MedVision

USER MANUAL

Simulator PS.VI

Interactive Virtual Patient Simulator

LEONARDO VR

Contents

Introduction

A **Virtual Patient Simulator** is a large interactive multi-touch table presenting a virtual patient.

The simulator screen also displays physiological parameters, ECG data, assigned laboratory tests results and X-rays of a virtual patient necessary for diagnostic decision making. The simulator allows real-time tracking of any changes in the condition of the virtual patient, manipulations performed by students and relevant patient's reactions to the treatment. After the exercise is finished, the screen displays the assessment of the student's actions according to the specified criteria.

The simulator offers clinical scenarios of different levels of difficulty covering various medical specialties, i.e. cardiology, endocrinology, traumatology, neurology, obstetrics, etc.

With the use of the virtual simulator, students greatly improve their skills in making clinical decisions, which increases the competence of health care professionals and reduces the risk of medical errors.

Specific features

- True-to-life training environment at all stages, i.e. from diagnostics to treatment
- Physical examination on all sides by moving the camera where necessary
- A wide selection of virtual patients (male and female)

- Realistic doctor-patient communication, dynamic dialogues, quick response by the patient
- Visual examination of a patient, i.e. external signs of pain, cyanosis, jaundice, chest movements, etc
- Physical examination of a patient, i.e. heart and lung auscultation, temperature measuring, checking the pupil reaction to light
- Online vital signs monitoring
- Laboratory tests necessary in making the diagnosis, i.e. urinalysis, blood analysis, biochemistry, etc
- ECG procedure
- The use of various methods of medical imaging, i.e. CT images, angiography, radiography, ultrasound, echocardiography, endoscopy, etc
- An easy-to-use list of drugs for prescription (all drugs are allocated by category, dosage and mode of administration)
- A good collection of drugs, i.e. antibiotics, bronchodilators, vitamins, etc
- Various kinds of interventions, i.e. defibrillation, chest compressions, oxygen therapy, etc
- A built-in debriefing function: recording all the actions performed and assessing the student's performance

1 Safety precautions

Before a session, carefully inspect the simulator and the power cable for tears, cracks, burned or scorched areas, etc. If any damage is found, wait until the failure is fixed.

In case of burning smell, smoke or sparks, immediately stop using the simulator and inform the person responsible for safe operation.

YOU MUST NOT:

- Spill liquids on the simulator.

Figure 1.1 Keep dry

- Dust the simulator with a wet cloth.
- Cover the simulator surface with any material.
- Dismantle the simulator.
- Let the simulator fall, be hit or otherwise damaged.

- Expose the simulator to direct sunlight. Long-term sunlight exposure can irreversibly damage the screen.
- Install the simulator on uneven, inclined, slippery or fragile surfaces.
- Leave the simulator switched on if unused.

Warning: the environment in the room where the simulator is located must not cause any condensation on electronic and mechanical components of the product.

Make sure simulator cables are not located in the aisle area and do not cause any danger when being moved during and after sessions.

2 Authorisation

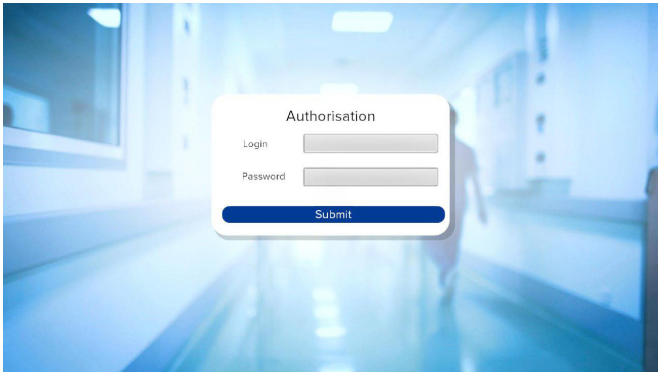

Figure 2.1 Authorisation window

Authorisation menu (Figure 2.1) will open immediately after the program starts running. To log in and go to the main menu, enter your login in the Login field, enter your password in the **Password** field and click on the **Accept** button.

