Fig.1.1) - is used for all others (tears, urine, sweat etc.).

11.4.1 Reservoir refill

In order to refill the reservoir follow the sequence below:

1. Turn off the robot-patient and disconnect it (if needed) from the power outlet (see the «**Startup and Shutdown**» section for more information);
2. Locate the pocket with skin insert on the robot-patient's side (either

-
- right or left, depending on which reservoir is need to be re-filled);
3. Carefully remove the skin insert to expose reservoir connections;
 4. Insert the hollow tube in the smaller connector. This one used for the air pressure release;
 5. Insert «filler» (included in the simulator equipment) tube to the bigger connector. This one is used for the reservoir refill;
 6. Squeeze the «filler» bottle to fill the reservoir with fake blood* or water;

* Fake blood is not included in the simulator equipment, but it can be prepared by using fake blood powder/concentrate (stain-free types are preferable). Follow the respective instructions for the chosen concentrate.

11.5 Intraosseous infusion and intravenous injection

Simulated **intravenous injection** is done through the special module (catheter imitator) located on the inner side of the right hand's elbow (Pos. 2 on the Fig.1.1). A set of pre-programmed imitation syringes (which are included in the simulator equipment) can be used. An extensive medicine library containing a vast amount of different medications and drugs is available and can be used for the implementation of every possible created scenario.

To perform the «injection», select one of the pre-programmed imitation syringes, pull back the plunger to the line on the selected syringe for the required dosage of potential medicine. Then insert the syringe in the catheter imitator and push the syringe plunger. Type of administrated medicine will be identified automatically by the software, and dosage is

determined by the «amount of liquid» in the selected syringe.

Intraosseous infusion can be done through the special module located on the inner side of the left knee (Pos. 5 on the Fig.1.1). A specific pre-programmed syringe (with actual needles) must be used for it. Performance of the intraosseous infusion is met with life-like resistance of the ADAM-X skin and bone tissues, as well as secretion of fluids in the place of pierced skin. The skin modules can be specifically replaced in the “piercing area” instead of the whole arm/leg.

11.6 Defibrillation

There are two possible ways, the defibrillation can be performed:

1. Using real adapted defibrillator machine. Power of the charges can be set on the defibrillator paddles. **Please note:** to avoid overheating you should not use the defibrillator for longer than 2 minutes straight, with break less than 30 seconds.
2. Using the defibrillator imitator (Figure 11.49) . Power and number of the charges can be set in the Instructor software and special plates are used as imitation of the defibrillator paddles. Robot patient automatically identifies defibrillation charged power and reacts accordingly.

Please, note: the first method is only possible if the adapted defibrillator machine was included in the simulator equipment.



Figure 11.49. Defibrillator imitator

11.7 ECG reading

A simulated ECG reading can be obtained from three different ECG leads placed on the robot patient's chest. These simulations of ECG forms and heart rate fully complies with the one on the bedside monitor.

To get an ECG reading you need to connect contact electrodes to the defibrillator's front panel (if present) and place them on four specific points on the robot patient's chest.

Please note: If the adapted defibrillator machine was included in the simulator equipment the ECG reading can be used for in-scenario analysis or later during scenario performance discussion.



Figure 11.50. ECG Imitator

12 Cleaning maintenance

To clean the simulator body, use a light soap solution or mild domestic cleaners. Soak a soft cloth in the selected solution and carefully wipe any dirt and dust from the robot patient body its instruments, bracket and monitor's body etc. Please do not allow the liquid to leak inside the instruments handles and body of the simulator. For cleaning the monitor screen please use a special cleaning cloth.

Do not forget to perform regular dry and wet cleaning of the facility housing the simulator. If heating radiators are on in the facility - make sure the simulator's body does not press toward one. If you are not planning to use the simulator for some time, turn off its power source.

