CAEAthena

Female Patient Simulator User Guide

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Müse System Requirements

Operating System Support

Müse 2.3 - 2.4 Supports	Müse 2.6 Supports	Müse 2.7 Supports
Windows 7 and 8	Windows 7, 8, and 10	Windows 7, 8, and 10
Mac OS X 10.6 - 10.12	Mac OS X 10.6 - 10.12	Mac OS X 10.9.2 - 10.12

Minimum Requirements

Any computer (Instructor Workstation) used to operate Müse or TouchPro must meet the following minimum requirements.

Any computer NOT associated with a simulator (SCE Development Workstation) used to operate Müse or TouchPro must also meet the following requirements, with the exception of ethernet/network connectivity.

Windows® Operating System:

- Windows 7
- Firefox 45+ ESR or Internet Explorer 9
- Adobe Flash Player® 24
- Adobe Reader DC 2015+
- Hardware
- Intel Core 2 Duo, 2.0 GHz, 4 GB DDR3 RAM
- 8 GB Hard Drive space available
- 1366x768 screen resolution
- USB 2.0
- Wireless 802.11b/g/n Ethernet card
- 100BASE-T Ethernet Adapter

Mac® Operating System:

- Mac OS X 10.9.2 (Mac OS X 10.6 for Müse 2.6 or older)
- Firefox 45+ESR
- Adobe Flash Player® 24, Adobe Reader DC 2015+
- Hardware
- Intel Core 2 Duo, Intel Core i5 2.5 GHz, 4 GB DDR3 RAM
- 8 GB Hard Drive space available
- 1280x800 screen resolution
- USB 2.0
- Wireless 802.11b/g/n Ethernet card
- 100BASE-T Ethernet Adapter

> **IMPORTANT:** *If your Mac operating system has been updated after installing Müse, please download and run the Muse patch utility available here:* www.caehealthcare.com/images/uploads/documents/Muse-Patch-Utility.pdf .

Note: Mac is a registered trademark of Apple Inc. Windows is a registered trademarks of the Microsoft Corporation in the United States and/or other countries. Chrome is a registered trademark of the Google. Adobe Flash Player is a trademark of Adobe Systems Inc.

SPECIFICATIONS

All hardware and software needed for the operation of the simulator are offered with the simulator. If you wish to extend the Instructor Workstation to other computers, contact CAE.

Size

Manikin/Simulator: 69" H x 22" W x 15" D (175cm x 56cm x 38cm)

Instructor Workstation - varies by device

Mac laptop: 1" H x 12.8" W x 8.9" D (2.5cm x 32.5cm x 22.7cm)

Windows laptop: 1.5" H x 13.4" W x 9.3" D (3.8cm x 34cm x 23.6cm)

Vivo tablet: 0.4" H x 9" W x 6" D (1cm x 23cm x 15.2cm)

Weight

Manikin/Simulator: 105lbs (48 kg)

Instructor Workstation: 4.5lbs (2.1kg)

Environmental Requirements

Ambient Temperature Range

Manikin/Simulator

Operation: 40°F to 104°F (4°C to 40°C)

Storage: 40°F to 122°F (4°C to 50°C)

Relative Humidity: 0% to 90% noncondensing

Instructor Workstation

Operation: 50°F to 95°F (10°C to 35°C)

Storage: -13°F to 113°F (-24°C to 45°C)

Relative Humidity: 0% to 90% noncondensing

Maximum Altitude

Instructor Workstation

Maximum operating altitude: 10,000 ft

Maximum storage altitude: 15,000 ft

Maximum shipping altitude: 35,000 ft

Power

Manikin/Simulator

AC Input: AC 100 – 240VAC, 50/60Hz

Consumption: Maximum 150W (Charging), 100W (charged), Typical 40W

Internal Batteries: 14.4V 90-watt-hour lithium-ion, rechargeable

Run Time: 4 hours (Typical)

Instructor Workstation

AC Input: AC 100 – 240VAC, 50/60Hz

Run Time: 2 to 4 hours (Typical)

TouchPro Computer (optional)

Please see the product's user guide for power specifications.

Communications

Simulator Network

Wired: 10/100 Ethernet or

Wireless: IEEE 802.11g

Wireless Voice

537 MHz to 819MHz (Country Specific)

Electrotherapy

Defibrillation: 20 to 360 Joules (Monophasic, Biphasic)

Pacing: 20 mA to 180 mA

Air Supply

To properly regulate psi, the optional wall air kit must be used in conjunction with the facility supply source and facility wall adapter. The wall air kit is an additional optional accessory.

CAUTIONS AND WARNINGS

Please read and understand these cautions and warnings before you begin using the Athena CAE Maternal Fetal Simulator system.

USE OF THIS EQUIPMENT IN AN UNSPECIFIED MANNER, MAY IMPAIR DESIGNED PROTECTION.

Your safety is in your hands. Be sure to follow the instructions on the proper setup, breakdown and use of the simulator system.

SHOCK HAZARD

Electrical Safety

- This product must be connected to an electrical outlet that is properly grounded. Precautions should be taken so that grounding or polarization is not defeated.
- Do not place defibrillator paddles on or adjacent to the ECG patient electrodes. Contact between defibrillator paddles and the electrodes may cause injury to the user and damage to the equipment.
- Manikin should be isolated and **NOT** plugged into electrical power when using defibrillation
- Always use the supplied power cords. Do not substitute.
- Operate the system from a power source with the following rating:
  - 115VAC, 50/60 hertz (cycles per second) (e.g., North America, Japan)
  - 230VAC, 50/60 hertz (cycles per second) (e.g., Europe)
- Do not allow excess fluids to flow on or into electronic parts
- Do not attempt to disassemble the simulator or service any of the electrical components other than changing the batteries
- Always use the supplied power adapter to charge or run simulator from AC

Latex Warning

Certain components of the simulator, such as vein tubing and wound umbilicals, contain latex. Users with latex sensitivity should use caution when working with these components or during maintenance with exposure to latex on the simulator.

General Use Warnings

Please observe the following warnings when using the Athena Lucina simulator.

Electrical System

- Operate the system from a power source with the following rating: 115VAC, 50/60 hertz (cycles per second) (e.g. North America, Japan), and 230VAC, 50/60 hertz (cycles per second) (e.g. Europe)

- Do not operate the simulator system in rain. Apply water to the manikin only in accordance with the supported clinical procedures identified in this User Guide

- Do not allow excess fluids to flow on or into electronic parts

Bleeding System

- DO NOT modify the tank or any assembly component

- ALWAYS protect eyes, skin and clothing against accidental exposure

- ALWAYS read and follow instructions for creating trauma fluids (e.g. blood)

- NEVER fill the tank with more than 2 liters (0.5 gallons) of fluid

- After use, ALWAYS drain the tank. DO NOT store liquids in the tank

Skin

- Make sure the skin is fully installed and covering pulse points whenever the manikin is in use

- Avoid contact with sharp surfaces and excessive pulling on skin

Transport

- Prior to using the stretcher packed with the shipping container, the manikin must be wrapped in a sheet. Failure to wrap the manikin in a sheet may result in permanent damage to the manikin skin

- CAE is not responsible for damage to the manikin skin if the manikin is not wrapped in a sheet while using the stretcher

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INTRODUCTION

Welcome to the CAE Athena Simulator user guide. This guide provides complete instructions on how to use and maintain your simulator. The Athena simulator has been designed to provide instructors and learners with advanced tools for female patient training.
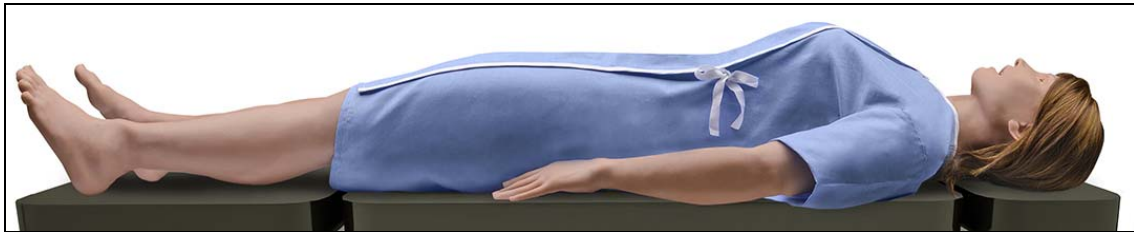
The Athena Simulator

The autonomous simulator reacts to medical interventions with appropriate physiological responses and wirelessly communicates with the Instructor Workstation, creating an authentic experience for the learner and keeping the instructor informed as the scenario progresses. The Instructor Workstation provides the instructor with scenario development tools and programmable patient physiology to create an immersive, realistic training environment.

The Athena simulator comes with extensive clinical features and capabilities designed specifically for healthcare professionals.

The simulator can be placed on a standard operating room table, on an ICU bed, on the ground, or even in a vehicle (in the case of a simulated accident). Athena can also be seated in an upright position.

In addition, Athena has the assessment, cardiovascular, and genitourinary features familiar to CAE customers plus genitourinary fluids on board, bilateral noninvasive blood pressure, and IV access. Wireless and tetherless, Athena takes simulation education to a new and exciting level of realism.

In addition, the following medical interventions can be performed:

- ECG and electrical therapy
- Intubation
- Medication and fluid administration
- Mechanical ventilation
- Suppository administration

Contained in this User Guide

This User Guide has been designed for quick access to information on how to use and maintain the CAE Athena Simulator. Please be sure to read and follow the **Cautions and Warnings** on the pages preceding the **Table of Contents**. This is for the safety of users as well as for the protection of the simulator.

The **Equipment Overview** outlines the items that come standard with the purchase of an Athena. Before using the system, follow the step-by-step instructions included in the **Setup** section.

The **Using Müse** section describes the different features and functions in the Müse software.

The **Using TouchPro Patient Monitor** section describes how to setup and utilize the TouchPro Patient Monitor.

The **Using Vïvo** section describes how to setup and utilize the Vïvo software and tablet.

The **Using Athena** section provides instructions on the use of the various parameters and hardware features integrated into the simulated experiences. This section also includes information on how the simulator and software components work and the functionality that each supports.

The **Care and Maintenance** section contains warranty details, cleanup, and care instructions that must be followed to ensure optimal functioning of the simulator.

The user guide also includes information on:

- Condition Guidelines for Programming Patients in Müse
- Müse Parameter Descriptions
- Parameter Display Definitions
- Recommended Clinical Supply Sizes
- Ischemic Index Conditions
- Wireless Voice Link Instructions

EQUIPMENT OVERVIEW

The Athena female simulator comes with standard equipment as well as optional equipment. Optional equipment refers to items which are available for purchase to enhance the simulation experience and additional accessories refers to consumable items which are available for purchase as they may need to be replaced.

Standard Equipment

The standard equipment for Athena includes all the necessary equipment for basic use of the simulator. The items listed in the table below are shipped with the simulator.

Table 1:

Standard Equipment
Full-Body Wireless Manikin
Laptop Instructor Workstation
Power Adapter/Cord
Gown
Accessories

Full-Body Wireless Manikin

All patient assessments and clinical interventions are played out on the female manikin, which represents a human patient. At 5 feet, 9 inches (175 cm) in height and weighing 105 pounds (48 kg), Athena is fully operational in the supine, lateral, prone and seated positions. The simulator offers features such as arm pronation and supination, breath and heart sounds, palpable pulses, patient voice, and genitourinary features. The manikin comes with two batteries in place, on the left side.

Laptop Instructor Workstation

The laptop Instructor Workstation is a computer that utilizes Müse or Vivo software to operate as the main simulation control center. Instructors control the simulation session from the workstation by running Simulated Clinical Experiences (SCEs) that meet their learning objectives, or on the fly with Vivo.

IMPORTANT: *All CAE computer components are preconfigured for use with the simulator. There are no software installation steps required. Only approved CAE applications should be installed or run with the simulator.*

Power Adapter and Cord

The simulator comes with a power adapter and cord; no other power cord should be used with Athena.

Gown

A gown is provided for the manikin to enhance the reality of the simulation.

Accessories

The accessories for Athena include:

- Four ECG posts
- Pacing/defibrillation disks
- NIBP Adapter Kit
- IV priming syringe
- Priming tube
- Genitourinary (GU) Filling Tool
- Condensation drain
- IV Tubing Single Replacement Kit
- Wireless Voice Link Kit
- Lubricant spray (cottonseed oil)

Optional Equipment

Additional Instructor Workstation:

Laptop, Vivo Tablet, or Instructor Workstation Tablet PC

The Instructor Workstation is a computer that utilizes Müse Software or Vïvo to operate as the main simulation control center. Instructors control the simulation session from the Workstation by running Simulated Clinical Experiences (SCEs) that meet their learning objectives, or on the fly with Vivo.

IMPORTANT: All CAE computer components are preconfigured for use with the Athena system. There are no software installation steps required. Only approved CAE applications should be installed or run on the Athena system.

TouchPro Workstation

The TouchPro workstation is a touchscreen display monitor that utilizes the TouchPro Patient Monitor.

Additional Accessories

The following accessories are also available to customize the specific needs of a wide variety of education environments.

- Arm skin
- Hand skin (left or right)
- Lubricant spray (cottonseed oil)
- Vein tubing replacement kit
- Hands-free electrical therapy kit - Zoll
- Hands-free electrical therapy kit - Physio Quick Combo
- Hands-free electrical therapy kit - Philips AED
- Spanner
- Wall air kit (Required when using the facility supply source and facility wall adapter)

SETUP

Follow these steps to prepare for your simulation experience.

1	**Place Manikin in the Work Area**
2	**Power on the Manikin**
3*	**Power on the Instructor Workstation***
4*	**Connect to the Wireless Network**
5*	**Connect the TouchPro Patient Monitor to the Wireless Network (optional)**
6*	**Start Müse**

*If you are using the Vivo tablet, skip Steps 3 - 6 and proceed to the *Using Vivo* section of the User Guide.

BEFORE BEGINNING SETUP

Proper operation of the simulator requires correct configuration. Before setting up the system, keep in mind these basic guidelines:

- Read and understand the Cautions and Warnings located in the beginning of the Lucina User Guide
- Follow the sequence of the steps carefully
- Complete all steps in order
- Do not power on any components until instructed in the text
- Keep all original shipping materials, including boxes. Warranty and repair items must be returned and shipped in their original packaging.
- When unpacking the manikin for the first time, careful use of box cutters protects both the packaging and the product

Step 1: Place Manikin in the Work Area

Select a work area with enough room for all equipment, providing ample space for easy access to the simulator. At least a 10' x 12' (3 m x 4 m) work area is recommended for movement of learners and positioning of components around the simulator.
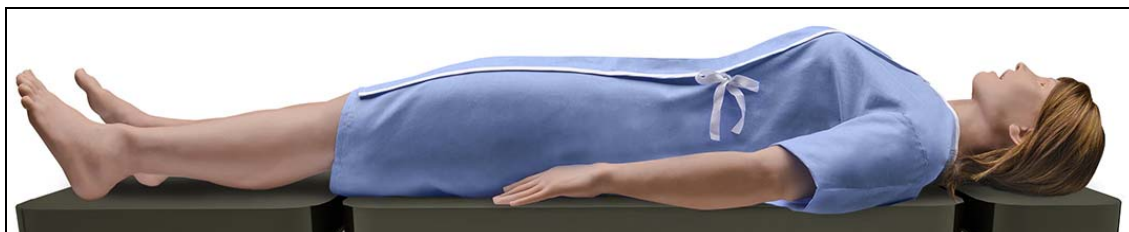
The Athena Simulator

The female manikin and the Instructor Workstation may all be operated from their batteries, allowing for wireless use.

In a lab environment, make sure that a multi-plug AC power outlet exists within the workspace to recharge the simulator and its powered components.

Before placing the simulator on a surface, be certain that surface can easily support 200 pounds.

NEVER lift the simulator by the LIMBS. Leverage the torso of the simulator and support the head while lifting.

Prior to using the stretcher packed with the shipping container, the manikin must be wrapped in a sheet. Failure to wrap the manikin in a sheet may result in permanent damage to the manikin skin. CAE is not responsible for damage to the manikin skin if the manikin is not wrapped in a sheet while using the stretcher.

Step 2: Power on the Manikin

To power on the manikin:

a. Prior to powering on the simulator, ensure the Athena manikin has fully charged batteries inserted into the left side of the torso, or the power cord is attached on the right side of the torso

b. Locate the power button on the right side of the manikin's torso

c. Press and release the power button

The button illuminates when the manikin is powered on.

The Power button

The Power cord

The Manikin Power Button and Power Cord

IMPORTANT: *Wait three (3) minutes while the simulator establishes a wireless network before attempting to connect to the instructor workstation. Failure to wait will prevent proper connection if the user attempts to make a direct Ethernet connection to the simulator network. The manikin should say, "Hello" when it is ready to be used with the Müse software.*

For information on recharging batteries, see the *Care and Maintenance* section of this user guide.

Note: If you are using the Vivo tablet, skip Steps 3- 6 and proceed to the Using Vivo section of this guide.

Power on the Instructor Workstation

To power on the instructor workstation

a. Place the Laptop or Tablet Instructor Workstation near the manikin in a convenient location

b. Connect the AC adapter to the Instructor Workstation and a surge-protected power outlet (optional)

Note: If the Instructor Workstation is running on battery power, ensure the battery is fully charged.

c. Press the power button on the Instructor Workstation

Step 4: Connect to the Wireless Network

A) Mac Laptop Instructor Workstation Option

Once the manikin and Instructor Workstation are both powered on, they automatically establish a wireless connection and, when the browser is opened, the Müse software launches.

If the auto-connect does not occur, perform the following steps:

1. Click the **WiFi** icon in the top toolbar. If necessary, turn WiFi on.

2. Select your simulator's wireless network (for example, mfsxxx, where xxx is the serial number for the unit) and enter password
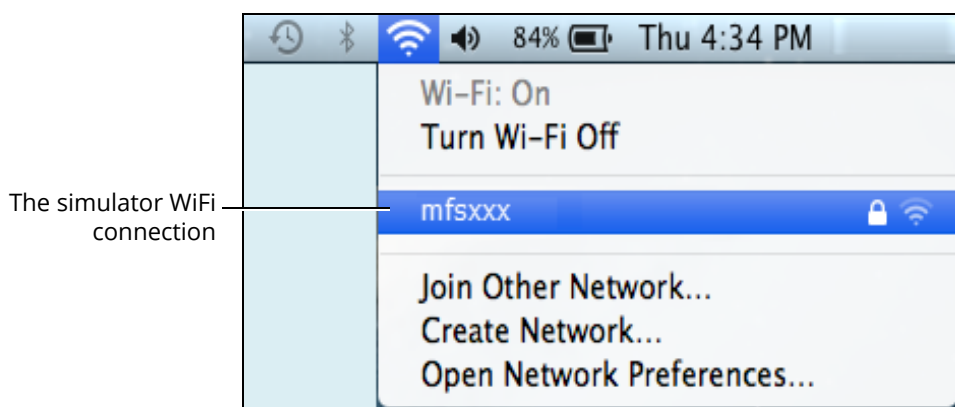
The simulator WiFi connection

The Simulator WiFi Connection

The case-sensitive network password is *caeadmin.*

The wireless connection is established.

The Müse software can now be launched.

For more information on starting the application, see the *Using Müse* section of the User Guide.

>   **TIP:** *Some previous versions of Mac refer to WiFi as **Airport**.*
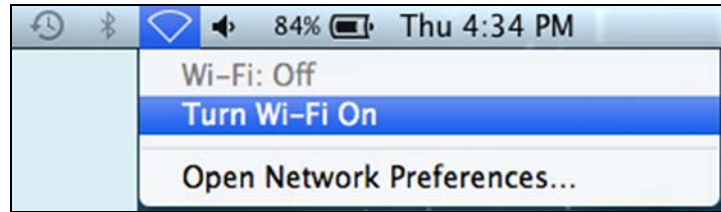
The WiFi Icon

3. Select your simulator's wireless network (for example, ATHXXXX, where XXXX is the serial number for the unit) and enter password

The simulator WiFi connection
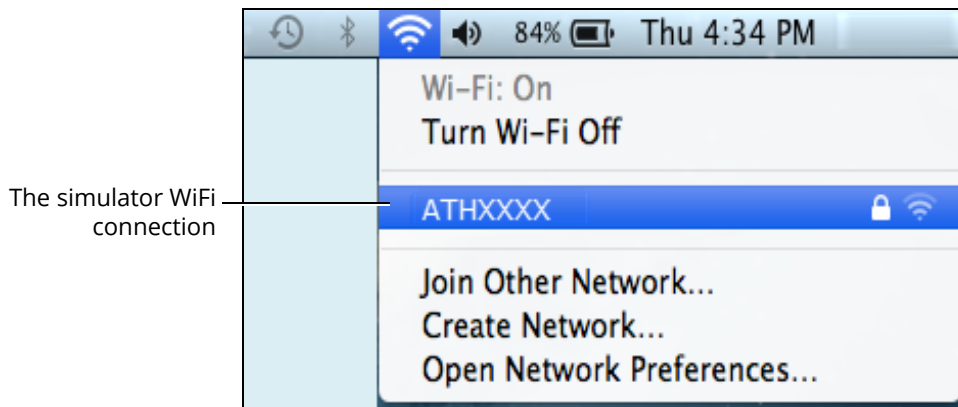
The Simulator WiFi Connection

>   The case-sensitive network password is *caeadmin.*

>   The wireless connection is established.

>   The Müse software can now be launched.

For more information on starting the application, see the *Using Müse* section of the User Guide.

B) Windows Laptop or Tablet Instructor Workstation Option

Once the manikin and Instructor Workstation are both powered on, they automatically establish a wireless connection and, when the browser is opened, the Müse software launches.

If the auto-connect does not occur, perform the following steps:

1. Click the **Wireless Network** icon in the bottom Windows toolbar
2. Click to select your simulator's wireless network (for example, ATHXXXX, where XXXX is the serial number for the unit)
3. Click **Connect** and enter password
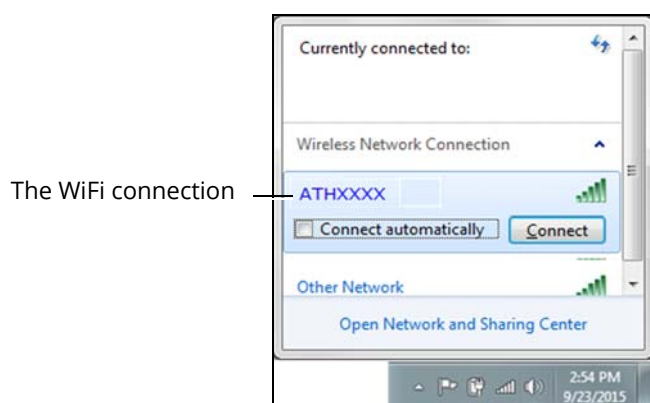
The WiFi connection

The Simulator WiFi Connection

The case-sensitive network password is *caeadmin*.

The wireless connection is established.

The Müse software can now be launched.

For more information on starting the application, see the *Using Müse* section of the User Guide.

Step 5: Connect a TouchPro™ Workstation to the Wireless Network (Optional)

The CAE TouchPro workstation comes pre-configured for use with the simulator. If you wish to supply your own computer to run the TouchPro software, the computer must meet the system requirements and must join the simulator network prior to use.

The simulator and Instructor Workstation form a local area network with static IP addresses. To incorporate an additional computer to run TouchPro, the computer's network properties must be configured to join the simulator network. Refer to the following instructions or contact the system administrator for your institution to configure the network properties and connect the TouchPro software, if necessary.

Note: The Instructor Workstation MUST be connected to the simulator network prior to performing the steps below.