3 Start-up

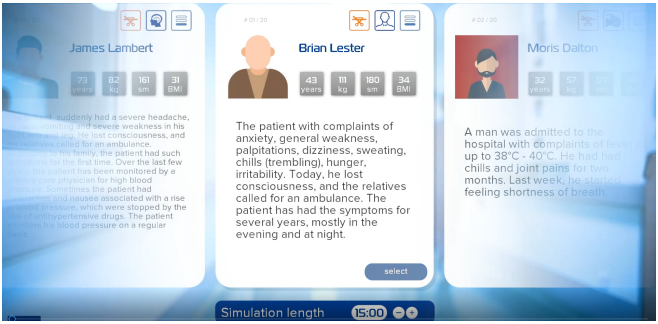

Figure 3.1 Exercise selection

The main menu of the program contains all the scripts available for use.

The following patient related information is indicated in the script window.

- Name
- Age
- Weight
- Height
- Body Mass Index (BMI)

To run an exercise, select the required scenario and tap the **Select** button in the bottom right corner of the screen.

It is also possible to **control the simulation length**. To do this, use the panel at the bottom of the screen (Figure 3.1).

4 Exercise menu

Figure 4.1 Selected exercise menu

The following icons of available action menus are found at the bottom of the screen:

- Survey
- Monitoring
- Examination
- Analyses
- Treatment
- Screening
- Drugs

4.1 Survey

To interview a patient, tap the **Survey** icon at the bottom of the screen (Figure 4.2).

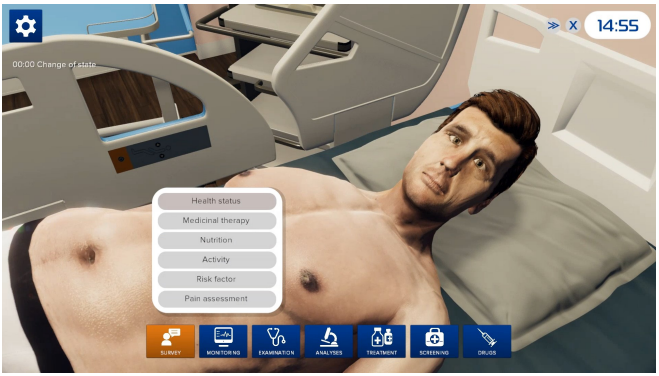

Figure 4.2 Survey

After tapping the **Survey** button, a list of available interview topics will open (Figure 4.2):

- Health status
- Medication
- Nutrition
- Activity
- Risk factor
- Pain assessment

After an interview topic has been selected, a list of relevant questions becomes available (Figure 4.3). When you select a question from the list, the patient's reply is displayed on the screen.

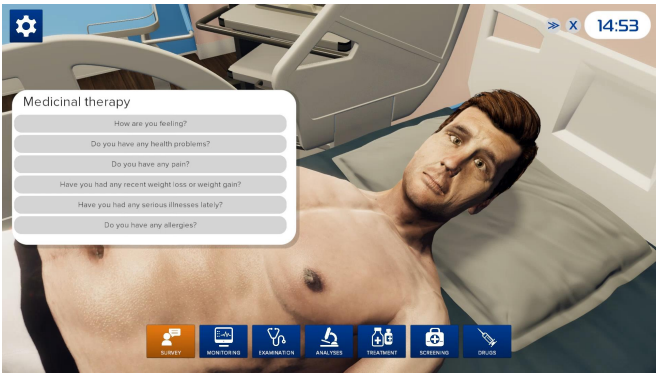

Figure 4.3 List of questions

4.2 Vital signs monitoring

To monitor the vital signs, tap the **Monitoring** icon at the bottom of the screen (Figure 4.4).