To connect the TouchPro software to a Mac laptop not provided by CAE:

    a. Power on the computer to be used for the TouchPro software

    b. On the Instructor Workstation Mac laptop, from the **Apple** menu, click **System Preferences**

    c. From the System Preferences window, click **Network**

    d. From the Network window, click **Advanced**

    e. From the Advanced window, click **TCP/IP**

    f. Write down the IP Address listed next to the **IPv4 Address**, then click **Cancel** to close the Advanced window

    g. Close the System Preferences window

    h. To launch TouchPro, open a web browser window and enter the IPv4 address in the address field

To connect the TouchPro software to a Windows laptop not provided by CAE:

    a. Power on the computer to be used for the TouchPro software

    b. On the Instructor Workstation Windows laptop, right-click the WiFi icon and select **Open Network and Sharing Center**

    c. Click the **Wireless Network Connection**

    d. Click **Details**

    e. Write down the IP Address listed next to the **IPv4 Address**, then click **Close** to close the Details window

    f. Close the Wireless Network Window and the Network and Sharing Center window

    g. To launch TouchPro, open a web browser window and enter the IPv4 address in the address field

CAEAthena

Step 6: Start Müse

Open your web browser and, from the Müse Start screen, Müse and TouchPro can be launched.

Click the Müse icon to launch Müse. For more information, see the *Using Müse* section of the User Guide.
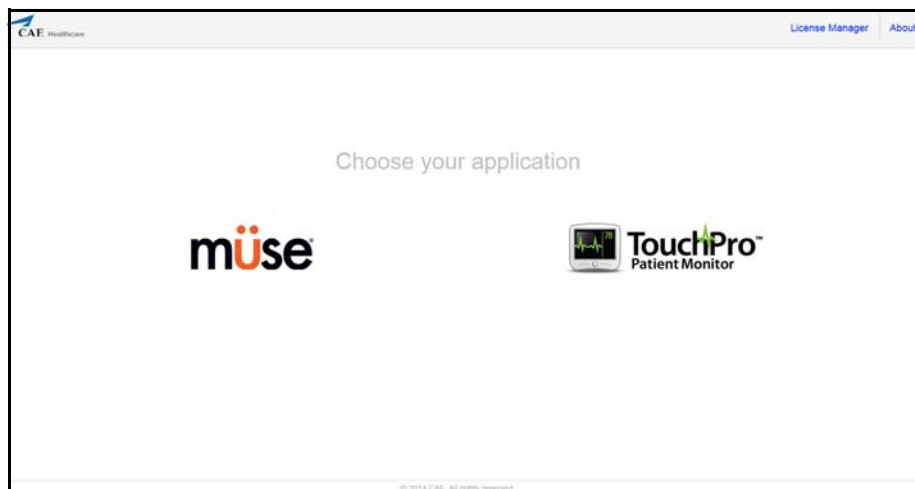
The Müse Start Screen

For more information on how to use the TouchPro software, see *Using the TouchPro Patient Monitor* section or *Using the TouchPro CTG* section in this user guide.

USING MÜSE

The Müse software is a browser-based application that can communicate directly with the simulator. With the software, users can run SCEs, create scenarios and SCEs, import and export educational content and perform administrative functions.

Note: For optimal Müse performance, no other software programs should be open while Müse is running.

IMPORTANT: *Only one Müse application window or tab and one TouchPro window or tab can be used per Instructor Workstation at a time.*

IMPORTANT: *Do NOT use any of the browser's navigational tools (i.e., back and forward buttons) while operating Müse.*

Starting Müse

Once the simulator is powered on and the Instructor Workstation is connected to the simulator network, the Müse software can be launched.

To launch the software:

1. Using the Laptop or Tablet Instructor Workstation, launch the web browser
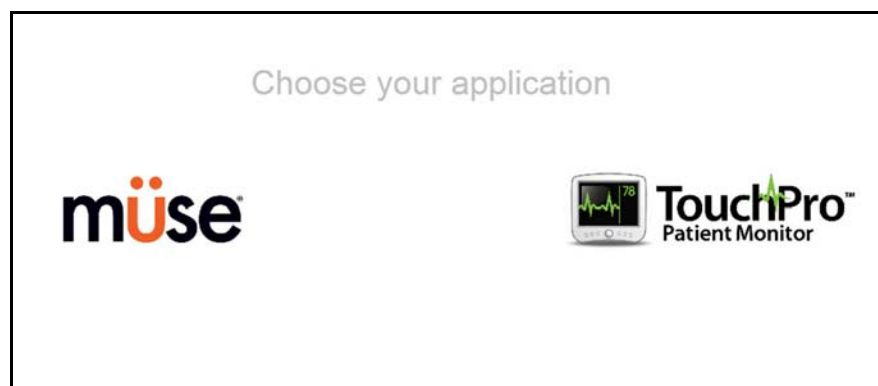
The Müse Start Screen

Note: If auto-connect does not occur, the Müse Start screen will not appear when the Internet Explorer browser launches.

2. Select **Müse**

The Müse Login Screen

The icons in the bottom left corner of the screen provide access to additional information about the software:

Clicking the **Info** icon to access the Info menu. From the Info menu, users can select from the following options:

- Select **About** to access information about the Müse software version, the type of simulator and the serial number

- Select **User Guide** to download the user guide (English version). To access the User Guide in other languages, please visit www.caehealthcare.com and click the **Support** link.

- Select **Support** for CAE Support contact information

Click the globe-shaped **Language** icon in the bottom left corner to change the language of the Müse software.

3. On the Login screen, enter the **Username** and **Password** in the appropriate fields and click **Login** to access Müse

The default **Username** is *admin* and the default **Password** is *admin*.

The Müse Login Fields

The Home Page Overview

From the Home page, users can run, create, edit, search for and print SCEs.

The Home page can be accessed by clicking the **Home** button in the upper right corner of the Müse software or, on any screen without a **Home** button, by clicking the **Return** button in the upper left or right corner of the screen.

The **System Administration** button

The **Account Profile** button

The **History** button

The **Home** button

The SCE Summary panel

The SCE Selection panel

The **Logout** button
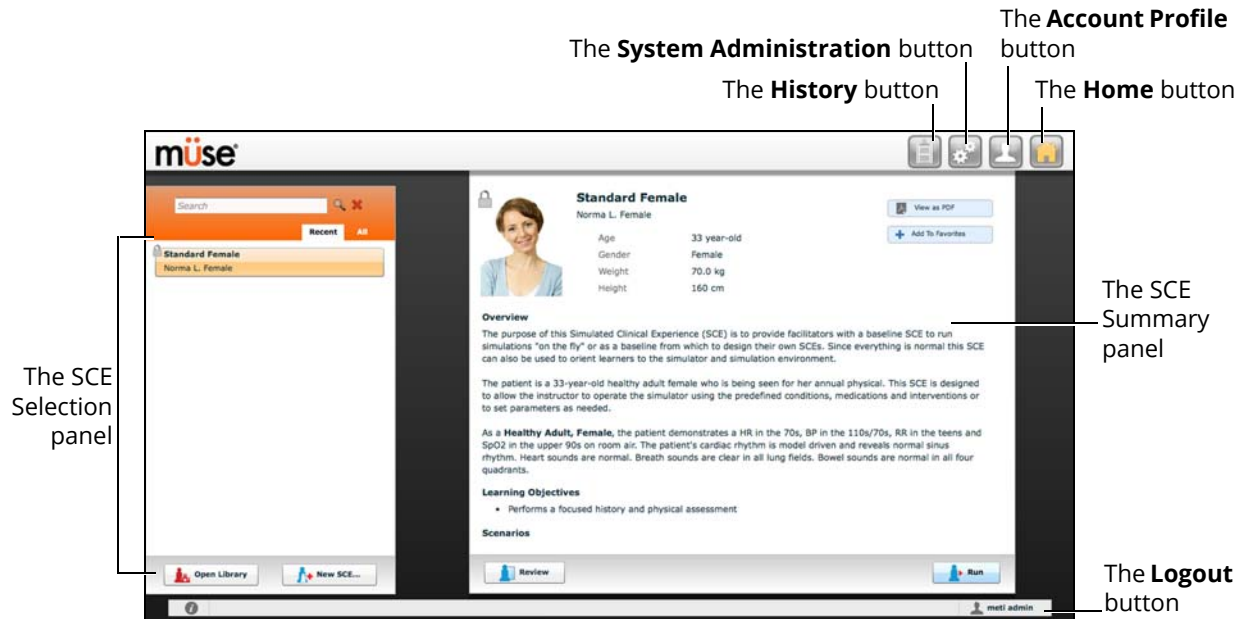
The Home Page

The SCE Library

The SCE Library lists all SCEs available on your workstation. Access SCEs from your library by clicking the **Open Library** button at the bottom of the SCE Selection panel. The SCE Library appears.

The SCE Library
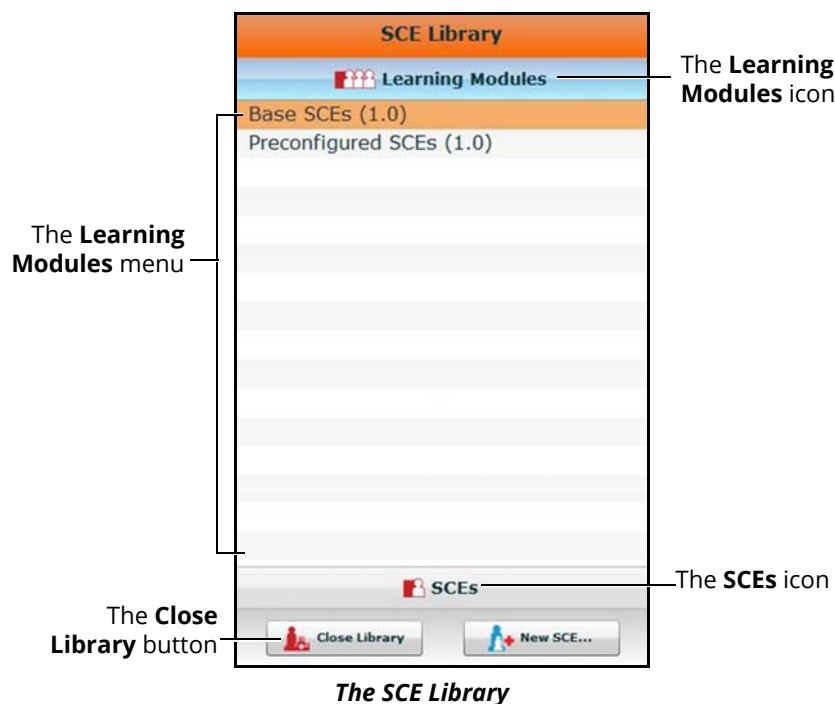
The Learning Modules menu is open by default. The Learning Modules menu lists Base SCEs, Preconfigured SCEs, and all installed learning modules. Click the desired learning module name to access its SCEs, or click Base SCEs or Preconfigured SCEs. The selected SCEs appear.

Clicking the **SCEs** icon reveals the SCEs menu, which lists all user-created SCEs.

Clicking the **Learning Modules** icon again reveals the Learning Modules menu.

To open an SCE, click the name of the SCE.

Click **Close Library** to exit the SCE Library.

Base SCEs

Base SCEs are fundamental SCEs with no scenarios and no progression of events. Each base SCE is designed to provide facilitators with a baseline to run simulations "on the fly" or as a physiological baseline from which to design their own SCEs.

To access a base SCE from the SCE Library, choose **Learning Modules**, then click **Base SCEs**. The base SCEs are displayed and available for selection.

Preconfigured SCEs

Preconfigured SCEs are training tools with scenarios and multiple states. They are intended to be used for learner education and training.

There are five categories of preconfigured SCEs: Anesthesia, Obstetric, Allied Health, Advanced Cardiac Life Support (ACLS) and Advanced Life Support (ALS).

To access a preconfigured SCE from the SCE **Library**, click **Learning Modules**, then click **Preconfigured SCEs**. The available preconfigured SCEs will be displayed and available for selection.

HPS with Müse includes the following preconfigured SCEs :

Anesthesia

- Aortic Cross Clamping
- Anaphylaxis in Awake Patient
- Cannot Intubate, Cannot Ventilate
- Cardiac Tamponade
- Emergence Apnea
- Emergence Hypertension
- Emergence with Laryngospasm
- Emergence with Negative Pressure Pulmonary Edema
- Total Spinal Anesthesia
- Local Anesthetic Toxicity During IV Epidural Injection
- Sympathectomy due to Epidural Anesthesia
- Hypoxia due to Bronchospasm During Induction of Anesthesia
- Hypoxia due to Atelectasis in the Obese Patient During Laparascopy
- Malignant Hyperthermia Under General Anesthesia
- Tension Pneumothorax
- Peripheral Nerve Block Complications
- Anesthesia Machine Failure
- Anaphylaxis Under General Anesthesia
- Awareness During Caesarean Section
- Perioperative Anterior Myocardial Infarction

Obstetric

- Amniotic Fluid Embolism
- Epidural Analgesia
- Pulmonary Aspiration
- Supine Hypotension Syndrome
- Obstetrics Venous Air Embolism
- Pre-Eclampsia

Allied Health

- Angina with Cardiac Arrest
- Asthmatic with Pneumothorax
- Chronic Obstructive Pulmonary Disease (COPD) with Respiratory Failure
- Heart Failure with Pulmonary Edema
- Inferior Myocardial Infarction
- Organophosphate Exposure
- Pneumonia with Septic Shock
- Severe Young Asthmatic
- Splenic Rupture with Pneumothorax
- Stab Wound to the Chest
- Subdural Hematoma
- Anaphylaxis
- Anterior Myocardial Infarction
- Tension Pneumothorax

Advanced Cardiac Life Support (ACLS)
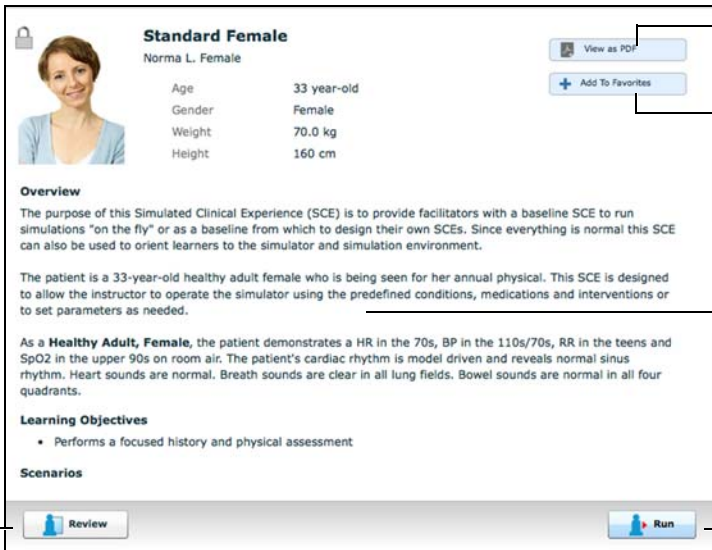
- ACLS Acute Coronary Syndrome
- ACLS Acute Stroke
- ACLS Asystole
- ACLS Bradycardia and Heart Blocks
- ACLS Pulseless Electrical Activity
- ACLS Pulseless Ventricular Tachycardia and Ventricular Fibrillation
- ACLS Respiratory Arrest
- ACLS Supraventricular Tachycardia
- ACLS Ventricular Fibrillation AED
- ACLS Ventricular Tachycardia

Advanced Life Support (ALS)

- ALS Acute Coronary Syndrome
- ALS Acute Stroke
- ALS Asystole
- ALS Bradycardia and Heart Blocks
- ALS Pulseless Electrical Activity
- ALS Pulseless Ventricular Tachycardia and Ventricular Fibrillation
- ALS Respiratory Arrest
- ALS Supraventricular Tachycardia
- ALS Ventricular Fibrillation
- ALS Ventricular Tachycardia

The SCE Summary Panel

The SCE Summary Panel provides information about the selected SCE.

The **View as PDF** button

The **Add to Favorites** button

The SCE Content Summary

The **Review** button

The **Run** button

The SCE Summary Panel

The **View as PDF** button can be used to generate a printable PDF of the selected SCE.

The **Add to Favorites** button adds the SCE to your Favorites list.

Click the **Review** button to review all information about an SCE; and edit any unlocked SCE.

Select the **Run** button to run the SCE.

Printing SCEs

To print an SCE:

1. From the Home page, select the SCE to print
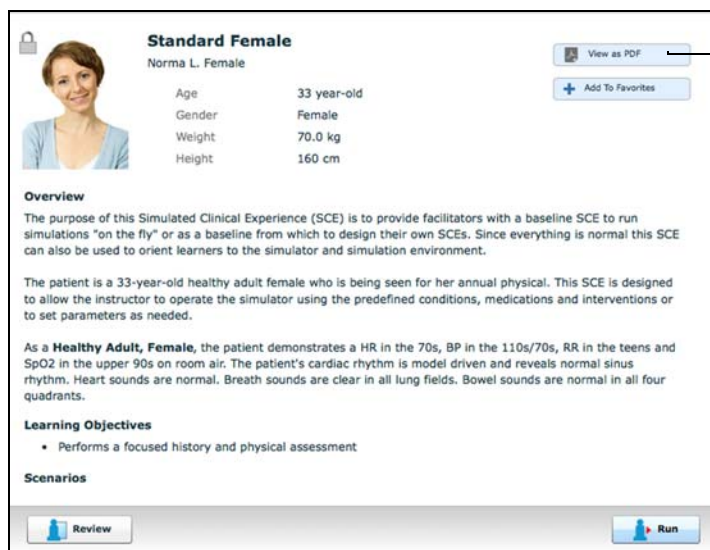
The **View as PDF** button

The SCE Summary Panel

2. From the SCE summary panel, click the **View as PDF** button

3. Save the PDF to an external storage device to print from another computer

   Note: To print from the Instructor Workstation, consult your network administrator for assistance connecting to a printer.

4. When finished saving or printing the PDF, close the browser window containing the PDF to return to Müse

Running an SCE

To run an SCE, from the Home screen, select an SCE and click the **Run** button. The Run screen can also be accessed from the Scenario Designer or SCE Editor by clicking the **Run** button near the top of the screen.

The Run Button
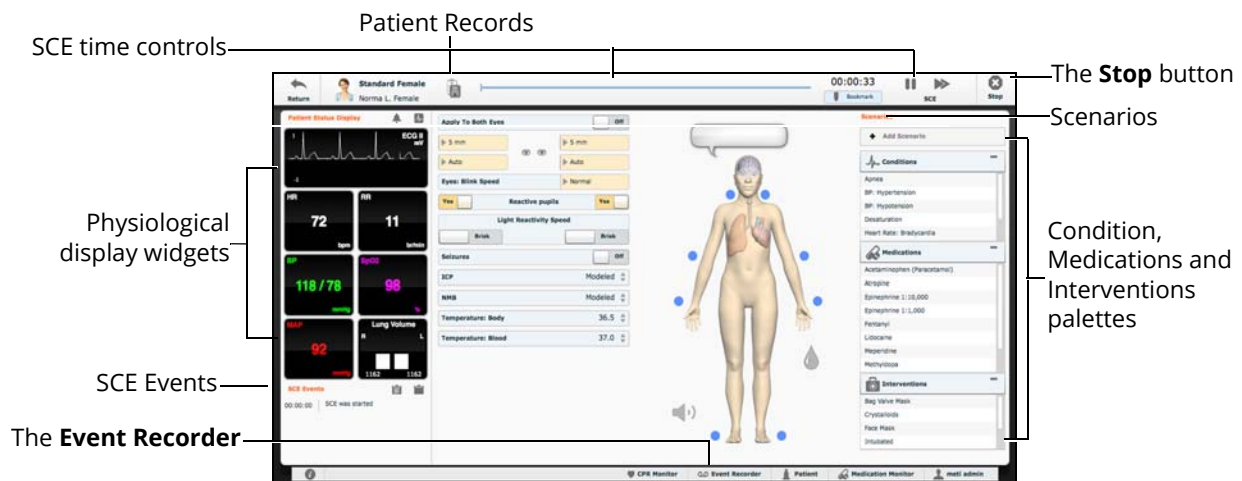
The Run Screen

From the Run screen, users can manage the SCE, perform interventions, view physiological status and events, save events as states, save the Patient and associate records with the Patient.

Monitor Signals

Lets the user control which vital sign signals are displayed on the patient monitor; including TouchPro and commercial monitors connected via VitalsBridge.

Monitor Signals Icon

Monitor Signals Panel

The listed probes impact which vital sign signals are displayed on the patient monitor; including TouchPro and commercial monitors connected via VitalsBridge. By default they are all on. Turning probes off here will impact some of the graphs as follows:

- ECG Leads OFF:
  - ◦ The ECG waveform is not displayed
- Pulse Oximeter OFF:
  - ◦ The PLETH waveform is not displayed
- Capnograph turned OFF:
  - ◦ The CO2 waveform is not displayed

The listed probes also impact the numerical values as follows:

- ECG Lead OFF and Pulse Oximeter OFF:
  - ◦ The HR (Heart rate) is not displayed
- Pulse Oximeter OFF:
  - ◦ SpO2 is not displayed
- Capnograph OFF:
  - ◦ EtCO2 not displayed
- Pulse Oximeter OFF and Capnograph OFF:
  - ◦ RR (Respiratory rate) not displayed
- Blood Temperature Probe OFF:
  - ◦ TBlood and TRectal not displayed
- Body Temperature Probe OFF:
  - ◦ TAxilla and TBody not displayed

Note: In simulators that include an emulated SpO2 probe which connects to the simulator's side and is placed on the finger, the detected on/off status of the emulated probe will take precedence over the on/off status indicated in the monitor signals menu.

Setting the catheter placement to Atmosphere causes a flat line to be displayed even when an override is used.
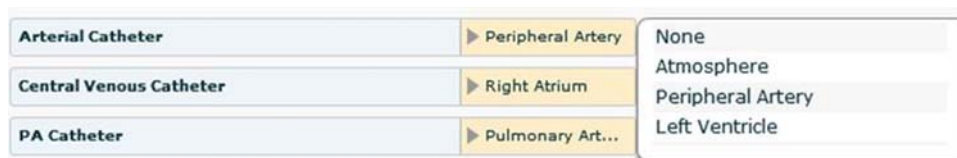
Arterial Catheter Placement
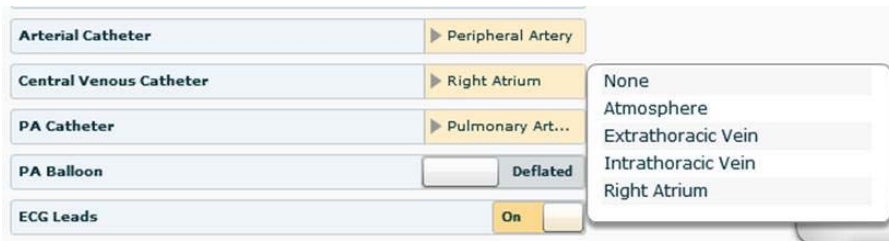
Central Venous Placement
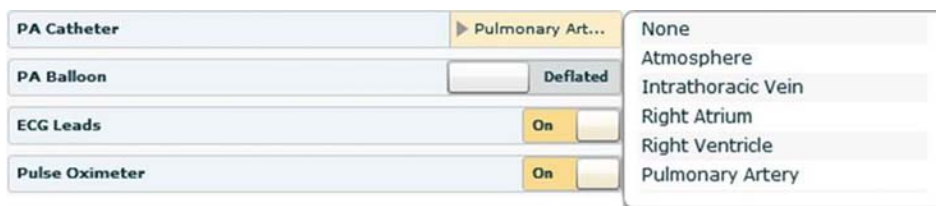
PA Catheter Placement

If the catheter placement is none, no graph is displayed vs a flat line when Atmosphere is selected. The associated widget is displayed and no alarm is generated.