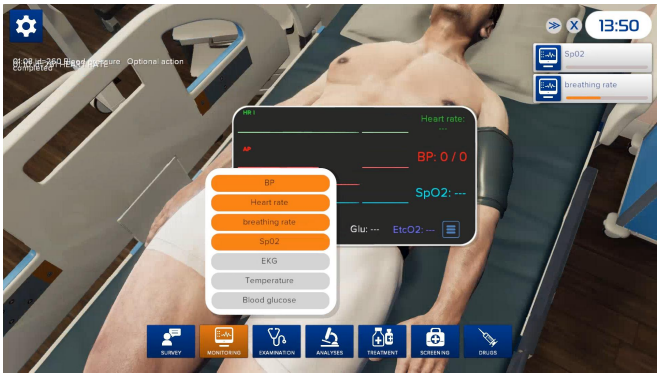

Figure 4.4 Vital signs monitoring

After tapping the **Monitoring** button, a list of available vital signs will open (Figure 4.4):

- BP
- Heart Rate (HR)
- Breathing Rate (RR)
- SpO2
- ECG
- Temperature

- Blood Glucose

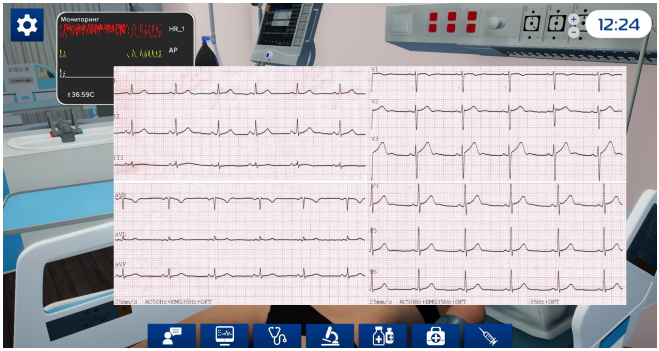

Figure 4.5 Vital signs monitoring

When you select a vital sign from the list, the relevant screen pops up (Figure 4.5). The vital signs selected for monitoring are highlighted in orange (Figure 4.4).

4.3 Examination

To examine a patient, tap the **Examination** icon at the bottom of the screen (Figure 4.6).

Figure 4.6 Examination

After tapping the **Examination** button, a list of available areas will open (Figure 4.6):

- Breathing
  - Lung auscultation
  - Chest palpation
  - Chest percussion
  - Airway assessment

- Blood circulation:
  - Pulse palpation
  - Heart auscultation
  - Capillary refilling
- Skin:
  - Cyanosis on the face / hands / body / feet
  - Yellow face / hands / body / feet
  - Rash on the face / hands / body / legs
- Abdominal zone:
  - Stomach palpation
  - Auscultation of abdomen
- Body position:
  - 45 degrees of head elevation
  - 60 degrees of head elevation
  - On the side
  - Flat on back
- Consciousness check
  - Pupillary response to light

4.4 Analyses

To perform necessary tests, tap the **Analyses** icon at the bottom of the screen (Figure 4.7).

Figure 4.7 Analyses

After tapping the **Analyses** button, a list of available test groups will open (Figure 4.7):

- Bacterial research:
  - Urine culture
  - Hemoculture
  - Sputum examination
- Laboratory:
  - Analysis of urine

- Biochemical blood test
- Arterial blood gas (ABG)
- Cardiac markers
- Coagulation test
- Lipid profile
- General blood analysis
- Blood glucose level

The results of the selected tests will be displayed on the screen.

4.5 Treatment

To perform treatment procedures, tap the **Treatment** icon at the bottom of the screen (Figure 4.8).

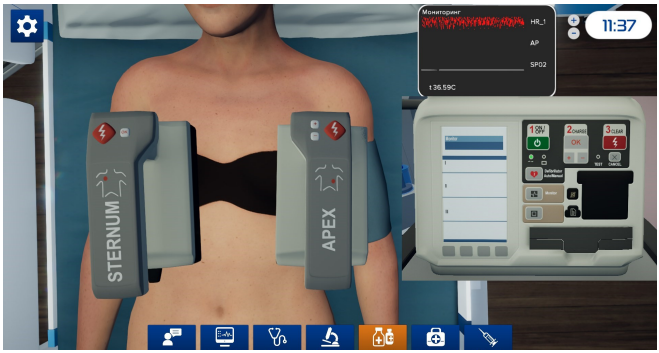

Figure 4.8 Treatment - Defibrillation

After tapping the **Treatment** button, a list of available treatment procedures will open (Figure 4.8):

- Catheterization:
  - Bladder catheterization
  - Intravenous peripheral catheter
  - Central venous catheter
- Defibrillation:
  - Two-phase defibrillator
- Cardiopulmonary resuscitation
- Oxygen therapy
- Infusion therapy

The instruments and equipment necessary to deliver the selected method of treatment will be displayed on the screen.