Catheters in Proper Locations
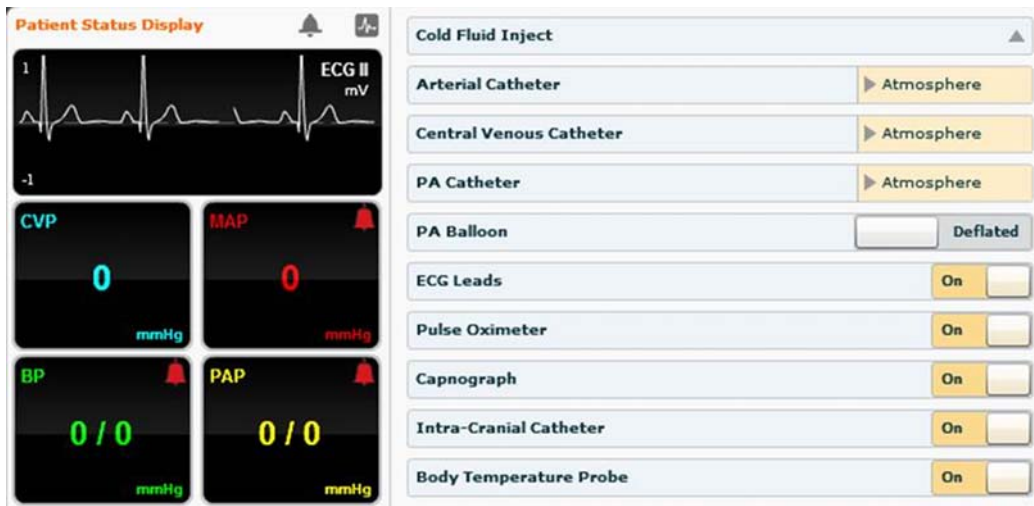
Catheters set at Atmosphere
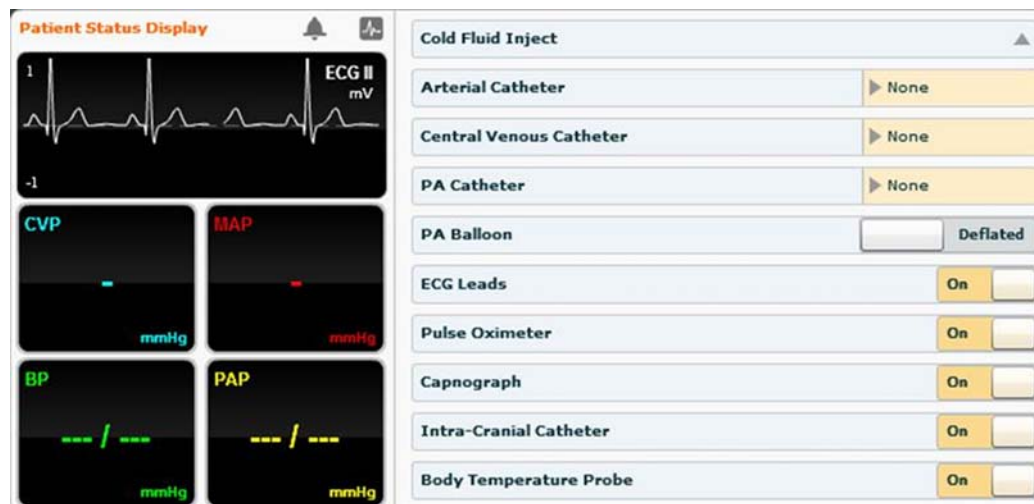
Catheters set at None

SCE Information

The SCE Information is a drop-down menu which is accessed by clicking the SCE title in the upper left corner of the screen.

The SCE Information drop-down menu

The SCE Title and Patient Name
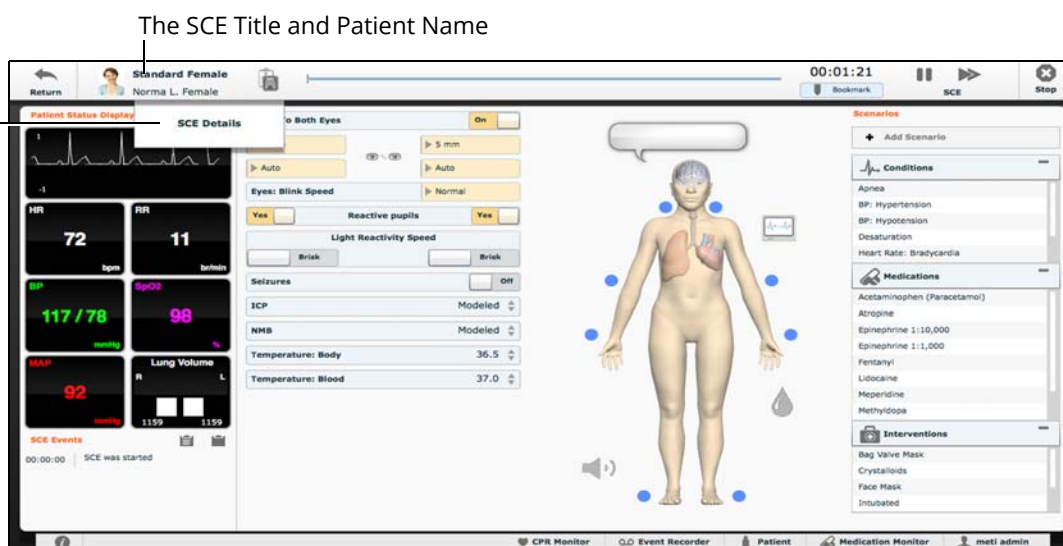
The Run Screen

Select **SCE Details** to access the SCE Editor screen where the baseline setup, SCE Content and Configuration Setup information can be viewed. To return to the Run Screen, click the **Continue** button in the upper right corner of the screen.

Using the Patient Status Display

On the Run screen, there are widgets that display the patient's physiological status. The **Patient Status Display** widgets can be changed to reflect the user's needs.

The **Mute All** button

The **Configuration** button
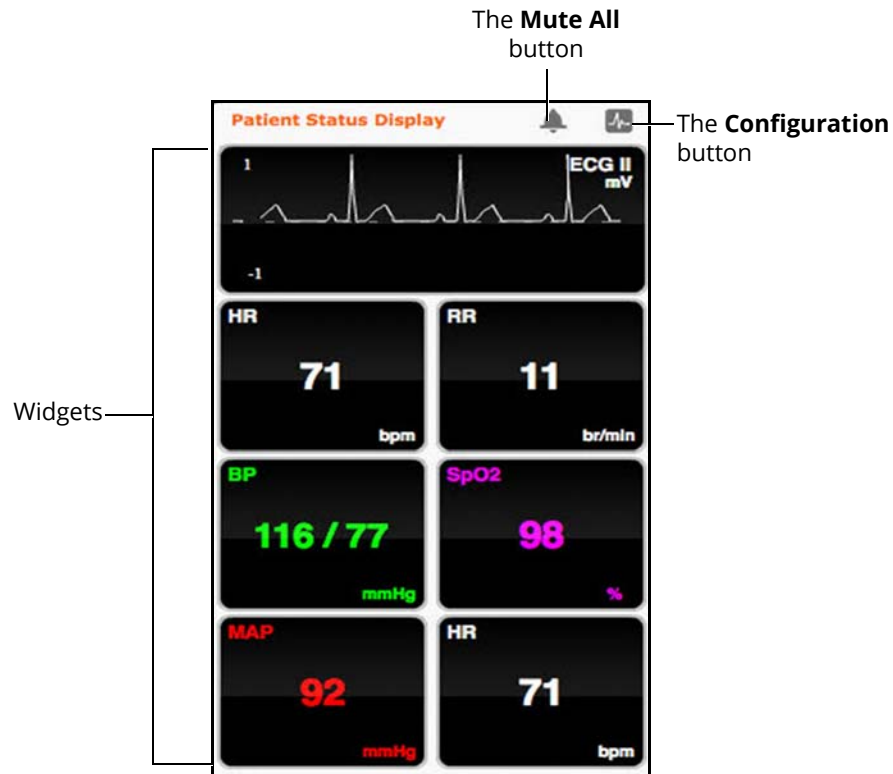
Widgets

The Patient Status Display Widgets

Use the **Mute All** button to mute all Patient Status Display alarms.

To change the information displayed in a **Patient Status Display** widget, click on a desired widget. A list appears, showing all the parameters available for the selected widget type.

To adjust the widget layout, click the **Configuration** button.

The Widget Configuration menu opens, displaying available widget types: Waveform, Numeric and Volume.
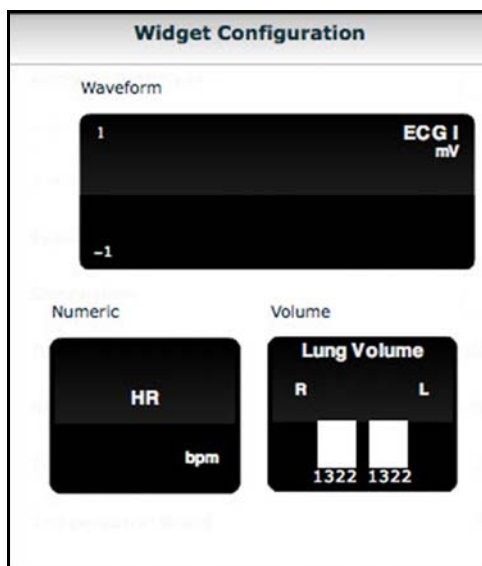
The Widget Configuration Menu

Adjust the Patient Status Display layout by dragging a widget type from the Widget Configuration Menu and dropping it over the Patient Status Display. The new widget type replaces the old.

Note: The capnogram waveform is not displayed on the TouchPro software from the Instructor Workstation. Capnogram information can be found on the clinical patient monitor if one is connected to the simulator.

The **Set Color** button

The **Set Alarm** button
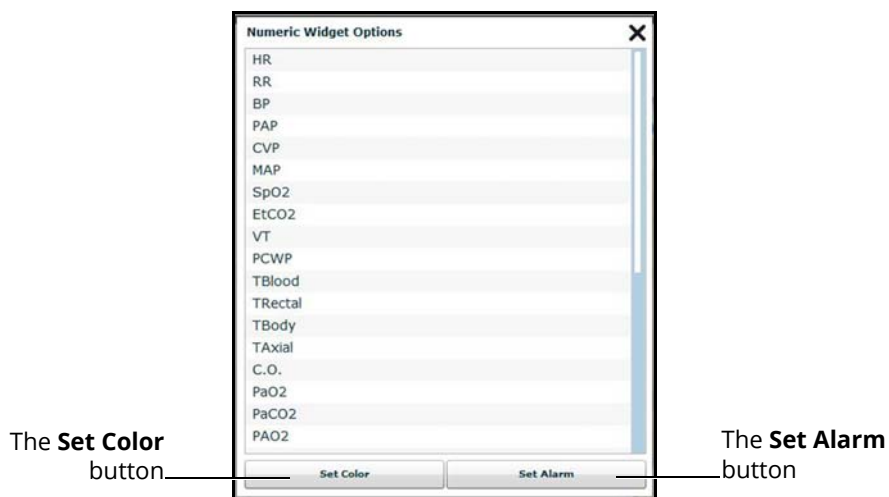
The Numeric Widget Options Panel

Choose the desired option from the list and the widget changes to reflect the new selection.

From the numeric widget menu, the **Set Color** button can be used to change the display color of the widget and the **Set Alarm** button can be used to change the alarm settings for the selected widget.

The Event Logs

During an SCE, all software operations sensed by the simulator or entered manually (e.g., virtual defibrillation, setting a physiological parameter value) are recorded by an event entry that appears on the screen. The event entry notes what occurred and the time it happened.

The Event Logs

Displaying Patient Records

Patient records can be uploaded to Müse and displayed in the TouchPro software while an SCE is running.

To display an uploaded patient record:

1. From the Müse Run screen, click the **Patient Records** button

The Patient Records Button

Patient records

The **Start Displaying** button
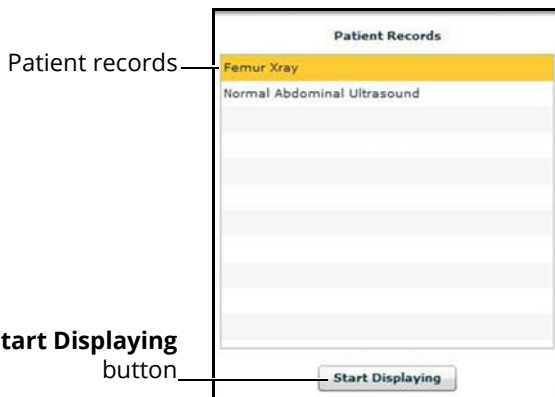
The Patient Records List

2. Select a patient record from the list

3. Click **Start Displaying**

   IMPORTANT: *Ensure pop-up blocking is turned OFF in the web browser of the Instructor Workstation and any TouchPro workstations. Consult the web browser's help menu for assistance.*

   Note: The web browser window containing the patient record may be minimized initially. If the window is not readily visible, click the web browser icon on the Dock (Macintosh Instructor Workstation) or Taskbar (Windows Instructor Workstation) to locate the new window.

   The **Patient Records** button turns red, indicating that a patient record is being displayed.

The Patient Records Button

The **Start Displaying** button at the bottom of the Patient Records list changes to a red **Stop Displaying** button.

Patient records

Patient Records

Femur Xray

Normal Abdominal Ultrasound

The **Stop Displaying** button
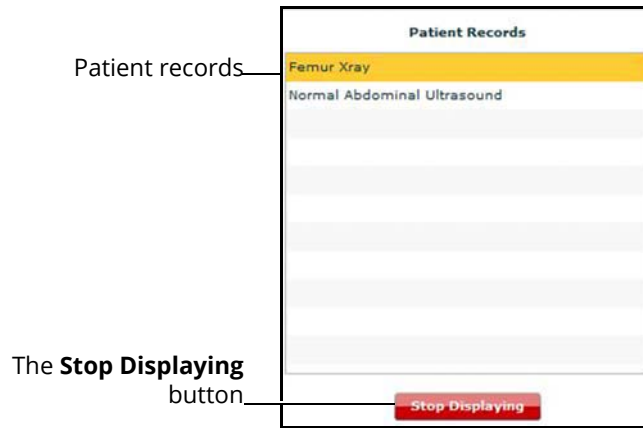
Stop Displaying

The Patient Records List

To stop displaying a patient record, click **Stop Displaying** at the bottom of the Patient Records list.

To close the Patient Records list, click the **Patient Records** button. The list closes. If a patient record is being displayed, the **Patient Records** button remains red until the list is re-opened and **Stop Displaying** is chosen.

Note: Only one patient record can be displayed at a time.

For more information about uploading patient records for selection from the Run screen, see the Patient Records section of Using Muse.

Adding a Scenario to a Running SCE

SCEs incorporate scenarios that contain pre-programmed physiology and events. Scenarios can be added to SCEs to enhance patient physiology.

To add a scenario to an SCE that is running:

1. Click the **Add Scenario** button on the Run screen

The Add Scenario Button

The **Add** button

The **Search** field
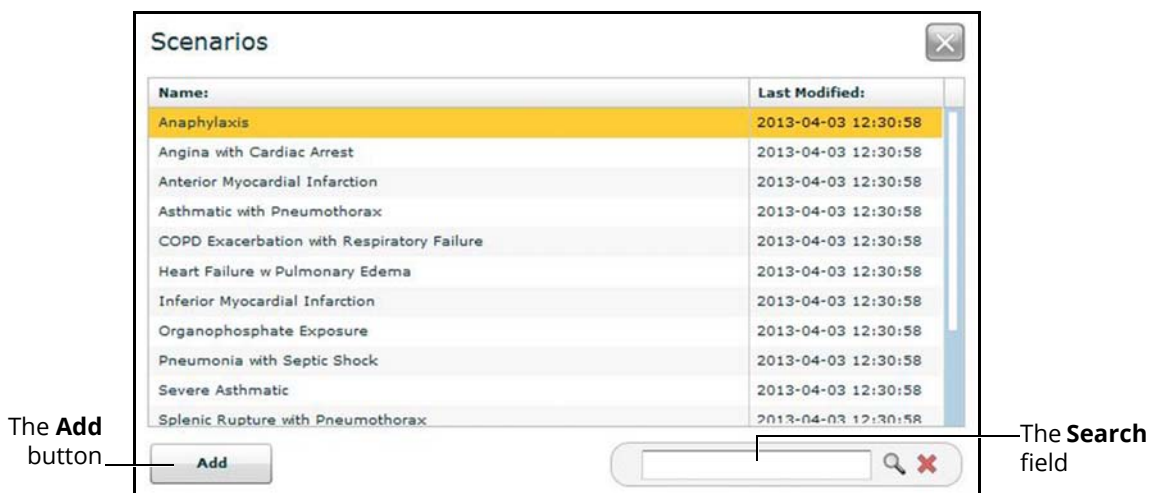
The Choose Scenario Dialog Box

2. Select a scenario from the Choose Scenario Dialog Box

3. Click **Add**

    The scenario is added to the SCE and appears under the **Scenarios** heading on the Run screen.
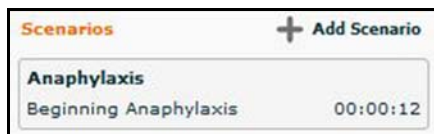
An Added Scenario

Changing Physiology

The patient physiology can be adjusted while an SCE is running in two ways, by using one of the physiological views on the Run screen to modify parameters, or by using the Conditions, Interventions and Medications palettes.

Using the Physiological Views

From the Run screen, users can select from five different views representative of various body systems and features:

- Neurological
- Respiratory
- Cardiovascular
- Fluids
- Fluids and Bleeding
- Sounds

To access each view, click the appropriate organ, icon or button.

- For Neurological, click the brain
- For Respiratory, click the lung
- For Cardiovascular, click the heart
- For Fluids, Click the **Fluids** icon
- For Fluids and Bleeding, click the Fluids Control icon
- For Sounds, click the **Sound** icon

From each view, various parameters can be viewed and adjusted.

- Brain
- Heart
- Lung
- **Fluids** icon
- **Sound** icon
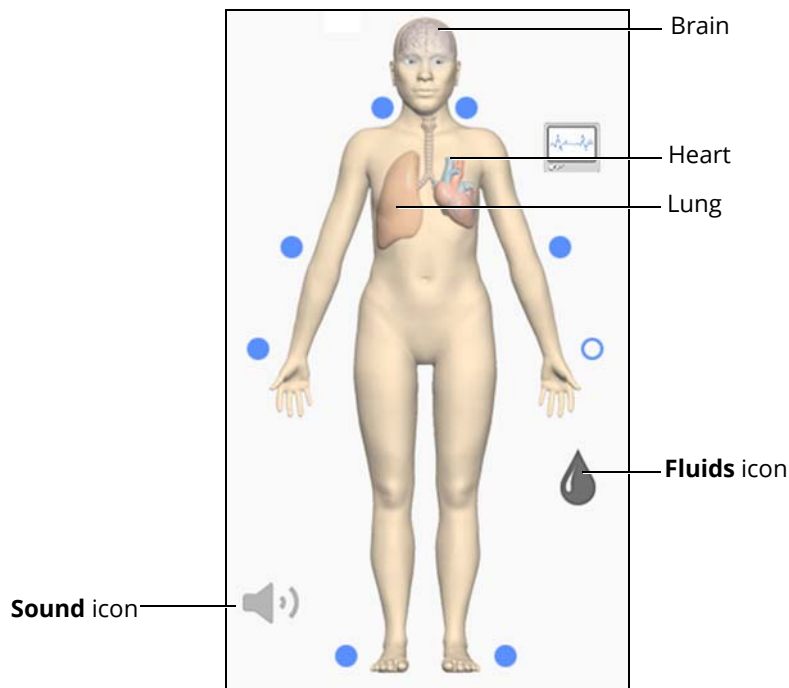
The Physiological Views

To change a patient's physiology using the physiological views:

1. Click the appropriate organ, icon or button from the homunculus to select the desired physiological view

The associated parameters
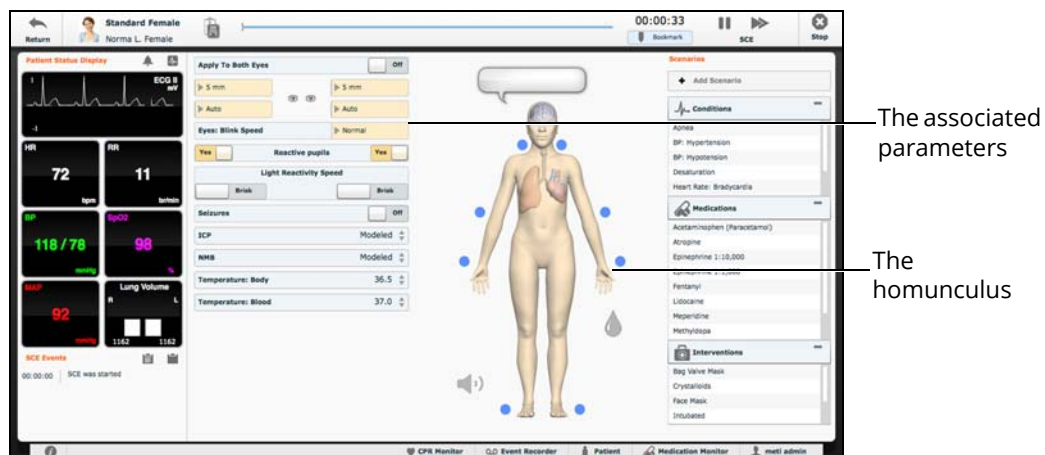
The homunculus

The Run Screen

The associated parameters appear to the left of the homunculus.

2. Locate the desired parameter

   Note: Some simulators have a **Basic/Additional** switch on the Respiratory and Cardiovascular views. Basic parameters are shown by default. The **Basic/Additional** switch can be toggled to show more parameters.

3. Select the parameter and set the new value

   Parameters have varying controls, such as sliders, switches and menus. In the image below, the Heart Rate parameter is shown. Within the Heart Rate parameter, there are switches that toggle between **Modeled** and **Override** and **Seconds** and **Minutes**, a slider that sets the beats per minute and an available field where the beats per minute value can be keyed in.

The **Override/Modeled** switch

The value setting slider
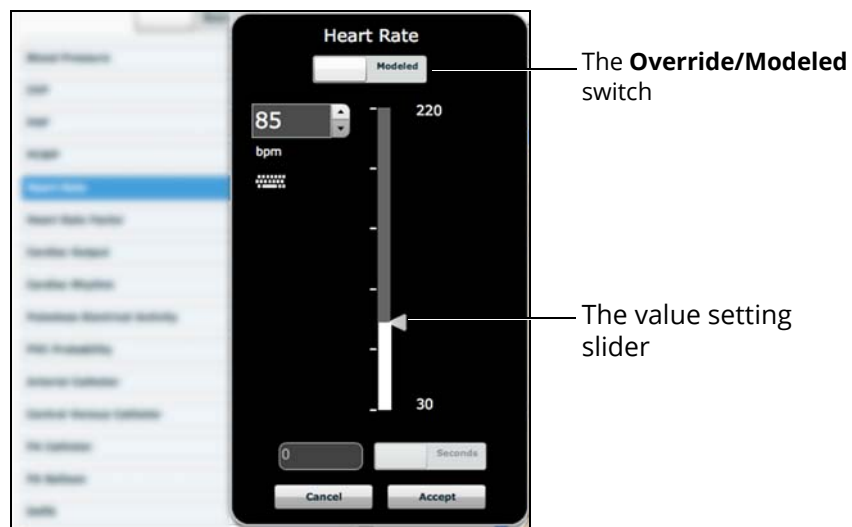
The Heart Rate Parameter

Once the parameter has been set, it is reflected in the patient's physiology.

Types of Parameters

There are two types of parameters: numeric and discrete.

Once a parameter is selected and set, the patient's physiology changes according to the model for that parameter.

Numeric Parameters

Numeric parameters set either a measured value (e.g., 20 mL), a multiplied value called a factor (e.g., Heart Rate Factor 2.0 is two times the baseline Heart Rate) or a coefficient that affects a physiological value in a non-linear way (e.g., FHR Variability Coefficient).