4.6 Screening

To perform screening, tap the **Screening** icon at the bottom of the screen (Figure 4.9).

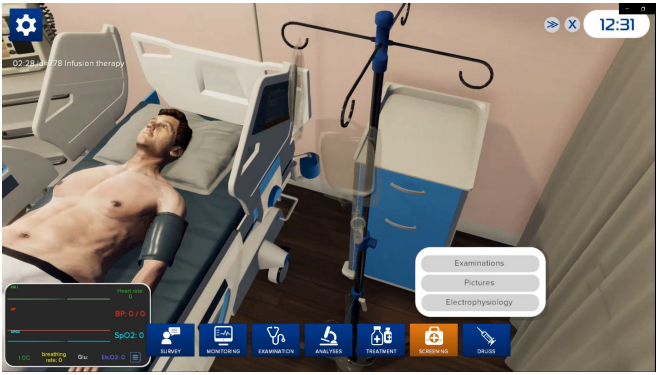

Figure 4.9 Screening

After tapping the **Screening** button, a list of available screening procedures will open (Figure 4.9):

- Examinations:
  - Stroke Scale (NIHSS)
  - Glasgow Coma Scale
- Pictures:
  - Abdominal CT
  - CT of the lower limbs

  - CT scan of the head
  - CT scan of the pelvic organs
  - CT scan of the chest
  - Abdominal radiography
  - Chest x-ray
  - Radiography of the pelvis in the PPP
  - Radiography of the cervical spine
  - Transcranial Doppler
  - Transthoracic echocardiography
  - Transesophageal echocardiography
  - Abdominal ultrasound
  - Ultrasound of the lower extremities arteries
  - Carotid Doppler
  - Colonoscopy
  - Coronary angiography
  - Endoscopy of the upper GI tract.

- Electrophysiology:
  - 12-lead ECG.

The results of the selected screening procedures will be displayed on the screen.

4.7 Drugs

To select medications, tap the **Drugs** icon at the bottom of the screen (Figure 4.10).

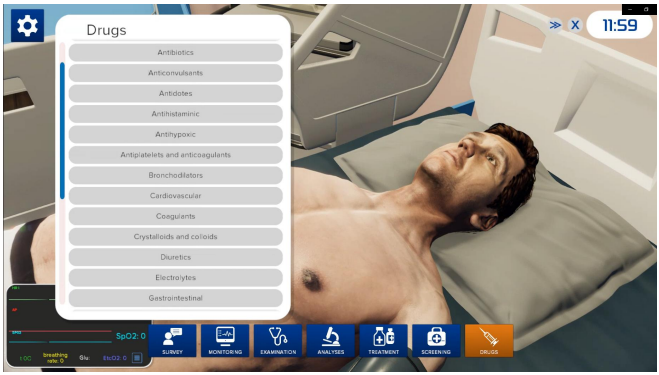

Figure 4.10 Drug prescription

After tapping the **Drugs** button, a list of available medication groups will open (Figure 4.10):

- Analgesics
- Antiplatelets and anticoagulants
- Antiarrhythmic
- Antibiotics
- Antihypoxic
- Antihistaminic

- Antidotes
- Bronchodilators
- Vitamins
- Hypnotics
- Hormones
- Gastrointestinal
- Crystalloids and colloids
- Coagulants
- Myorelaxants
- Diuretics
- General anesthetics
- Neuroleptics
- Nootropic
- Anticonvulsant
- Cardiovascular
- Spasmolytics
- Steroids

After the medication group has been selected, the list of relevant available drugs pops up along with a menu to set the dosage and time of administration (Figure 4.11).

Figure 4.11 Drug prescription

4.8 Exercise menu

To open the exercise menu, tap the icon in the upper left corner of the screen.

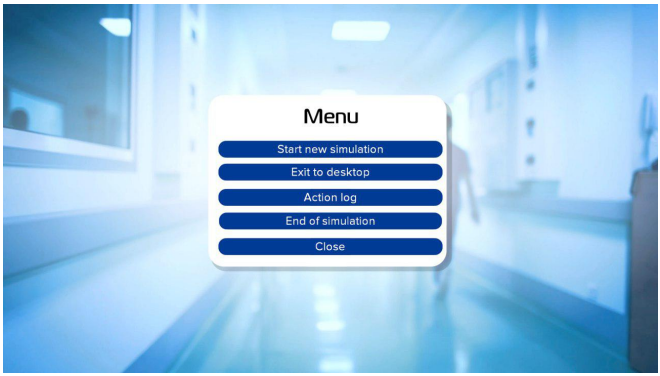

Figure 4.12 Exercise menu

The exercise menu has the following functions:

- **Start a new exercise.** Go to the exercise selection menu.
- **Exit the desktop.** To close the program.
- **Action log.** To open the list of performed actions.
- **End of simulation.** To finish the simulation.
- **Close.** To close the menu and go back to the simulation.

4.9 Exercise finish

To finish the simulation, wait until the set time is over or tap the icon in the upper left corner of the screen and select **End of simulation** in the pop-up list. The simulation will end automatically if all the necessary actions have been done correctly.

After the simulation is over, you have to choose the right diagnosis (Figure 4.13).

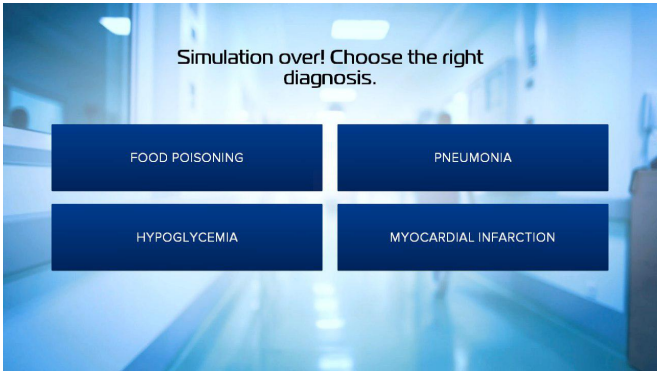

Figure 4.13 Diagnosis selection

When the diagnosis is chosen, the simulation statistics will be displayed (Figure 4.14).

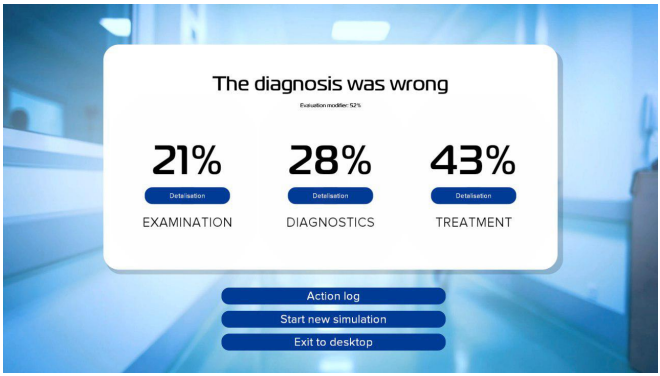

Figure 4.14 Simulation statistics

5 Scenario Constructor

The **Scenario Constructor** Software is used to create new training scenarios or edit the existing ones. To **start** the process, launch the Scenario Constructor software.

5.1 The Scenario Constructor control bar

The control bar is at the top of the window. The following functions are available:

- **New.** To create a new scenario.
- **Open.** To open an available scenario.
- **Save.** To save changes.
- **Save As.** Save changes as a new scenario. Never save changes to the existing scenario using this button. It may cause the scenario failure.
- **Actions.** To open the library of actions that may be added to a scenario.
- **Scenario info.** To open/close the scenario general information (in the right part of the screen).
- **Configuration.** To display information on the current software version and to change the interface language.