Numeric parameters are changed by clicking in the relevant field and entering a new value in place of the existing one or using a slider to move through the range of parameter values until the desired numeric value is established.

Once a measured value is set, that value overrides the physiologically modeled parameter value. To return to a physiologically modeled value, switch the slider in the parameter dialog from **Override** to **Modeled**.

Discrete Parameters

Discrete parameters enable users to select one of two or more options.

Discrete parameters are changed by choosing the appropriate option using a drop-down menu or toggle switch.

In the image below, the **Bronchial Occlusion** parameter is shown. The **Bronchial Occlusion** parameter is set using a discrete parameter switch that toggles between **Off** and **On**.

The toggle switch

The Bronchial Occlusion Parameter

Once the parameter has been set, it is reflected in the patient's physiology.
Some parameters have two toggle switches or buttons, one for the left side of the manikin and one for the right.

In the image below, the **Reactive Pupils** parameter is shown.

The Reactive Pupils and Apply to Both Eyes Parameters

When the **Apply to Both Eyes** parameter is set to **On**, any change made to the left or right side is also automatically applied to the other side.

Note: Not all changes to parameters affect the patient's physiology, but all are logged.

Using Conditions, Medications and Interventions Palettes

The Conditions, Medications and Interventions palettes on the Run screen enable the application of conditions, medications and interventions during simulation. Once applied, conditions are reflected in the patient's physiology and logged. All medications and interventions are also logged, and most affect the patient's physiology.

Using the Conditions Palette

Conditions are pre-programmed pathophysiological states that use one or more physiological parameters and are designed to enable you to create physiological changes on the fly.

There are two ways to apply conditions using the Conditions palette: using a Quick Link or using the complete Conditions menu. Quick Links are pre configured conditions that are made accessible in the Conditions palette for quick application. Quick Links can also be created for the Medications and Interventions palettes.

To set parameters using the Quick Links in the Conditions palette, click one of the Quick Link conditions. A popup menu will show the available conditions; and hovering over the condition will show the parameters. Click a specific condition to apply it and affect the patient's physiology.
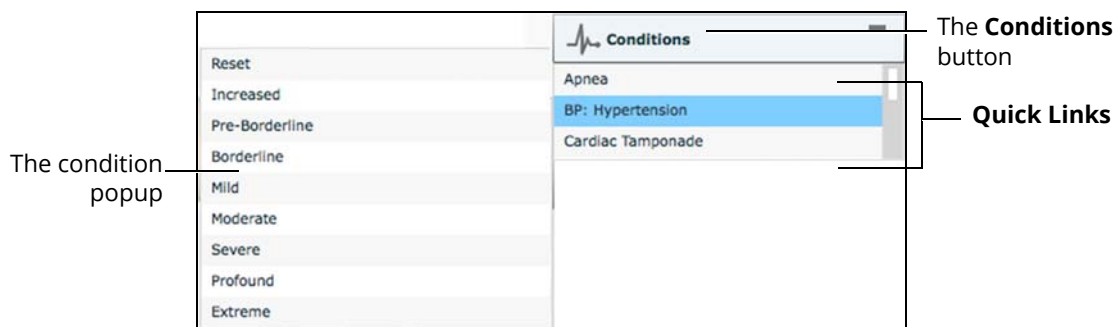
The Medications Palette

Note: Quick Links can only be added while creating or editing an SCE.

To apply a condition that is not set up as a Quick Link in the **Conditions** palette:

1. Click the **Conditions** button

   Conditions are organized by system, or all available conditions are listed under **ALL CONDITIONS**.
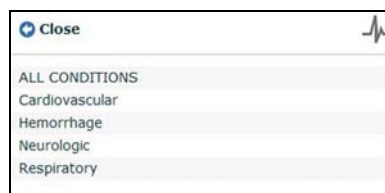
The Conditions Menu

2. Navigate the menus to find the desired condition

Using the Medications Palette

There are two ways to administer medications using the **Medications** palette: using a Quick Link or using the **Medications** menu. Quick Links are preconfigured medications that are made accessible in the **Medications** palette for quick application. Quick Links can also be created for the **Conditions** and **Interventions** palettes.

To set parameters using the Quick Links in the **Medications** palette, click one of the Quick Link medications. A popup menu will show the available doses. Click a specific dose to apply it and affect the patient's physiology.
The option for custom doses will also be in the popup menu. Click the route of administration to get the Custom Dose Administration menu.

Note: Not all medications affect the patient's physiology, but all are logged.

The Medications Palette
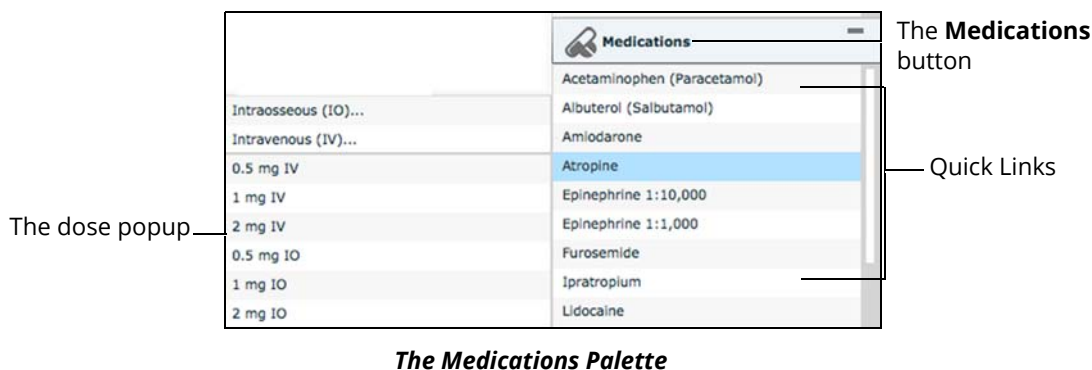
Note: Quick Links can only be added while creating or editing an SCE.

Or, to apply a medication that is not set up as a Quick Link in the **Medications** palette:

1. Click the **Medications** button. Medications are organized by type, and all available medications are listed under **ALL MEDICATIONS**
2. Navigate through the menus to locate the desired medication
3. Once the medication has been located, click the medication's name from the list
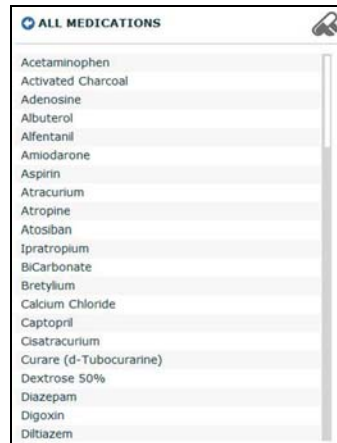
The All Medications Menu

The custom dose options

The predefined dose options

The Medication Dose Menu

4. Select a dose option. This can be done one of two ways:

a. Choose a pre-defined dose

The Medication Dose Menu

b. Choose a route of administration to administer a custom dose

The Medication Dose Menu
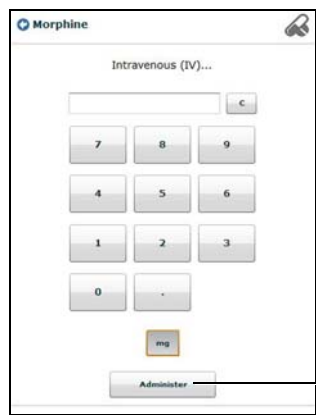
The Custom Dose Administration Menu

5. Enter the desired dose and click the **Administer** button

   Note: Not all medications affect the patient's physiology, but all are logged.

Using the Interventions Palette

There are two ways to perform and/or administer interventions using the Interventions palette: using a Quick Link or using the complete **Interventions** menu. Quick Links are preconfigured interventions that are made accessible in the **Interventions** palette for quick application. Quick Links can also be created for the **Conditions** and **Medications** palettes.

To apply an intervention using the Quick Links in the **Intervention** palette, click an Intervention Quick Link.

Note: Not all interventions affect the patient's physiology, but all are logged.

The Interventions Palette

Once an Intervention is selected, a menu appears with available options for the selected Intervention. Click the desired option to select it. The intervention is applied and appears in the patient's physiology.
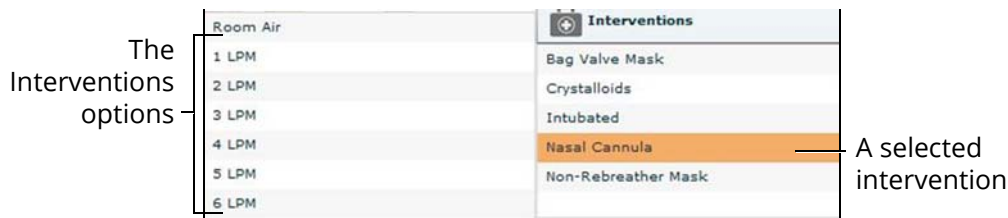
The Selected Intervention Options

Note: Quick Links can only be added while creating or editing the SCE.

To apply an intervention that has not been set up as a Quick Link in the **Interventions** palette:

1. Click the **Interventions** button
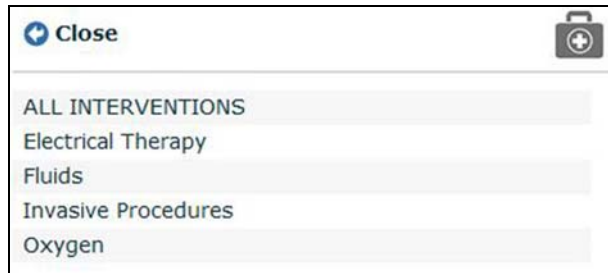
The Interventions Menu

Interventions are organized by type, or all available interventions are listed under **ALL INTERVENTIONS**.

2. Navigate through the menus to find the desired intervention

3. Click the intervention's name from the list

The Intervention Options menu appears, showing the available options for the selected intervention.

The Intervention Options Menu

4. Click the desired option

Transitioning Scenario States from the Run Screen

To move between scenario states from the Run screen:

1. Click the desired scenario

A Scenario

The Scenario Management pop-up menu appears, and all available states are listed.
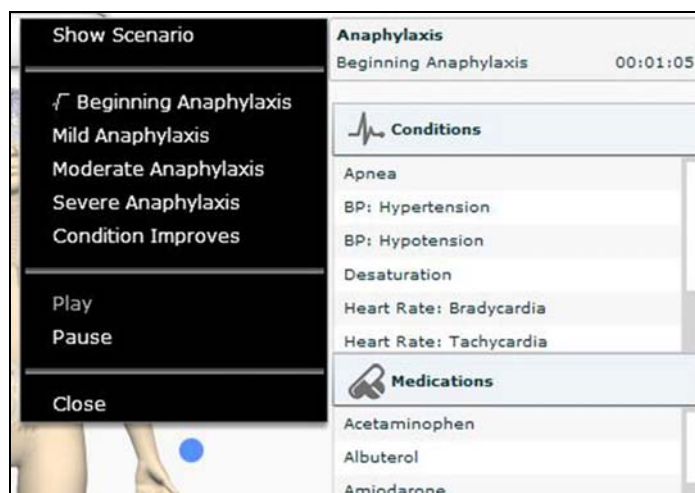
The Scenario Management Pop-Up Menu

2. Select the desired state

    The scenario can also be paused or continued by selecting the **Pause** and **Play** options from the Scenario Management Pop-Up menu.

Transitioning Scenario States from the Scenario Screen

To move between scenario states from the Scenario Screen:

1. From the Run screen, click the desired loaded scenario

The **Show Scenario** option
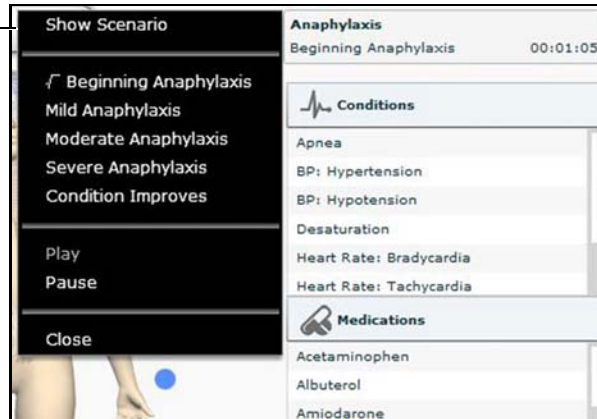
The Scenario Management Pop-Up Menu

2. From the menu, select **Show Scenario**

The **Jump to State** button
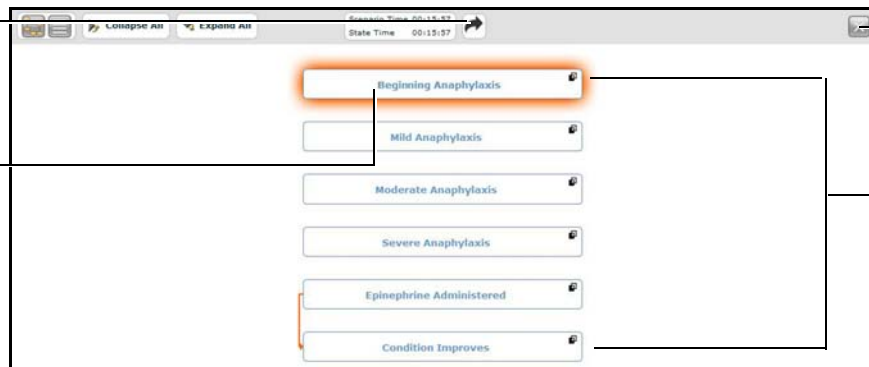
The **Close Window** Button

Selected state

States

The Scenario Screen

The Pause / Play

The **Jump to State** button

The **Close Window** Button

Selected state

States

The Scenario Screen

At the top of this screen, the Scenario Time and State Time are visible. Additionally, users can pause and continue playing the scenario by clicking the Scenario **Pause** and **Play** button on the top of the screen.

3. Click the **Jump to State** button

Beginning Anaphylaxis
Mild Anaphylaxis
Moderate Anaphylaxis
Severe Anaphylaxis
Epinephrine Administered
Condition Improves
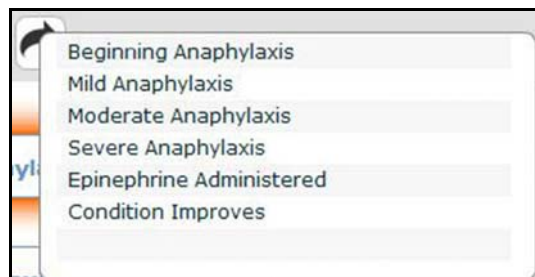
The Jump to State Menu

4. Select the desired state

   Note: *Double-click on the states to expand to the full view.*

5. Click the **Close Window** button to return to the Run screen

SCE Time Controls

The SCE time controls are located at the top of the Run screen.

The **Fast-Forward** button

The **Pause/Play** button

The **Timeline** bar

The **Bookmark** button

00:10:28

Bookmark

SCE
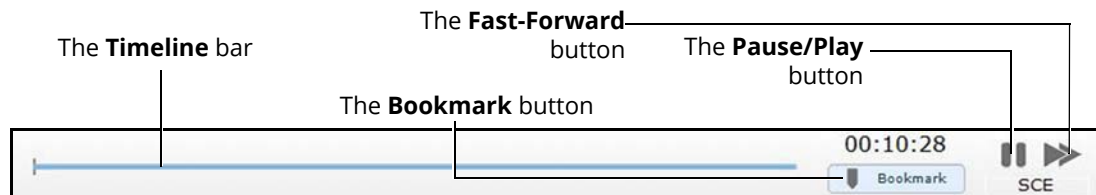
The SCE Time Controls

• The **Timeline** bar shows the amount of time that has elapsed and bookmarks that have been created

• The **Bookmark** button creates a bookmark at the current point in the SCE. The bookmark can be used later to reset the patient's physiology to what it was when the bookmark was created.

• Clicking the **Fast-Forward** button once accelerates the SCE time at a 4:1 ratio. Clicking the **Fast-Forward** button a second time accelerates the SCE time at an 8:1 ratio.

• The **Pause/Play** button pauses the SCE time or starts the SCE if it has been paused. The **Pause/Play** button also returns the SCE time to normal speed after **Fast-Forward** has been selected.

Using Bookmarks

To create a bookmark, click the **Bookmark** button. A bookmark appears on the **Timeline** bar.

A bookmark   The Timeline bar   The **Bookmark** button
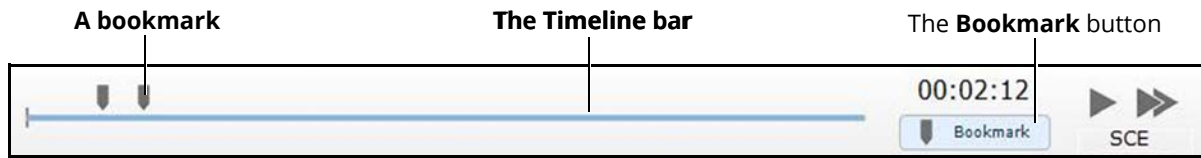
The SCE Time Controls

To return to a bookmarked time in the SCE:

1. Click the bookmark on the timeline

The **Return** button
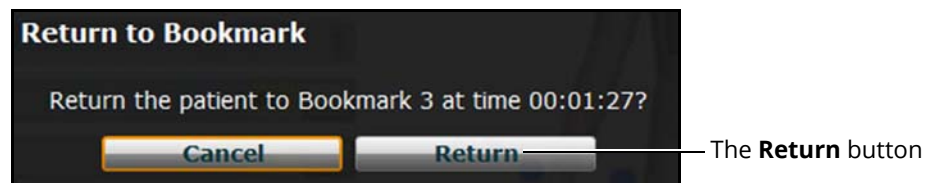
The Return to Bookmark Message

2. Click **Return**

   The patient's physiology returns to the selected point in the timeline.

   Note: The SCE time continues moving forward and does not reset to the bookmarked time.

The CPR Monitor

The CPR monitor is used to monitor the efficacy of CPR interventions and is available from the Run screen.

To use the CPR monitor, click the **CPR Monitor** button at the bottom of the Run screen.

The CPR Monitor Button
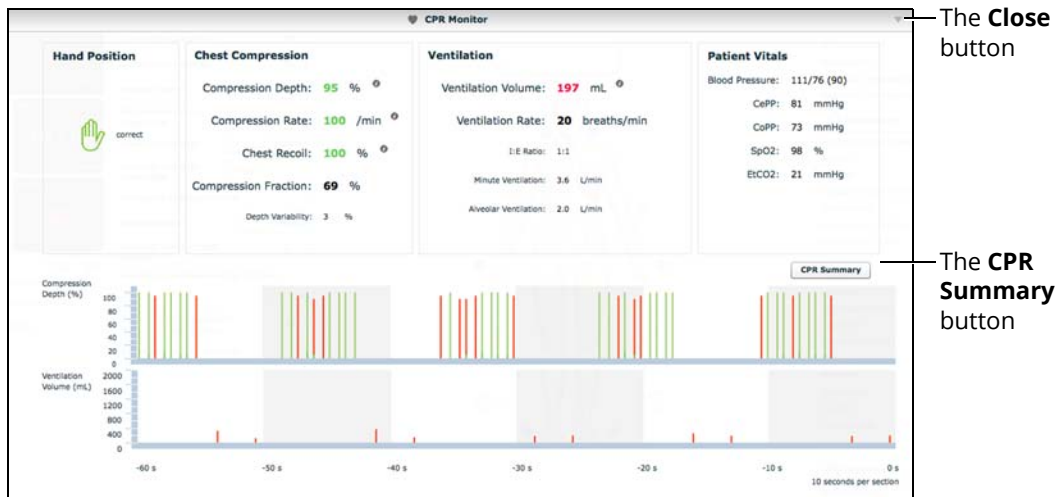
The **Close** button

The **CPR Summary** button

The CPR Monitor - Live Data View

Click the **CPR Summary** button to display the summary view.
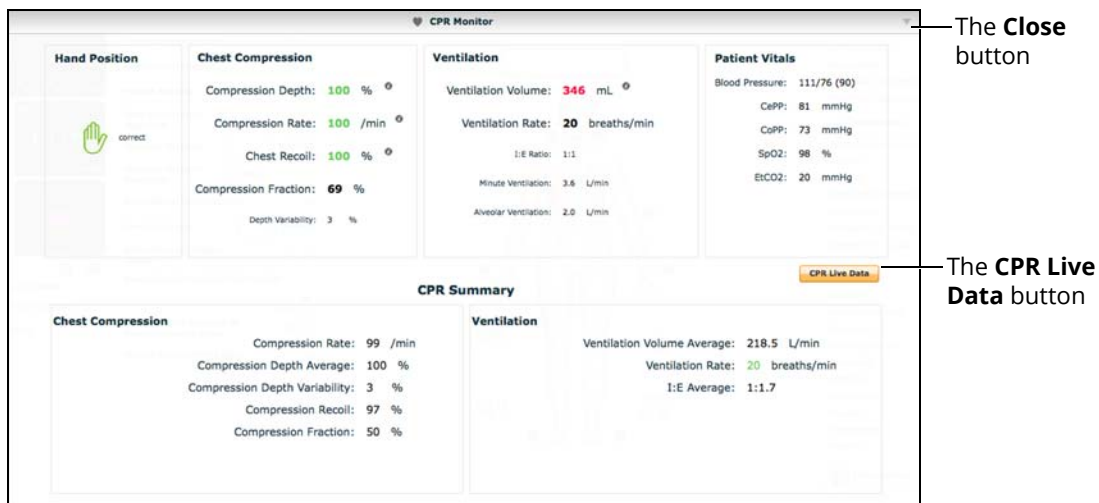
The **Close** button

The **CPR Live Data** button

The CPR Monitor - Summary View

Click the **CPR Live Data** button to return to the live data view.

The CPR Monitor displays several statistics, including current hand position, compression and ventilation rates, compression depth, ventilation volume, and compression-ventilation ratio.

CPR data is recorded in the Event Logs.

To close the CPR Monitor, click the **Close** button.

Using the Event Recorder to Save States

The Event Recorder displays all events that have occurred since the start of the SCE and can be used to save conditions, interventions and parameter changes as states.