Figure 5.1 The Scenario Constructor control bar

To close the Scenario Constructor, tap the icon in the upper right corner.

5.2 Creating a new scenario

To create a new training scenario, tap the **New** button. In the pop-up dialog box, enter the scenario name, select the scenario type, enter the name of the group the new scenario will be assigned to and select the patient type. Tap **OK** to confirm the action.

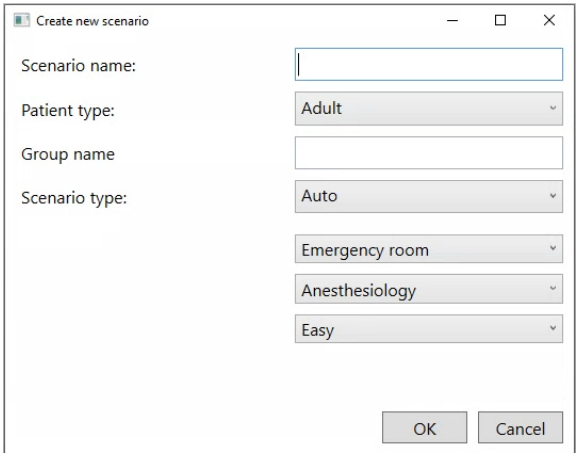

Figure 5.2 The new scenario creation menu

After that, the main menu of the scenario constructor will open.

5.3 General procedure for creating a new scenario

The general procedure for creating a new scenario or editing the existing one:

1. Launch the Scenario Constructor software.
2. Tap the New or Open buttons.
3. To create a new scenario, enter the scenario name, select the patient type, enter the group name and scenario type.
4. Fill in the general scenario data.
5. Set the initial state of the patient, i.e. the first stage of the sxenario.
6. Add and set the necessary number of states (scenario stages).
7. If necessary, add triggers to shift from one state to another.
8. Click Save, if you have edited an existing scenario, or Save as if you have created a new one.

5.4 Editing and setting the scenario

To edit, set or add information, tap the icon and follow the instructions displayed on the screen.

General settings are detailed below:

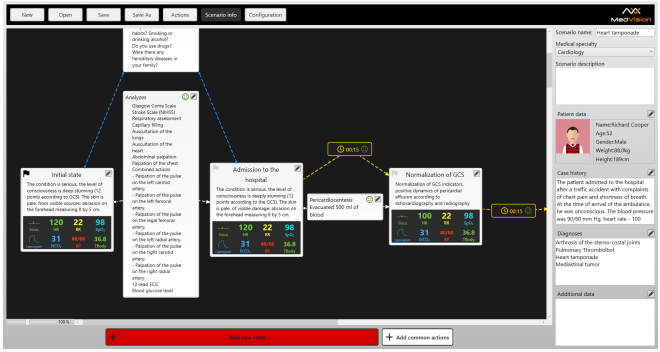

Figure 5.3 Main settings menu

When you tap **Scenario Info** on the control panel at the top of the window, a field with **general information about the scenario** is displayed. The information contains a brief description, patient data, medical history, major learning objectives, etc. All connections and triggers are also displayed there. At the bottom, you can see **Add new state**. If you tap it, a new patient state will be created.

The scenario general information (Figure 5.3) includes:

- **Scenario name.** Displays the current name of the created/edited scenario. May be edited.
- **Scenario description.** Gives a brief description of the scenario, which will be displayed in the main menu after the scenario has been selected. To add/delete/edit the description, use the field under the **Scenario description.**

- **Patient data.** Gives information on the patient: image (optional), name, age, gender, weight and height.

The patient data can be edited. To do this tap the button next to **Diagnoses** and make changes in the dialog box that opens. To change the patient's image, use the same dialog box and tap **Choose image** and select a photo/image from the root folder. Press **OK** to save changes.