To save a state using the Event Recorder:

1. Apply the desired conditions, interventions and parameters
2. Click the **Event Recorder** button at the bottom of the Müse screen

The Event Recorder Button
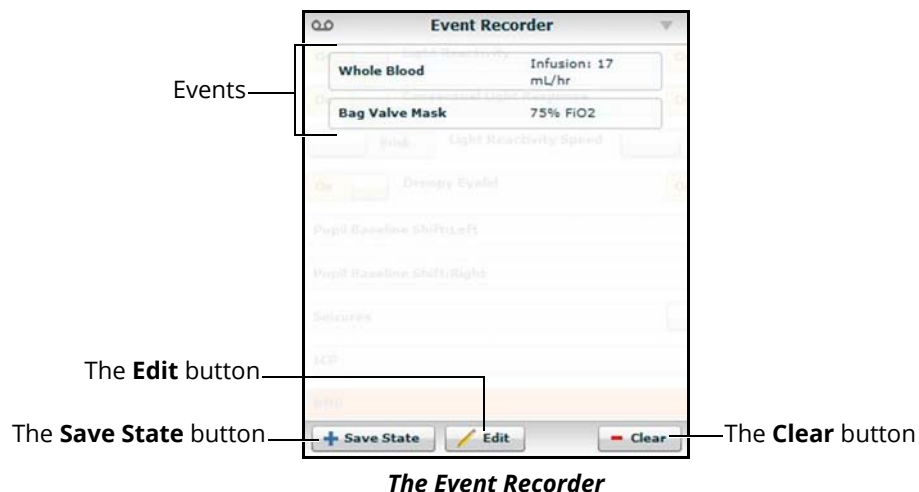
The Event Recorder

WARNING: *The **Clear** button deletes all recorded events. This action cannot be undone.*

3. Review the list of events

   If you wish to remove any events from the state to be saved:

   a. Click **Edit**

A **Delete** button appears next to each recorded event

Events —

Delete buttons

The **Done** button —

The **Save State** button —
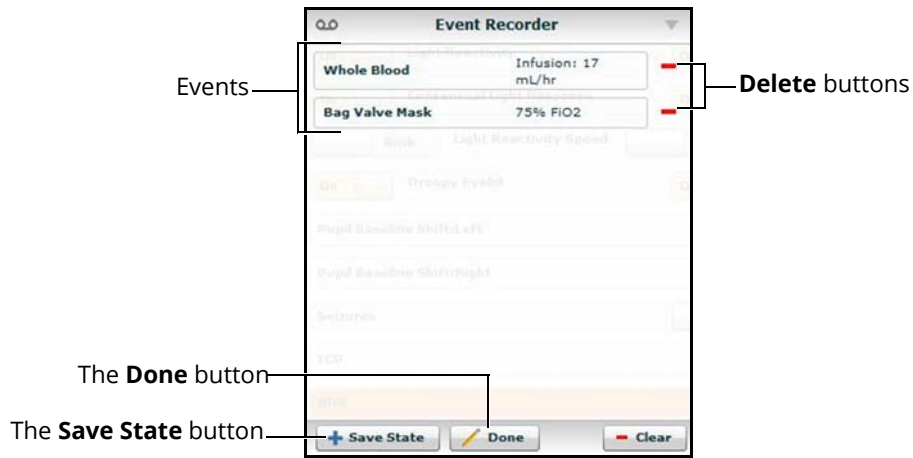
The Event Recorder

b. Click the Delete button next to each event to be removed

c. Click Done

4. Click Save State

The **Save** button
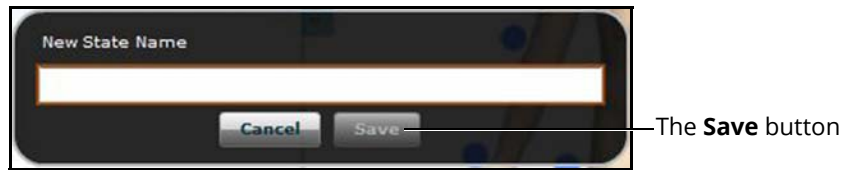
The New State Name Window

5. Enter a state name

6. Click **Save**

Creating a New Patient

When an additional patient with specific physiological characteristics is needed for repeated use, a new patient can be created from the Run screen.

To create a new Patient:

1. From the Home page, run an SCE that has a Patient with the same gender as the Patient to be created
2. Apply the desired conditions and set the necessary parameters
3. Once complete, click the **Patient** button at the bottom of the Run screen

The Patient Button

The **Save** button

The Patient Pop-Up Menu

4. Click **Save**
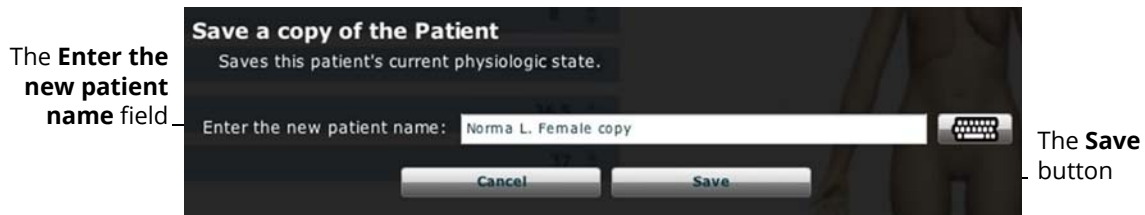
The **Enter the new patient name** field

The **Save** button

The Save a Copy of the Patient Dialog Box

5. Enter a name for the new Patient in the **Enter the new patient name** field
6. Click **Save**

Note: Overwriting a patient will only impact the running SCE, not the base patient library or any other SCE created with the same base patient.
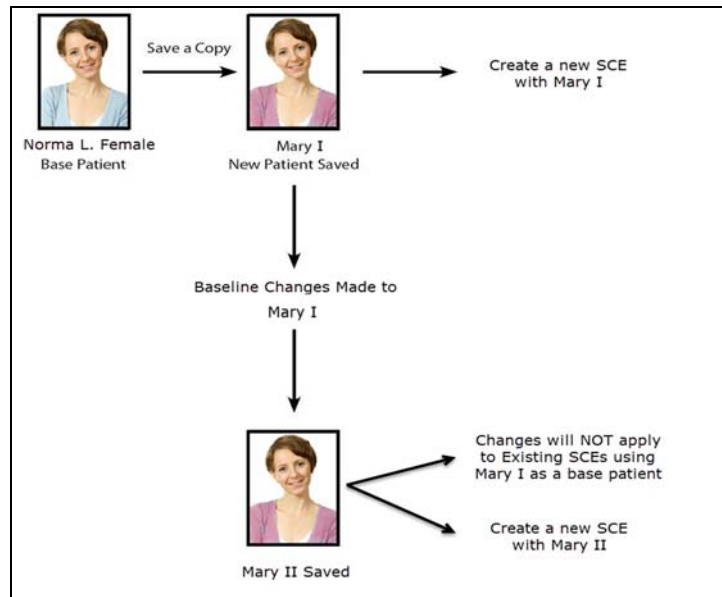
The New Patient Diagram

Resetting a Patient

Resetting a Patient brings the Patient back to its original physiological state before any scenarios were applied or modifications were made. Any running scenarios are paused. However, the SCE time is unaffected. Additionally, the reset appears in the Event Logs.

To reset a patient:

1. While running an SCE, click **Patient** at the bottom of the Run screen

The Patient Button

The **Reset** button

The Patient Pop-Up Menu

2. Click **Reset**
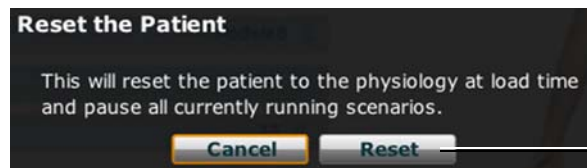
The **Reset** button

The Reset the Patient Dialog Box

3. Click **Reset**

   The patient reset is indicated with a red marker on the SCE timeline bar.

4. To resume any paused scenarios, click the loaded scenario on the left side of the screen

5. From the Scenario Management pop-up menu, select **Play**

The Medication Monitor

The Medication Monitor tracks the infusion of medication administered for medications that affect patient physiology. To activate the Medication Monitor, from the Run screen, click the **Medication Monitor** button in the bottom, right portion of the screen.

The Medication Monitor Button

Medication name

The **Close** button

The **Reset** button

Normalized effector site concentration
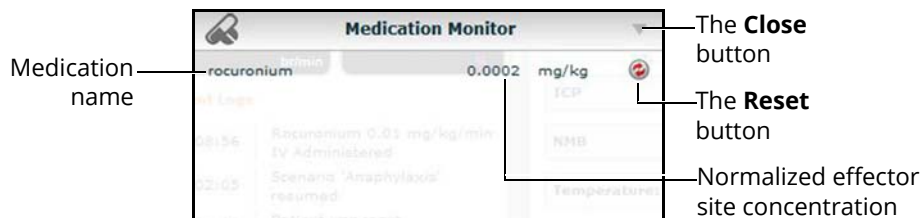
The Medication Monitor

The normalized effector site concentration is shown next to each medication listing.

The **Reset** button is used to clear a medication from the physiological model and the Medication Monitor.

To close the Medication Monitor, click the **Close** button in the upper right corner of the medication Monitor window.

Resetting a Medication

To reset a medication from the Medication Monitor, click the **Reset** button on the Medication Monitor.

The Reset Medication dialog box appears, asking you to confirm that you wish to reset the medication.

The **Reset** button
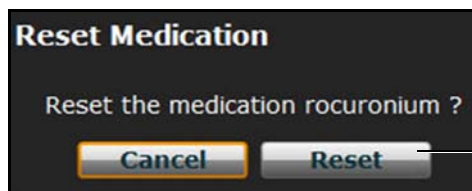
The Reset Medication Dialog Box

The medication is cleared from the model and from the Medication Monitor.

With continuous infusions, the amount infused goes back to zero, but the infusion continues. To stop the infusion, you must select the medication from the medication library and set the infusion rate to zero.

Returning to the Home Page

To exit the SCE and return to the Home page, click the **Return** button in the upper-left of the run screen.

The Return Button

The SCE continues running and the Home page appears.

To return to the SCE from the Home page, click the **Continue** button in the SCE summary panel of the running SCE.

The **Continue** button

The SCE Summary Panel

Stopping the SCE

Running SCEs can be stopped from the Run screen or the Home page.

To stop an SCE from the Run screen:

    1. Click **Stop** in the upper right corner of the screen

The Stop Button
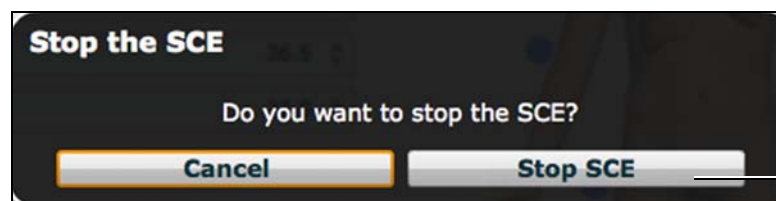
The **Stop SCE** button

The Stop The SCE Dialog Box

    2. Click **Stop SCE**

To stop an SCE from the Home page:

    1. Click the **Stop** button in the bottom left corner of the SCE Summary Panel

The Stop Button
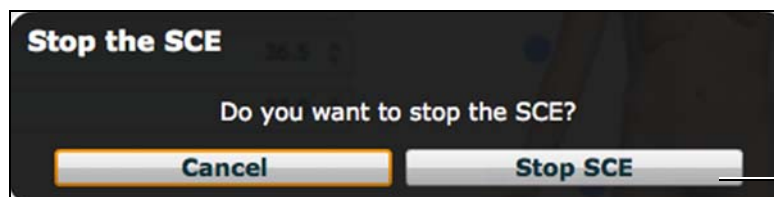
The **Stop SCE** button

The Stop The SCE Dialog Box

    2. Click **Stop SCE**

IMPORTANT: *Always stop all running SCEs before logging out of Müse.*

Developing SCEs

Creating and editing SCEs are similar processes. Once an SCE is created, the steps for modifying the SCE are the same as those for editing a previously-created SCE. The processes of creating and editing SCEs each begin with a unique button on the Home screen.

Use the **New SCE** button to create a new SCE.

The New SCE Button

The minimal requirements for creating a new SCE include selecting a Patient, naming the SCE and saving the SCE. Once the new SCE is created, you can continue with the SCE development or edit it later.

Use the **Review** button to edit an existing SCE.

The Review Button

Creating a New SCE

Creating an SCE requires naming the SCE and selecting a Base Patient.

To create a new SCE:

1. From the Home screen, click **New SCE**

The New SCE Button

The Patients Palette

2. Click a patient to select that patient from the palette a
3. Click **Create**

The SCE Editor

4. Enter the name for the SCE

   Note: *The name of the SCE may NOT exceed 80 characters. Additionally, SCE file names CANNOT contain any special characters, such as (' / \ : * ? < > % | ") .*

5. Click **Save**

   Once the SCE is saved, it is stored and can be edited and reviewed at any time, including creating a Patient Profile and content, determining settings and programming scenarios.

The SCE Editor

The SCE Editor can be used to review preconfigured SCEs and to create or edit custom SCEs.

To access the SCE Editor, click the **Review** button in the SCE Summary Panel or create a new SCE.

The SCE Editor

The buttons in the upper right corner of the SCE Editor provide options for running the SCE, generating a printable PDF, or returning to the Home page.

The **Content Management**, **Patient Management**, **SCE Configuration** and **Preloaded Scenarios** links in the left panel are used to review the SCE content and configuration, and to view scenarios applied to the SCE.

Editing a Patient's Profile

To edit the Patient Profile:

1. From the **Profile** section of the SCE Editor, click **Edit**

The **Edit** button

The SCE Editor Screen

The **Change Picture** button
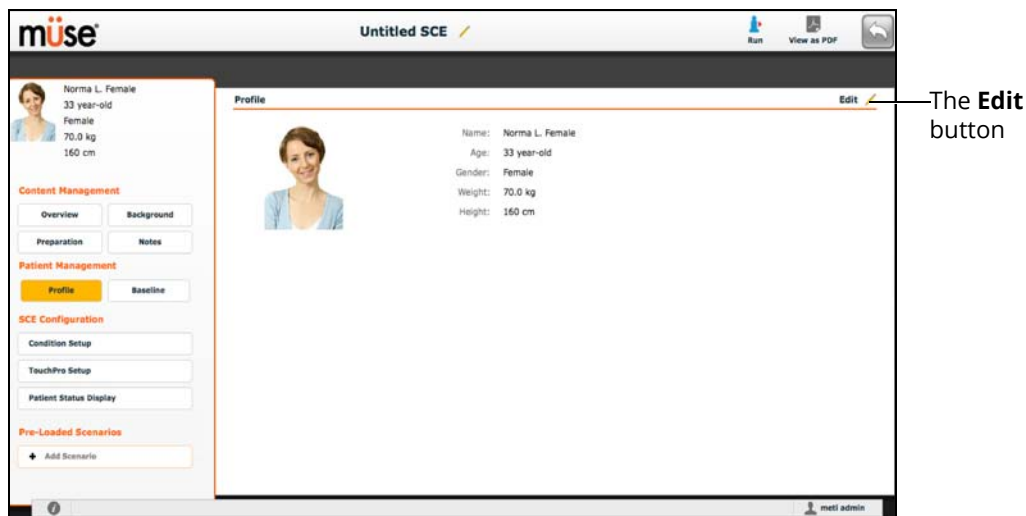
The **Save** button
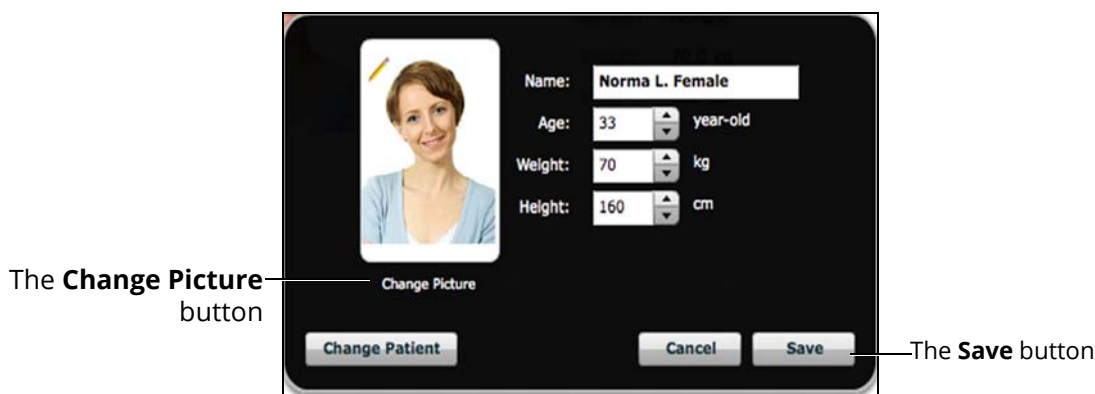
The Profile Editor

2. Set the Patient's name, age, gender and weight by filling in the appropriate fields

3. Click the **Change Picture** button to change the patient's picture (optional)

4. Click **Save**

    IMPORTANT: *No part of the patient's profile can contain any special characters, such as (' / \ : * ? < > % | ").*

Setting a Patient's Baseline

The patient baseline is the patient's initial physiology at the beginning of an SCE. To set the Patient's Baseline:

1. From the SCE Editor, click **Baseline**

The
Baseline
button

The SCE Editor Screen
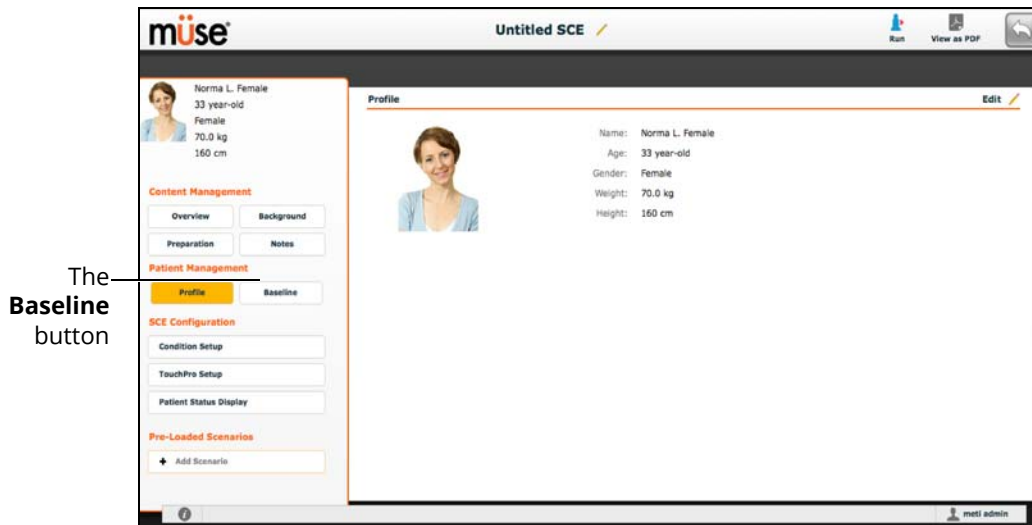
The
Complete
button
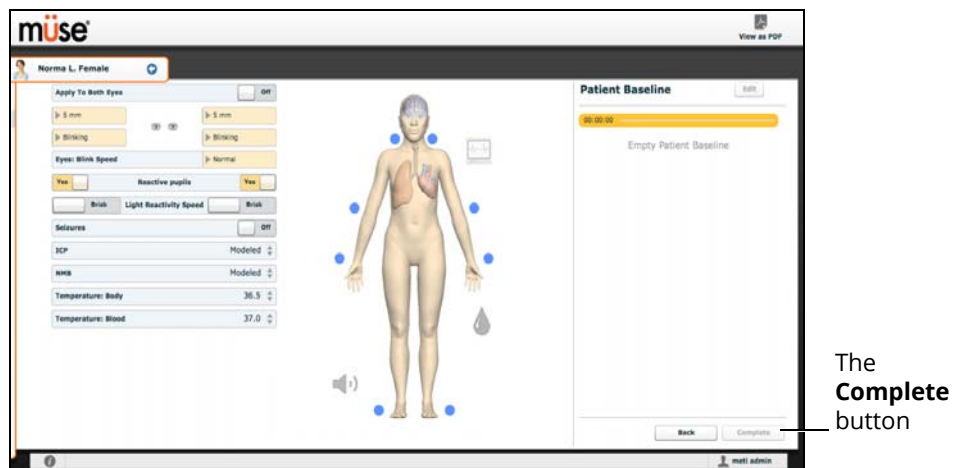
The Patient Baseline Screen

2. Set the Patient's baseline physiology by modifying the desired parameters
3. Click **Complete**

   When the SCE begins, the Patient physiology reflects the selected baseline settings.

Content Management

SCE Content is entered from the SCE Editor using the **Overview**, **Background**, **Preparation** and **Notes** buttons under the **Content Management** heading.
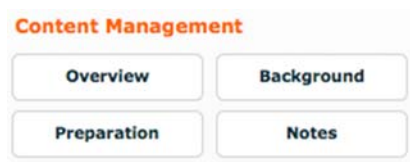
The Content Management Buttons

Each button accesses a screen that allows users to enter information for the chosen section (Overview, Background, Preparation or Notes). Click the **Edit** button of each section on the SCE Editor to access a rich-text editor that enables data entry.

IMPORTANT: *Text can be copied and pasted into the fields from TextEdit or Notepad only.*
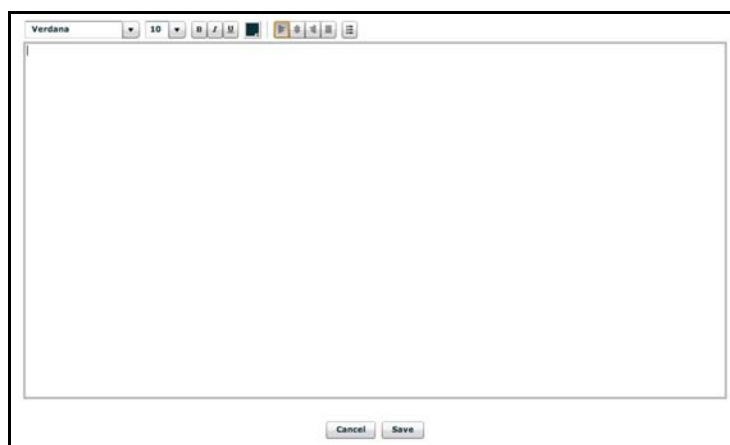
The Rich-Text Editor

Click **Save** when all data for the field has been entered.

SCE Configuration

Setting up the Conditions, the TouchPro software and the Patient Status Display is achieved by clicking the buttons under the **SCE Configuration** heading in the SCE Editor.

The SCE Configuration Buttons

Condition Setup Screen and Creating Quick Links

Click **Condition Setup** to access the Condition Setup screen. From the Condition Setup screen, conditions, medications and interventions can be preconfigured for the SCE creating Quick Links.

On the Condition Setup screen, **Conditions**, **Medications** and **Interventions** buttons are available. To navigate through available conditions and interventions, click the **Conditions, Medications** and **Interventions** buttons.
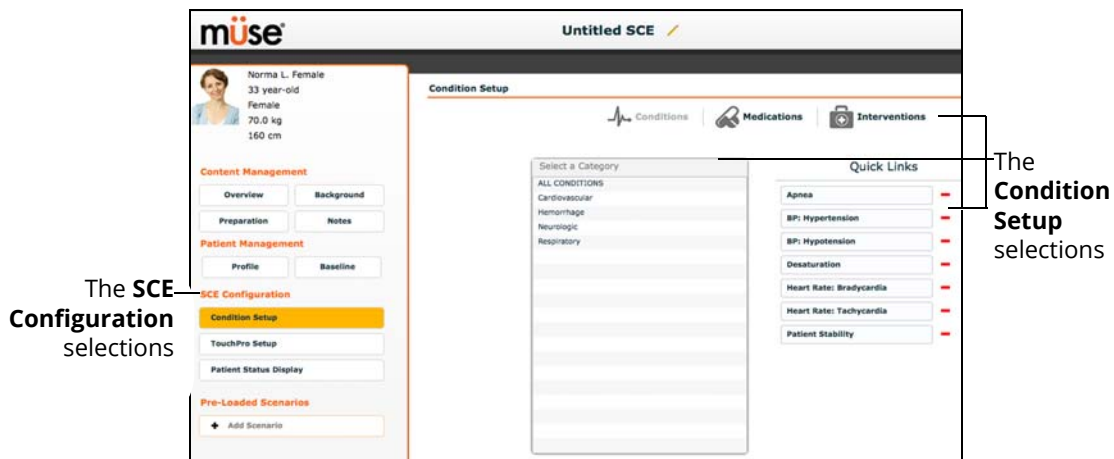
The Conditions Setup Panel

To create a Quick Link, drag and drop the desired choice from the Conditions, Medications or Interventions palette to the list of Quick Links.

Click the minus sign to remove a Quick Link from the SCE.

Modifying the TouchPro Setup

Use the **TouchPro Setup** link to access the TouchPro Setup panel.

From the TouchPro Setup panel, TouchPro layouts can be enabled or disabled for the selected SCE.

When a layout is enabled, it is available to be used in the TouchPro software with the selected SCE. When a layout is disabled, it is unavailable to be used in the TouchPro software with this SCE.