- **Case history.** Described the medical history of the patient for a particular scenario. To add, delete or edit the text, tap the square button next to the **Case history** field and enter the text in the window that opens.

- **Diagnoses.** Displays the list of diagnoses from which, upon completion of the simulation, the student will need to choose the right one. To change the options for diagnoses, tap the square button located next to **Diagnoses** and make changes in the dialog box that opens. Tap **OK** to save changes. To select the correct option, click on the relevant checkbox.

- **Additional data.** Contains data on additional instructor materials that can be added to the script.

5.5 Configuring scenario stages

The first stage (initial state) is created automatically. To add new states, tap **Add new state** (Figure 5.3).

To configure/edit the stage, tap the button in the upper right corner. The menu (Figure 5.4) has the following settings:

- **State name.** The default name of the patient state.
- **Short description.** A brief description of the state currently being edited.
- **Vital signs.** The patient's vital signs to be displayed on the bedside monitor. To set a vital sign, select it from the general field and follow the instructions in the pop-up dialog box.
- **Patient state menu.** Select one of the icons around the patient body and make necessary settings in the pop-up dialog box. All actions will be displayed in the box on the right.
- **Answers on questions.** A field to edit questions to ask the patient and relevant replies. To add a question, tap the "+" button to the right of **Answers to questions.** To delete a question, mark it with a tick and tap the "-" button. To select the required question from the drop-down list, tap the arrow icon in the field under the word Question (Figure 5.5). Enter the patient's response manually in the **Answers text** field.
- **Next state.** Selecting the next state (following the current state).

When selecting the **next state**, the following settings become available:

- **Transition time to next state.** The time needed to shift from the previous to the current state.
- **Transition curve.** Describes transition from the current to the next state. There are two transition modes: abrupt and linear.

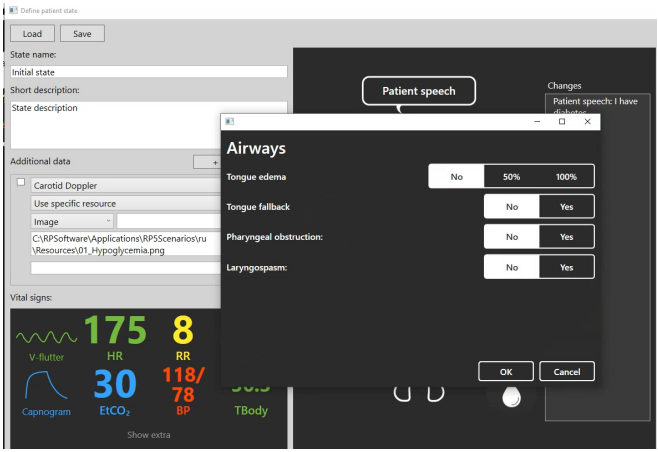

Figure 5.4 Patient state settings

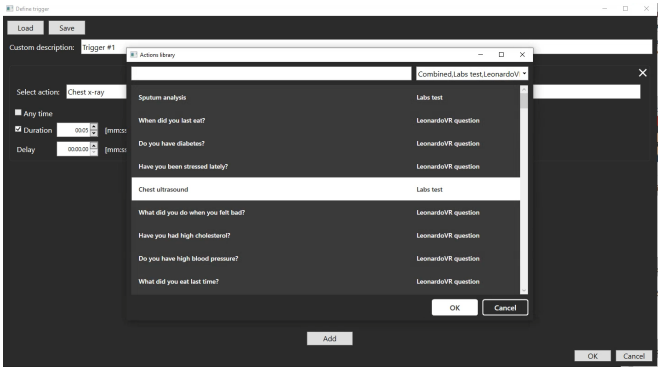

Figure 5.5 Choosing the question

Tap the **OK** button to finish configuring the stage. Tap the Cancel button to discard the changes made. To save the created stage to be further used in other scenarios, tap the **Save** button, enter the file name in the dialog box, select a folder and confirm your action. After that, the created stage will be available for downloading in the program. To do this, choose any of the stages, open the editing menu, tap the  button located in the upper right corner and tap the **Load** button in the new menu.