Click an **On/Off** switch next to a layout to enable or disable it.
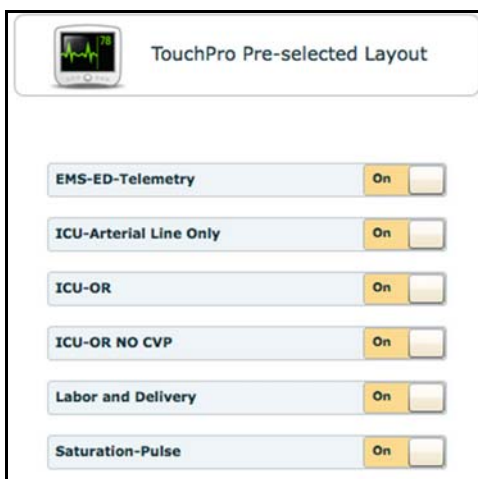
The TouchPro Setup Panel

Patient Status Display

To configure the Patient Status Display displayed on the Run screen, click **Patient Status Display** under the SCE Configuration heading on the SCE Editor.

Patient Status Display spaces

The Available Widgets panel
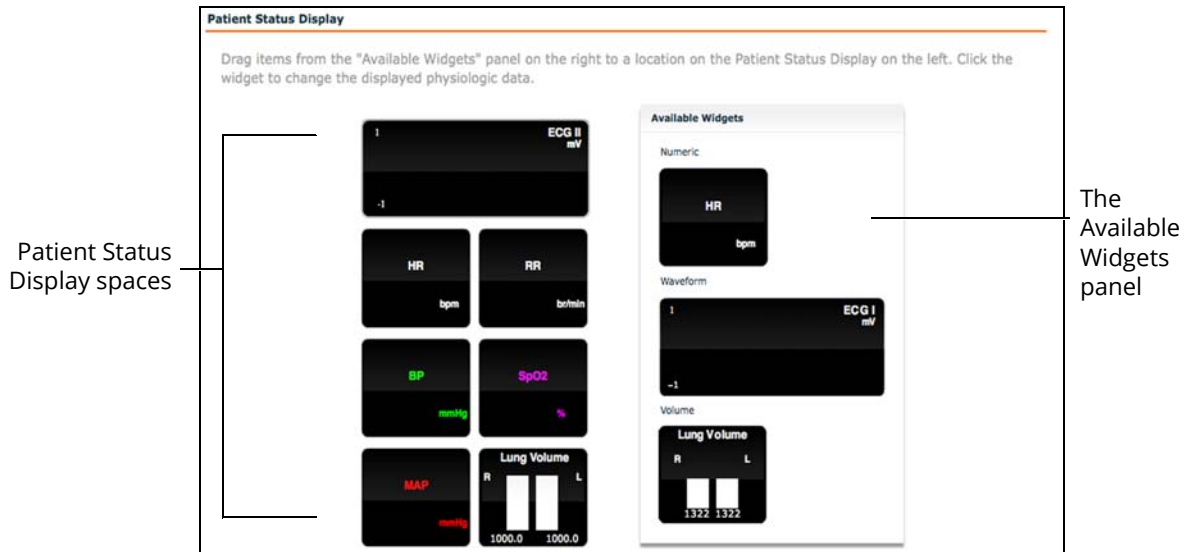
The Patient Status Display Screen

To modify the Patient Status Display, drag and drop the desired waveform, numeric or volume widgets from the Available Widgets panel to an available Patient Status Display space.

Note: Waveforms occupy two spaces.

Once the desired widget is placed, click the widget to change the physiologic parameter displayed.

Adding a Scenario from the SCE Editor

SCEs incorporate scenarios that contain preprogrammed physiology. Scenarios can be added to SCEs to enhance patient physiology. When a scenario is added to an SCE from the SCE Editor, the scenario becomes associated with the SCE and begins automatically when the SCE is run.

To add a scenario to an SCE from the SCE Editor:

1. From the Review screen, click the **Add Scenario** button under the Preloaded Scenarios heading
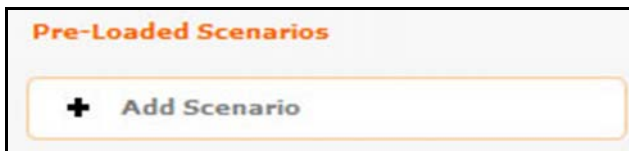
The Add Scenario Button
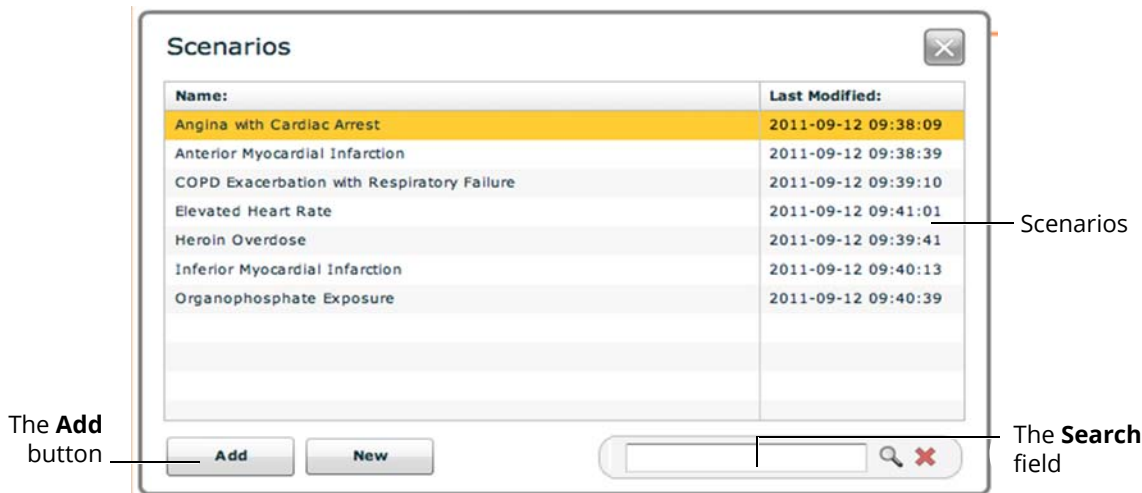
The Choose Scenario Dialog Box

2. Select a saved scenario from the Choose Scenario Dialog Box
3. Click **Add**

Developing Scenarios

The Scenario Designer allows users to create and edit scenarios.

Creating a New Scenario

To create a new scenario:

1. From the SCE Editor, under the Pre-Loaded Scenarios heading, click the **Add Scenario** button

The **Add Scenario** button

The Pre-Loaded Scenarios Heading

The **New** button

The Choose Scenario Dialog Box
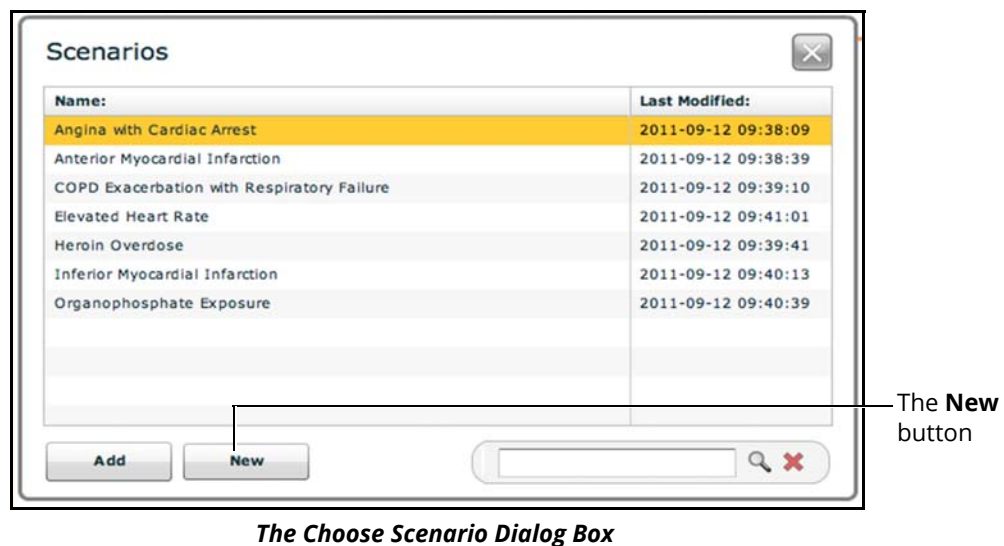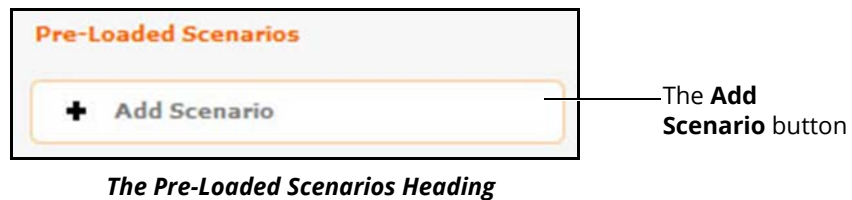
2. Click **New**

From the Scenario Designer, scenario states can be added, modified, and deleted.

The **Scenario** button

The **View** buttons

The **New State** button

Canvas

The Scenario Designer

- The **Scenario** button is used to manage states and save the scenario
- The **View** buttons toggle between Scenario Designer views
- The **New State** button is used to add new states

Once created, states are displayed on the Scenario Designer canvas.

Editing a Scenario

To edit a scenario:

1. From the SCE Editor, under the Pre-Loaded Scenarios heading, click the **Add Scenario** button
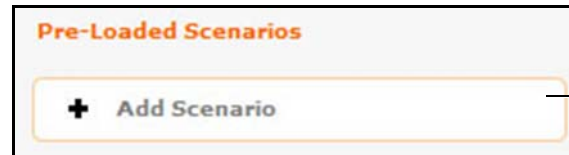
The **Add Scenario** button

The Pre-Loaded Scenarios Heading
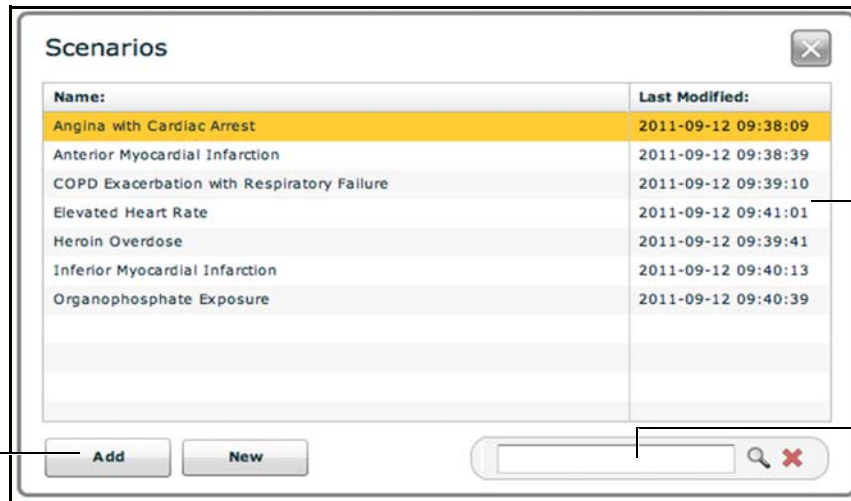
Scenarios

The **Add** button

The **Search** field

The Choose Scenario Dialog Box

2. Select a saved scenario from the Choose Scenario Dialog Box

3. Click **Add**

4. Click the scenario's name under the Pre-Loaded Scenarios heading
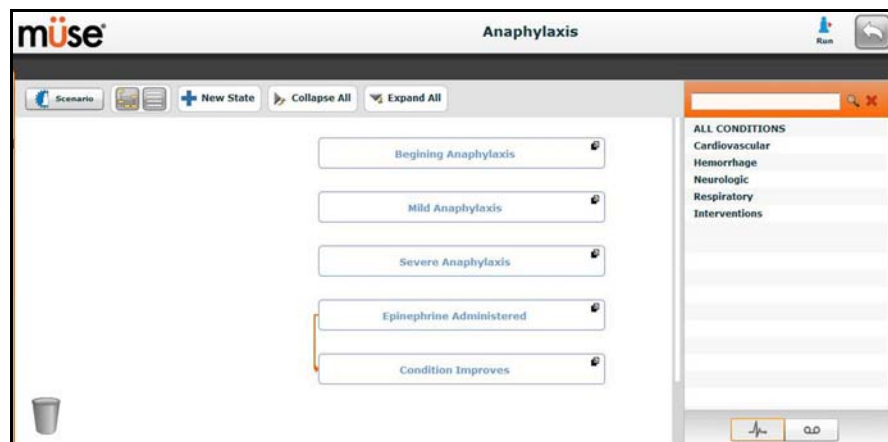
The Scenario Designer

Scenario Designer Views

The Scenario Designer has two views: the Graphical view and the List view. The Graphical view allows users to map out scenario states. The List view places the states and transitions into a linear format.

The
**Graphical
View** button

The **List View** button

The Scenario Designer View Buttons

Click the **Graphical view** button to utilize the Graphical View.

An expanded state

The **Collapse State** button
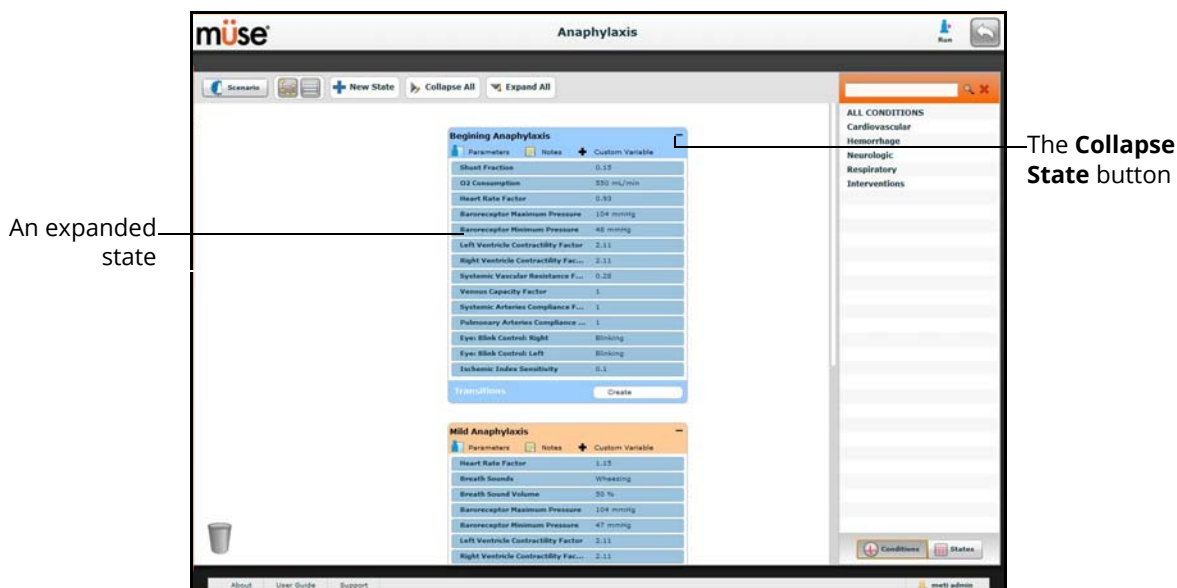
The Graphical View

From the Graphical View, double-click on any state to expand it and view all of its components. Click the **Collapse State** button to collapse an expanded state.

Click the **List view** button to utilize the List view.

The List View

From the List View, click the **Expand/Contract** arrow to the left of any state to expand it to view all of its components. Click the arrow again to collapse the state.
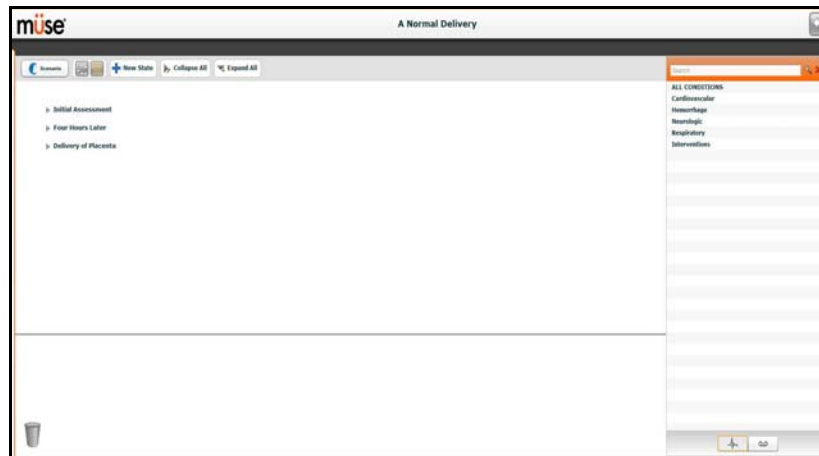
The List View

Adding Scenario States

When beginning to create a new scenario, the canvas is blank. Scenario states can be created by dragging and dropping conditions from their respective menus on the right side of the Scenario Designer to the canvas.

Drag and drop a condition onto the canvas to create a state
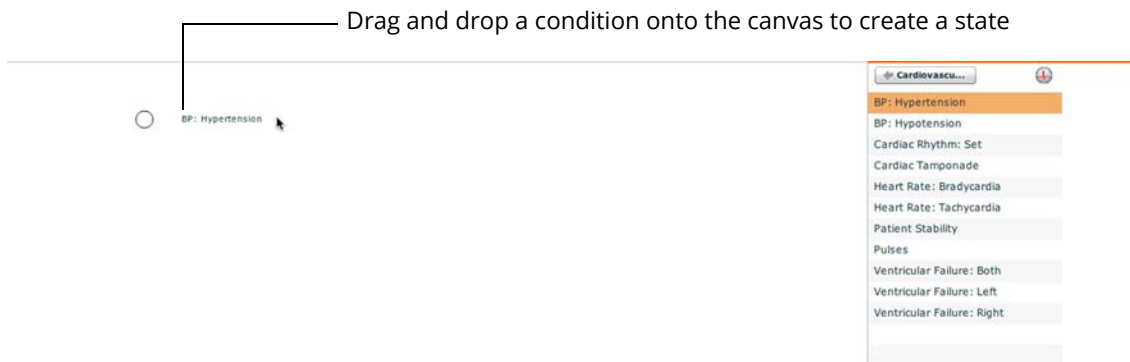
The Scenario Designer Canvas

Or, a new, empty state can be added using the **New State** button.

To add a new state using the **New State** button:

1. Click the **New State** button on the upper left side of the Scenario Designer

The New State Button

A New State

2. From the Graphical View, double-click the new state, or from the Line Item View, click the **Expand/Collapse** arrow to the left of the state to expand it

The state name

The Expanded State

3. Double-click the state name

By default, new states are named "State."

The **State Name** field

The **Save** button
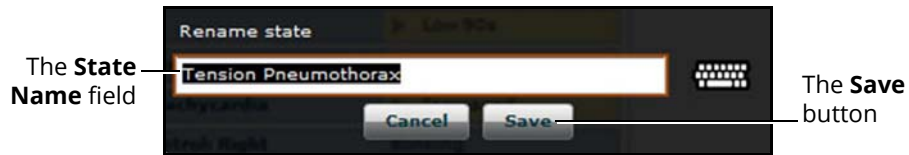
The Rename State Window

4. Enter a new state name

    Note: When naming a Scenario State, the state name may NOT exceed 127 characters Additionally, scenario file and state names CANNOT contain any special characters, such as (' / \ : * ? < > % | ").

5. Click **Save**

Modifying Scenario States

Once a scenario state has been placed on the canvas, it can be modified. Additional parameters, transitions and notes can be added. Each state can contain multiple parameters and transitions. Double-click the state name to rename it.

The **Collapse State** button
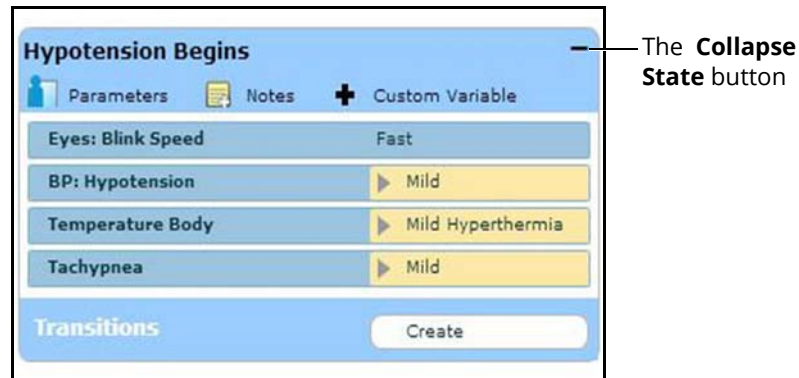
A State

Click the **Collapse State** button to minimize the state.

Double-click the collapsed state to expand it.

TIP: Parameters can also be adjusted by clicking on the parameter within the state.

Adding Conditions, Interventions and Parameters

Conditions can be added to states by dragging and dropping them from the **Conditions** menu to the desired state.

Adding a condition to a state ─────────────

The **Conditions** menu
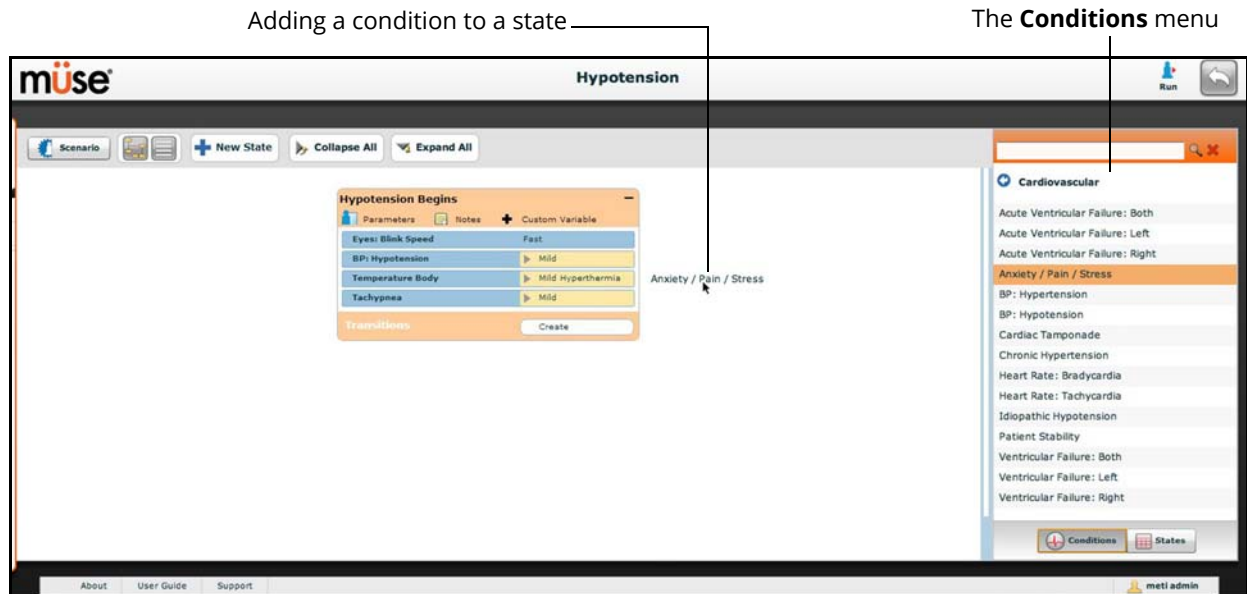
The Scenario Designer

To add parameters to a state, click the **Parameters** button within the state.