5.6 Triggers

To configure the sequence of the scenario stages, you can use the Add a new state button (see ”Configuring scenario stages”) or set a trigger, i.e. a condition for transition. To create a trigger, tap the first state and, sliding your finger across the touch screen, draw a line to

the second (required) state (Figure 5.6). To configure a trigger, click the icon located in the upper right corner.

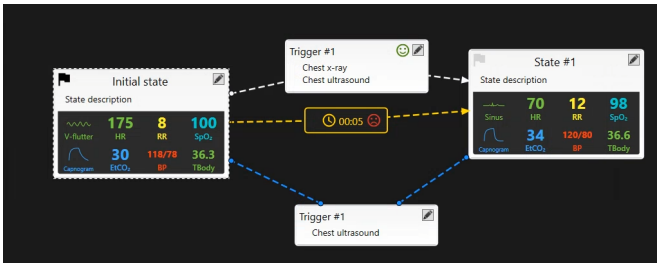

Figure 5.6 Creating a trigger

To add an action necessary to activate the transition from one stage to another, first tap Add, then select the action from the list. After that, the library of available actions opens (Figure 5.7).

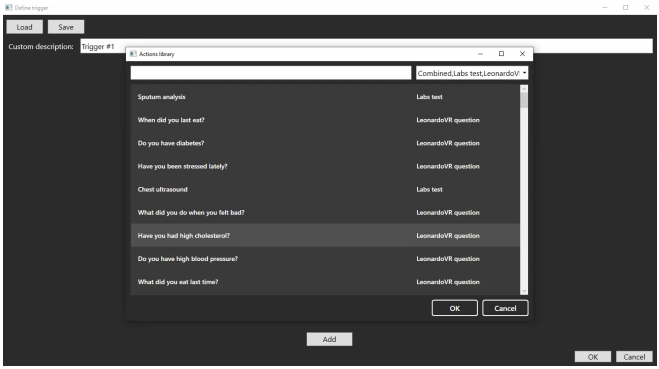

Figure 5.7 Trigger settings

You can use a shorter list, if selecting one or several categories. To do this, open a drop-down menu (the upper right corner) and tick the necessary categories. Find a necessary action from the list and tap **OK**. Tap **Cancel** to discard the changes.

To search for an action by its name(s), enter the name of the desired action in the field next to the category drop-down menu and select the desired action from the search results.

One trigger can contain several actions (sequence). Subsequent actions (following the first action) are added to the sequence similarly to the first action, i.e. tap **Add**, then select an action from the list. After the action or the sequence of actions has been defined, tap **OK** to finish creating the trigger.

Warning: If the trigger includes several actions, each of them must be successfully completed in order to activate the trigger and move to the next stage. In addition to a trigger with a sequence of actions (where all actions must be performed), you can also create several single-action triggers. In this case, any action performed will lead to the activation of the corresponding trigger and transition from one stage to another.

6 Packaging and transportation

The general recommendation would be to engage qualified professionals for the transportation and assembly of the simulator.

For the safe transportation of the simulator:

- Disconnect and carefully wrap the wires avoiding bending and twisting.
- Wrap the simulator with packing stretch film.
- Wrap the remote control and CDs with air-bubble film.

Impacts with case or box walls and jolting during transportation can cause a lot of damage to the sensitive parts. It is recommended to use air bubble film and cardboard to fill space between walls and simulator parts.

7 Cleaning maintenance

— Use soft dry cloth (microfiber cloth) to clean the simulator display and body. Do not use any chemicals such as wax, benzene, alcohol, diluents, insecticides, air fresheners, lubricants or detergents. This may damage the display.

— Do not forget to perform regular dry and wet cleaning of the the facility housing the simulator.

— If heating radiators are on in the facility make sure the simulator's body is not in its proximity.

— If you are not planning to use simulator for some time, turn off its power source.

Warning: to prevent fire, never place candles or other open flames near the virtual simulator.

Acknowledgement table

I have read and understood the manual:

Date	Name	Signature	Stamp