The **Parameters** button

A State

The State Parameters panel

The **Complete** button
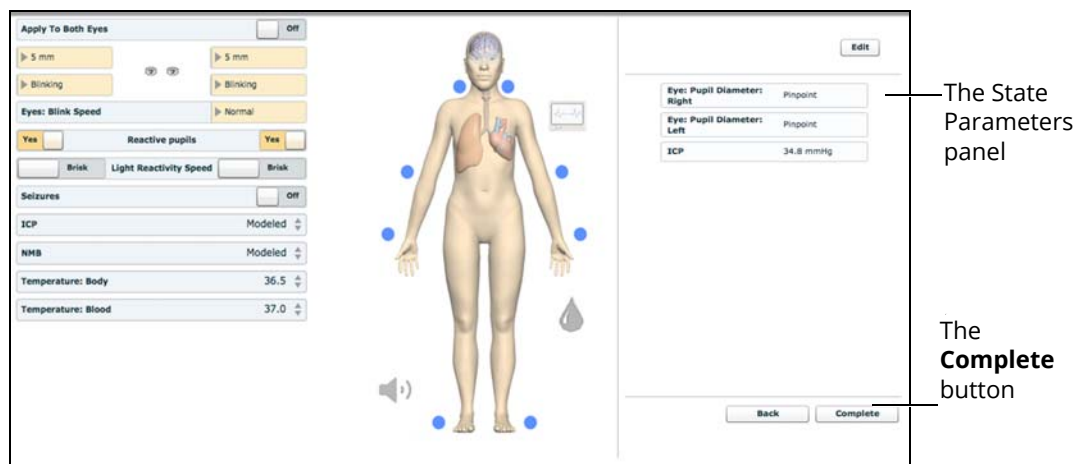
The State Parameters Screen

Click the various organs to change the views, and then select the desired parameter. Once a parameter has been selected, it appears in the State Parameters panel on the right side of the screen.

Add as many parameters as needed. Added parameters appear consecutively within the state. Drag and drop to reorder as needed. Click **Complete** to save and exit the State Parameters screen, or click **Back** to exit without saving.

Note: If the physiology of any of the parameters conflicts, the Müse software reflects the physiology of the last parameter entered.

Adding Transitions

To add a transition, the scenario must have both an original state and a state that results from the transition.

To add a transition:

1. Click the **Create** button in the original state
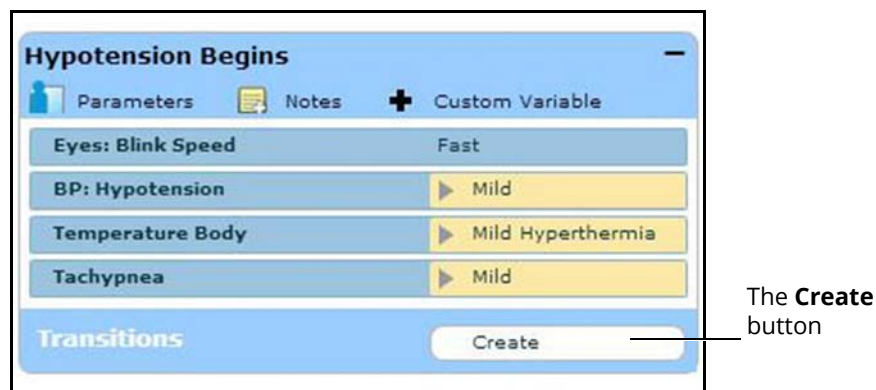
A State
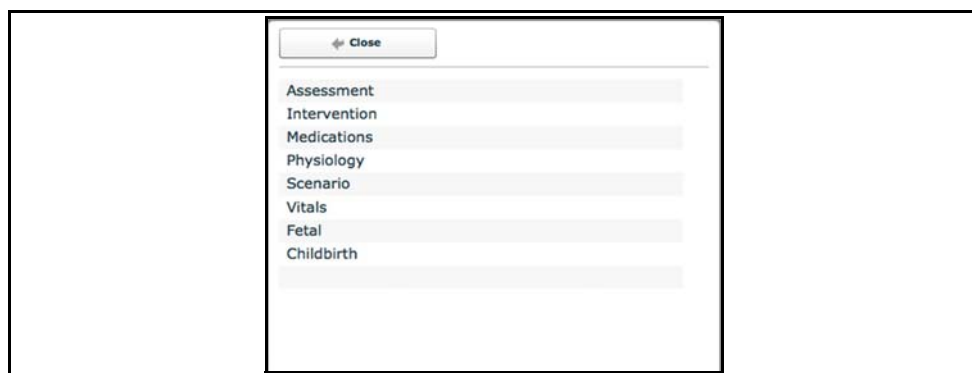
The Transitions Window

2. Select the desired variable type. For example, if a transition based on the administration of medication is desired, select **Medications** and then select the desired medication from the list.

Follow the same steps to make selections from similar menus for the **Assessment**, **Intervention**, **Physiology**, **Scenario, Vitals,** and variable types.

Transition value
Comparison type
The **Accept** button
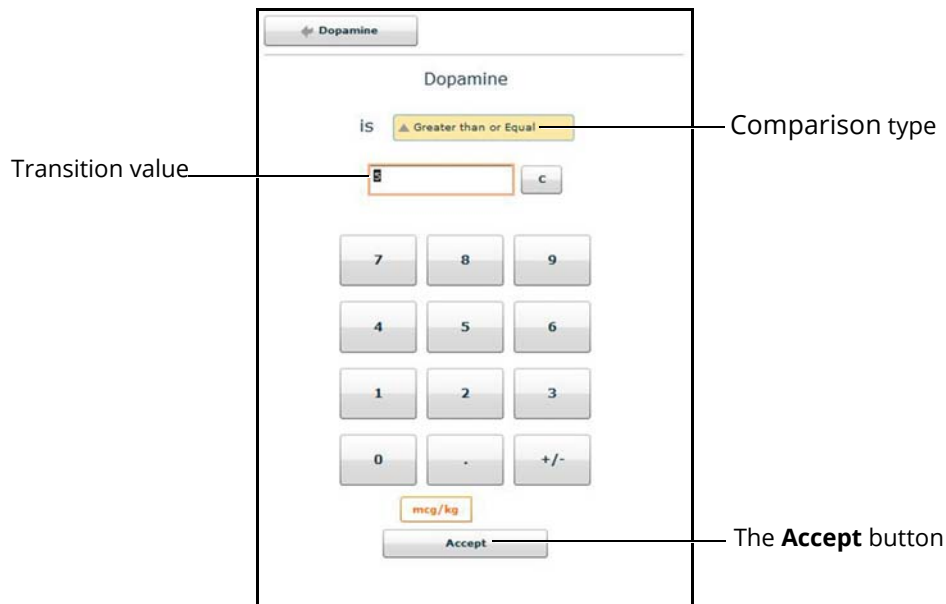
The Medication Transition Window

3. Once the variable values (e.g., comparison type and transition value) have been selected, click **Accept**

    The selected transition variable is listed beneath the original state on the Scenario Designer.

4. From the Scenario Designer, click the **GOTO** arrow beneath the new transition variable

The **GOTO** arrow

The Available States menu
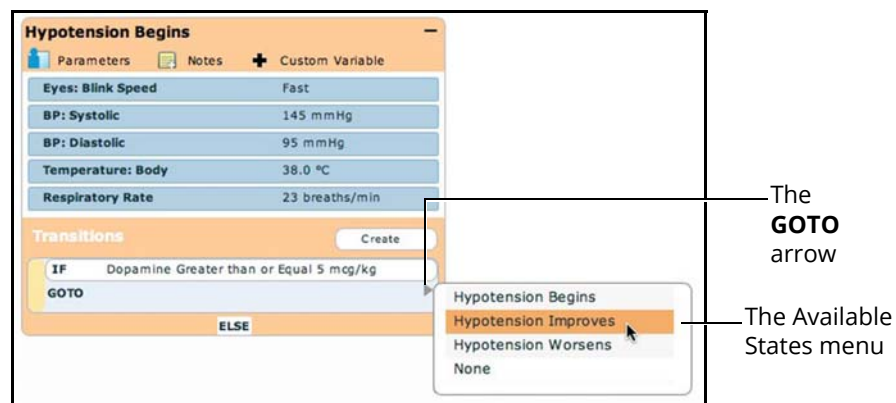
The Scenario Designer

5. Select a state from the menu

An orange connector line appears, indicating that the states are now linked by a transition.
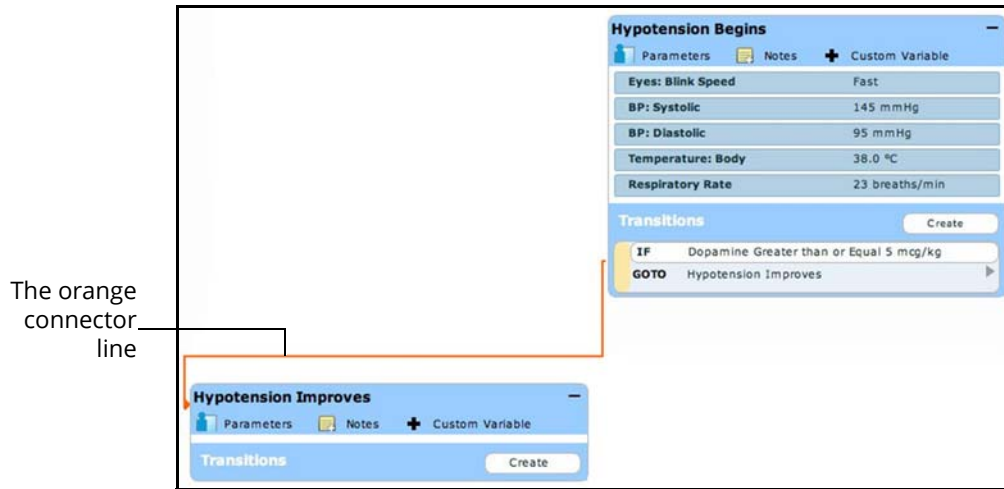
The Scenario Designer

ELSE Transitions

An ELSE transition is used to transition to a state automatically when none of the other programmed transitions occur.

Before specifying an ELSE transition from a state, the state must first contain at least one other transition.

To add an ELSE transition, click **ELSE** in the original state. The ELSE menu appears, listing all the available states.

The **ELSE** button

The ELSE menu
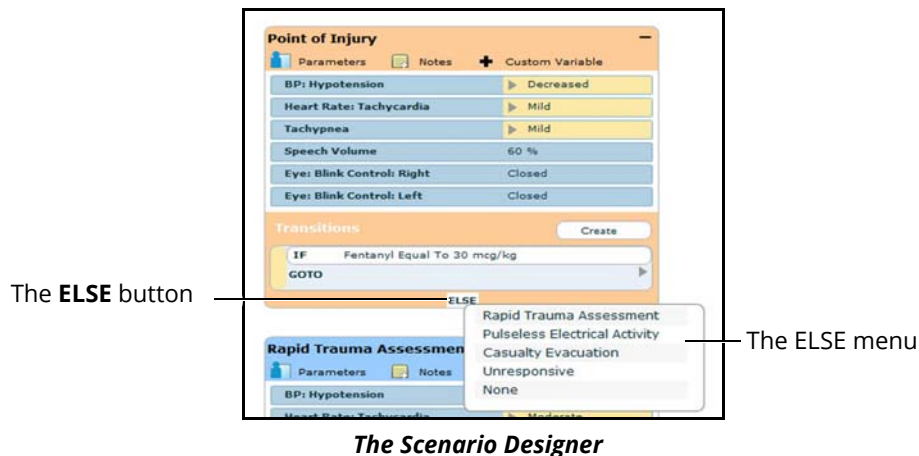
The Scenario Designer

Select the desired state. A black connector line appears, indicating that the states are now linked by an ELSE transition.

Black connector line
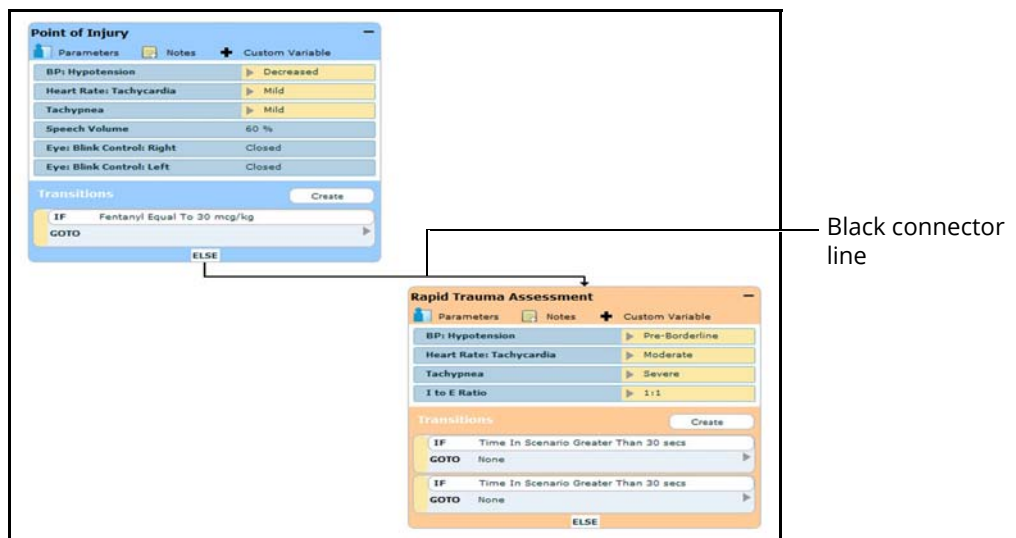
The Scenario Designer

Deleting Scenario States

To delete a state, drag and drop the state into the Trash.

A dragged state
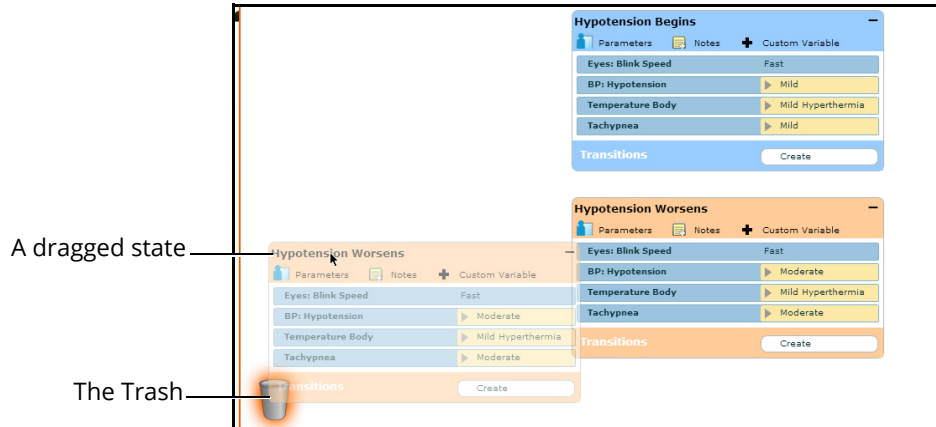
The Trash

The Scenario Designer

States can be dragged and dropped to the Trash from the Graphical view or the Line Item view.

Deleted states remain in the Trash until you log out of the software or the Trash is cleared.

Deleting Parameters and Transitions

To delete a parameter or transition, from an active state, drag and drop the desired parameter or transition into the Trash.

To drag a parameter, click anywhere within the parameter. To drag a transition, click the yellow selection bar to the left of the transition.
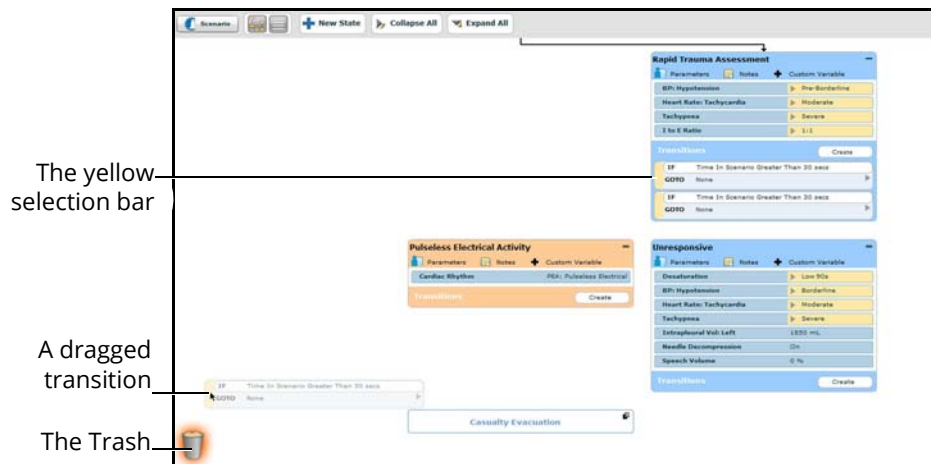
The Scenario Designer

Parameters and transitions can be dragged and dropped to the Trash from the Graphical view or the Line Item view.

Deleted parameters and transitions remain in the Trash until you log out of the software or the Trash is emptied.

Saving the Scenario

At any time during scenario creation or modification, the scenario can be saved.

To save a scenario:

1. Click the **Scenario** button in the upper left of the Scenario Designer

The Scenario Drop-Down Menu

2. To save the most recent version of a modified scenario, click **Save**

   To save a modified scenario as a new scenario, leaving the original scenario intact:

   a. Click **Save As**

The **Enter Scenario name** field ———— The **Save** button

The Save Scenario Dialog Box

   b. Enter the name for the scenario in the **Enter scenario name** field

   c. Click **Save**

Note: When naming a scenario, the scenario name CANNOT exceed 127 characters. Additionally, scenario file names CANNOT contain any special characters, such as (' / \ : * ? < > % ! | ").

Emptying the Trash

To empty the Trash, click the **Trash** icon in the lower left corner of the Scenario Designer.

The **Trash** icon

The Scenario Designer

The **Empty Trash** button
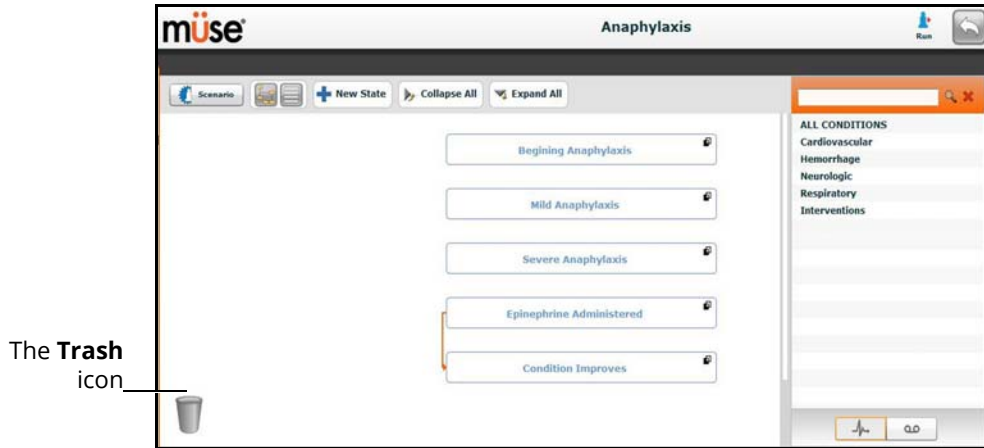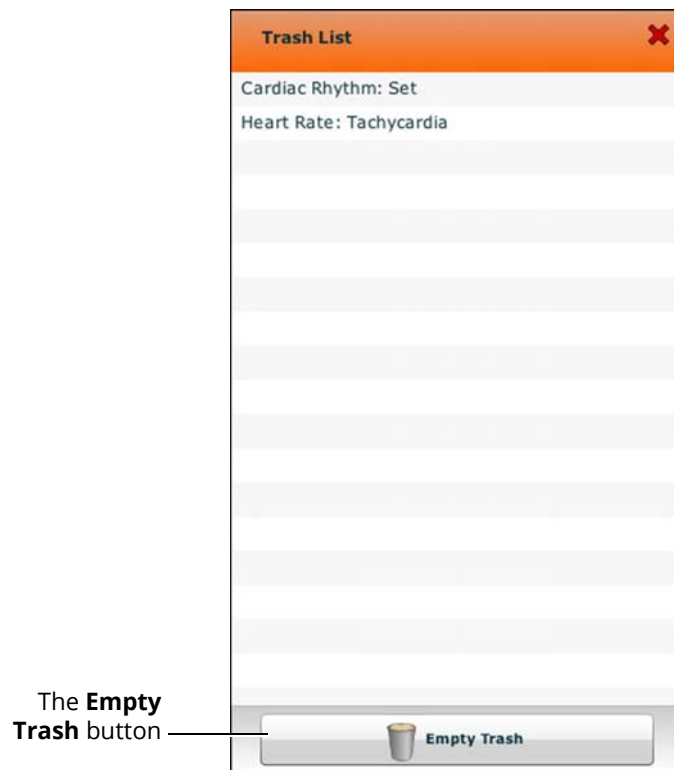
The Trash List

Click **Empty Trash** to empty the Trash. If you do not wish to delete the items listed, they can be dragged back into the scenario, at which time they are removed from the Trash.

Logging out of the software automatically empties the Trash.

IMPORTANT: *Items emptied from the Trash cannot be retrieved.*

Saving States to the State Library

Users can save states to the State Library for later use.

To access the State Library, click the **States** button in the bottom right corner of the Scenario Designer.

The **States** button

The States Button

The State Library

To save a state, drag and drop the state into the States Library.

The States Library

A dragged state
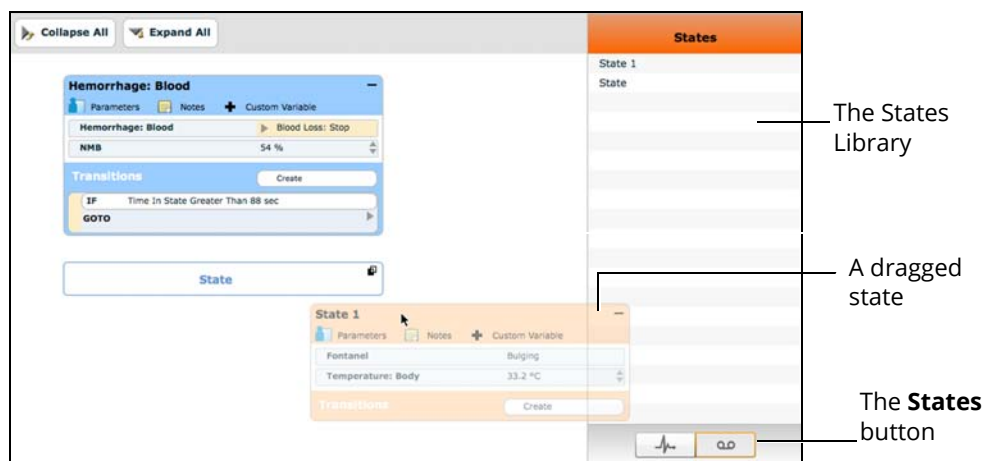
The **States** button

The Scenario Designer

To exit the State Library, click **Conditions**.

The **Conditions** button ————
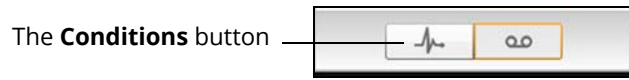
The Conditions Button

ADMINISTRATIVE TOOLS

The Müse software has administrative tools that allow users to manage logs, stored content, users and system settings. The administrative tools are accessed via the Administrative Tools buttons, located on the Home page.

The **History** button ——

The **System Administration** button

The **Account Profile** button

The Administrative Tools Buttons

- Click the **History** button to view and manage simulation session logs
- Click the **System Administration** button to manage stored content, user accounts, groups and system settings
- Click the **Account Profile** button to manage and determine preferences for the active account

History

From the History screen, users can view and export simulation session logs. Each simulation session is listed with the Start Time, the title of the SCE and the Patient's name. In addition, the SCE Events, Physiological Data, CTG data, Traction data, and CPR data are available for review or export.

Start Time	SCE	Patient	SCE Events	Physiological Data	' Clear All Logs
2016-02-04 14:26:56	Increased Intracranial Pressure	Ethan Walker	🔍	🔍	✖
2016-01-28 17:04:32	Healthy Female Infant	Rose Jackson	🔍	🔍	✖

The History Screen

By clicking the **Simulation SCE Events** link of a Simulation Session, users can view the entire log of the simulation and all the events that occurred during the SCE.

When the **Physiological Data** link of a Simulation Session is clicked, users can view all the physiological data that occurred during the SCE.

On the SCE Events, Physiological Data and CPR Data screens, there is an **Export** button that, when clicked, exports the data to a CSV file that can be stored on an external device.

The **Clear All Logs** option will delete all logs associated with the SCE.

On the Simulation Events and Physiological Data screens, there is an **Export** button that, when clicked, exports the data to a CSV file that can be stored on an external device.

System Administration

From the System Administration screen, users can control and access Content Management, User Accounts, Groups, Maintenance and System Settings.

To access the System Administration screen, click the **System Administration** button from the Home page.

The System Administration Button
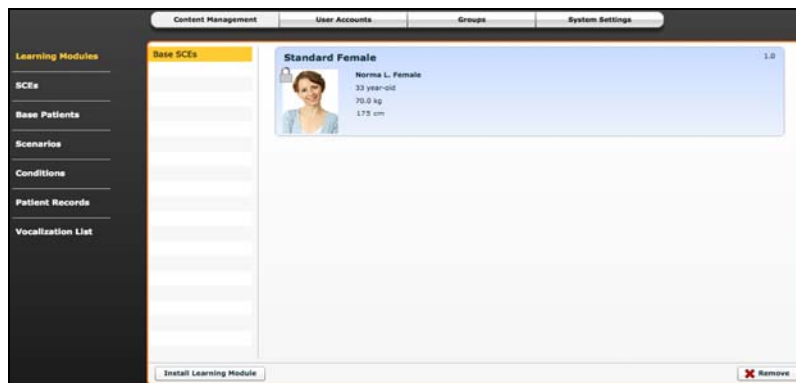
The System Administration Screen

Content Management

To access the Content Management options, from the System Administration screen, click **Content Management**.

From the Content Management options, users can manage learning modules, SCEs, Base Patients, Scenarios, Conditions, Patient Records, and Vocalization List.

The **Content Management** button

The Content Management options
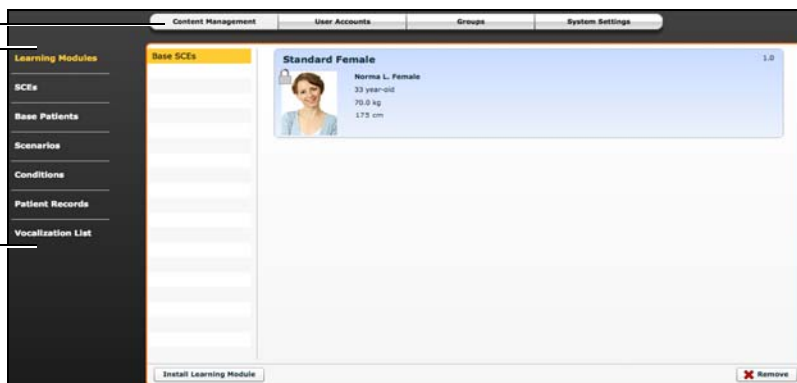
The System Administration Screen

Learning Modules

From the Learning Modules panel, learning modules can be installed or deleted.

When the Content Management button is selected, the Learning Modules panel appears by default. If another panel has been selected, return to the Learning Modules panel by clicking the **Learning Modules** link.

The **Learning Modules** link

The Learning Modules panel

The **Install Learning Module** button

The **Remove** button
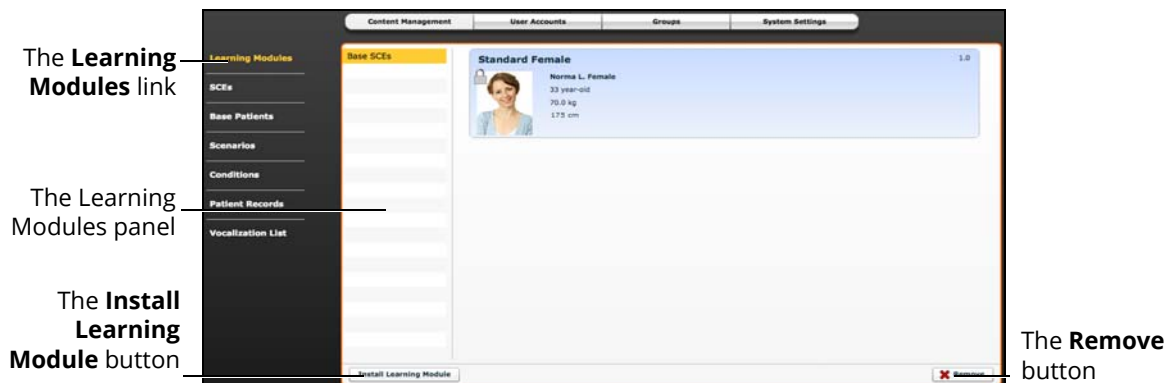
The Learning Modules Panel

To install a learning module:

1. Click **Install Learning Module**

2. Locate the correct learning module file on the external storage device or the hard drive location where the file is saved

   Note: The file extension is *mlm*.

3. Select the file and click **Select** or **Open**

To delete a learning module from Müse:

1. Select a learning module from the Learning Modules panel

2. Click the **Remove** button
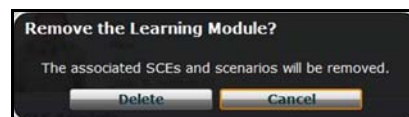
The Remove Learning Module Warning

3. Click **Delete**

   Note: Preconfigured learning modules cannot be deleted. If a user attempts to delete them, a failure message appears.

SCEs

From the Content Management options, click **SCEs** to access the SCEs panel.

The **SCEs** link

The **Import SCEs** button

The SCEs Panel

All user-created SCEs are listed in the SCEs panel.

On the SCEs panel, users can review, copy, delete, import and export the SCEs they have created.

Note: SCEs purchased from CAE CANNOT be exported.

Click **Import SCE** to import an SCE from an external device or the hard drive location where the SCE file is saved. Click **Export** to export an SCE to an external device.

Note: The SCE file extension is *sce*.

Base Patients

From the Content Management options, click **Base Patients** to access the Base Patients panel.

The **Base Patients** link

The **Import Patient** button
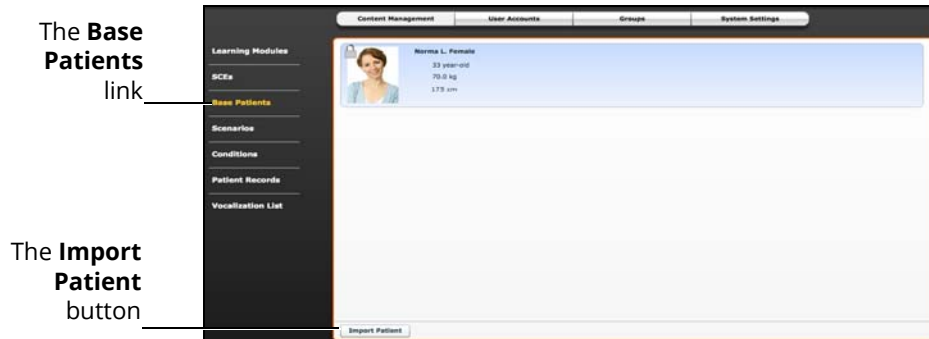
The Base Patients Panel

All Patients are listed in the Base Patients panel.

From the Base Patients panel, users can rename, review, delete and export Patients they have created by clicking the respective buttons next to each Patient.

- Click **Import Patient** to import a Patient file from an external device or the hard drive location where the file is saved

- Use the **Rename** button next to a patient to give the patient a different name or the **Delete** button to delete the patient

- The **Export** button next to each patient can be used to export the Patient file to an external device

Note: The Patient file extension is **pat**.

Note: Preconfigured CAE Base Patients have a lock symbol in the upper-left corner of the picture and CANNOT be renamed, deleted, or exported.

Scenarios

From the Content Management options, click **Scenarios** to access the Scenarios panel.

The Scenarios panel appears.

The **Scenarios** link

The **Import Scenario** button

The **Create New Scenario** button

The Scenarios Panel

All Scenarios are listed in the Scenarios panel.

From the Scenarios panel, users can rename, review, delete, import and export scenarios they have created by clicking the respective buttons within each scenario. Locked scenarios can only be reviewed.

Users can also create new scenarios from the Scenarios screen by clicking the **Create New Scenario** button.

Click **Import** to import a scenario file from an external device or the hard drive location where the file is saved. Click **Export** to export a scenario file to an external device.

Note: The scenario file extension is *mss*.

Note: Locked CAE scenarios CANNOT be exported, deleted, or renamed.

Conditions

From the Content Management options, click **Conditions** to access the Conditions Editor.

The **Conditions** link

The **Rename** button

The **Delete** button

The **Add** button

The **Edit Parameters** button
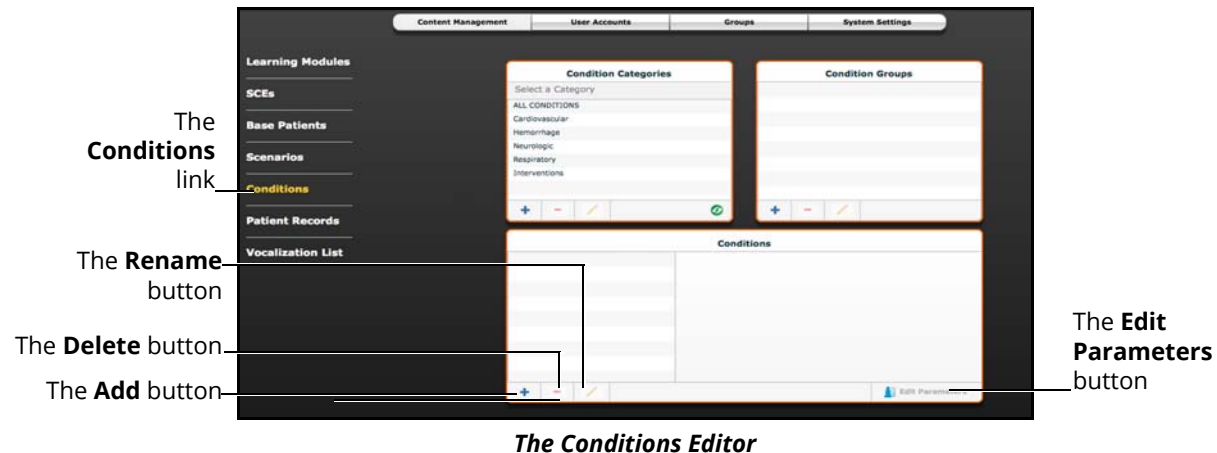
The Conditions Editor

All conditions can be viewed in the Conditions panel by selecting their associated categories and groups from the Condition Categories and Condition groups panels.

From the Conditions Editor, users can create new Conditions to be used in SCEs. To create a new condition:

1. From the Condition Categories panel, select a category
   Note: Conditions CANNOT be added to the **Interventions** category.
2. From the Condition Group panel, select a group
3. In the Conditions panel, click the **Add** button
4. Enter a name for the condition in the New Condition Name dialog box
5. Click **Save**
6. From the Conditions panel, select the new Condition
7. Click the **Edit Parameters** button
8. From the Parameters screen, select the desired Condition parameters
9. Click **Complete**

New condition categories and groups can also be added by clicking the **Add** button in the Condition Categories and Condition Groups panels.

Use the **Delete** and **Rename** buttons in each panel to delete or rename a Condition, group or category.

Note: CAE conditions, groups and categories cannot be deleted or renamed.

Patient Records

Patient records can be uploaded to Müse for display in the TouchPro software. Once uploaded, a patient record is available for use with any SCE.

Patient Records are managed from the Patient Records panel on the **Content Management** tab of the System Administration screen.

The Patient Records Panel
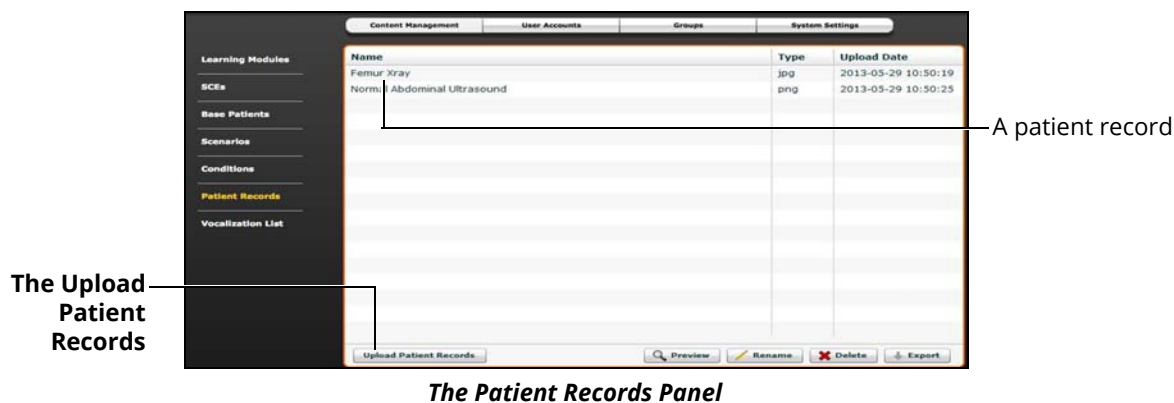
The following patient record file types can be uploaded to Müse:

- JPG or JPEG images
- GIF images
- PNG images
- XPS images
- PDF documents
- MPEG videos
- MOV videos
- MP3 audio files

A single patient record file cannot exceed 20MB.

To upload a patient record:

1. From Patient Records panel, click **Upload Patient Records**

   A file selection window appears.

2. Select the desired file and click **Open** or **OK**

   The file is uploaded and is available to display in the TouchPro software.

Müse can store at least 2GB of patient record files, depending on the disk space available. To ensure adequate space, please delete patient records when they are no longer needed.

To delete a patient record:

1. From the Patient Records panel, select the patient record to delete
2. Click **Delete**

    The patient record is deleted and is no longer available to display in the TouchPro software.

Individual patient records can also be previewed, renamed or exported by selecting the record and clicking **Rename**, **Export** or **Preview**.

Vocalization List

The manikin has the ability to voice custom sounds. Custom sounds are managed from the Vocalization List panel on the **Content Management** tab of the System Administration screen.
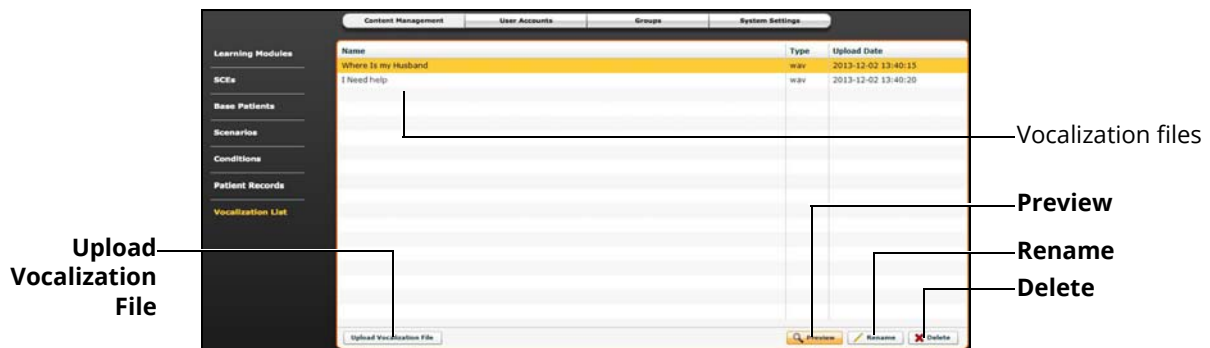
The Vocalization List Panel

The following vocalization file types can be uploaded to Müse:

- WAV

A single vocalization file cannot exceed 1MB.

To upload a vocalization file:

1. From Vocalization List panel, click **Upload Vocalization File**
2. Select the desired file and click **Open** or **OK**

Müse can store at least 2GB of patient record and vocalization files, depending on the disk space available. To ensure adequate space, please delete files when they are no longer needed.

To delete a vocalization file:

1. From the Vocalization List panel, select the vocalization to delete
2. Click **Delete**

Individual vocalization files can also be previewed or renamed by selecting the vocalization and clicking **Rename** or **Preview**.

User Accounts

To access the User Accounts panel, from the System Administration screen, click the **User Accounts** button. The User Accounts panel appears.

From the User Accounts panel, users can create, edit and delete users.

The **User Accounts** button

The user list

The **Delete** button

The user fields

The **Edit** button

The **New** button

The User Accounts Panel
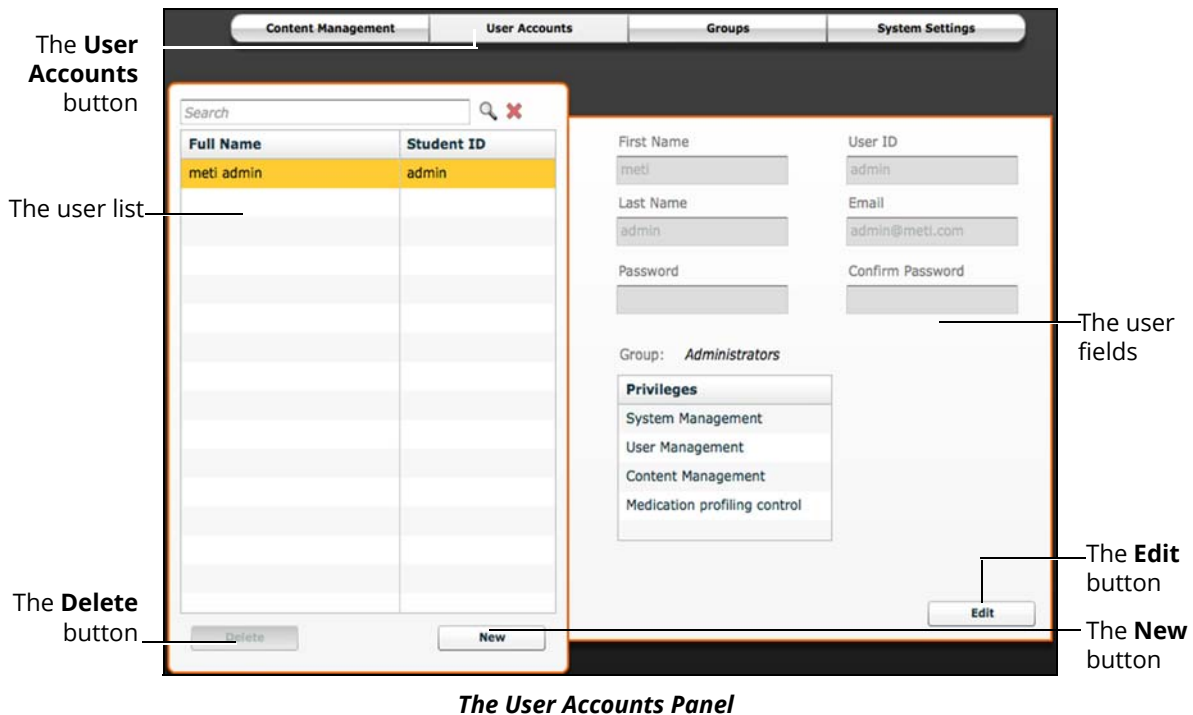
Note: User Accounts functions are available only to users with the User Management or System Management privilege.

Creating a User

To create a new user:

1. From the User Accounts panel, click **New**
2. In the New Account Creation panel, enter the user's personal data and choose a password
3. Assign the user to a group by selecting a group from the **Group** menu

   Note: A user can only be assigned to one group.
4. Click **Create**

Editing a User

To edit a user's information or privileges:

1. On the User Accounts panel, select the user to edit
2. Click **Edit**
3. Make the desired changes
4. Click **Save**

Deleting a User

To permanently delete a user, from the User Accounts panel, select a user and click **Delete**. When the User Deletion Warning box appears, click **Yes**.

The user account and the data associated with it are deleted. However, the administrative user deleting the account becomes the owner of any SCEs, scenarios or patients created by the user being deleted (i.e., the SCEs, scenarios and patients created by the deleted user are moved to the deleting user's account).

Groups

Users are assigned to groups to define access privileges. To access the Groups panel, from the System Administration screen, click **Groups**.

The Groups panel appears.
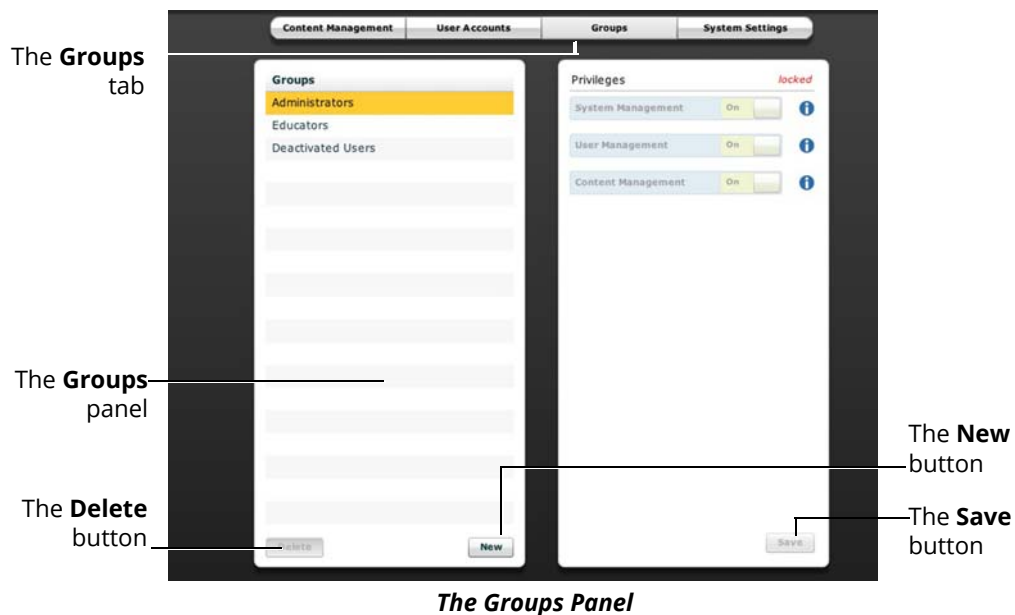
The Groups Panel

Note: Groups functions are available only to users with the User Management or System Management privilege.

From the Groups panel, users can create new groups, delete groups and assign privileges to groups.

In the Groups panel, three groups appear by default:

- Administrators
- Educators
- Deactivated Users

Each default group has privileges assigned.

Privilege System

The Müse software has three different privileges:

- System Management
- User Management
- Content Management

User Management and Content Management can be assigned independently or combined. The System Management privilege contains all privileges.

System Management

Users with the System Management privilege have access to all features of the Müse software, including the benefits of the User Management and Content Management privileges, listed below. Users with the System Management privilege can also view system settings, backup and restore data and apply software updates.

User Management

Users with the User Management privilege can manage all users and groups.

Content Management

Users with the Content Management privilege can create and manage all SCEs.

Creating a new Group

To create a new Group:

1. From the Groups panel, click **New**
2. Enter the name of the Group in the **Group Name** field
3. Click **Create Group**

   The group appears in the Groups panel. Privileges can now be selected.
4. Select the privilege(s) to be assigned to the Group
5. Click **Save**

Deleting a Group

Groups can be deleted when they are no longer needed. Once a Group is deleted, all users who were affiliated with the Group are moved to the Deactivated Users Group.

To permanently delete a Group, select the group to be deleted from the Groups panel and click **Delete**. When the Group Deletion warning box appears, click **Yes**.

Providing Access to Content Only

To provide users with the ability to create and manage SCEs, but NOT the ability to manage users or groups:

1. Create a new group called Content Only

2. Assign the group the Content Management privilege. Do NOT assign any other privileges to the group

3. On the **User Accounts** tab, create or edit the desired users, placing each user in the Content Only group

System Settings

From the System Settings panel, users can manage the System Configuration, Data Management, System Updates, Product Licensing, Language, Units, Updates, Simulator Usage Log, Error Log, CPR, and Performance Metrics of the Müse software.

To access the System Settings panel, from the System Administration screen, click **System** The System Settings panel appears.
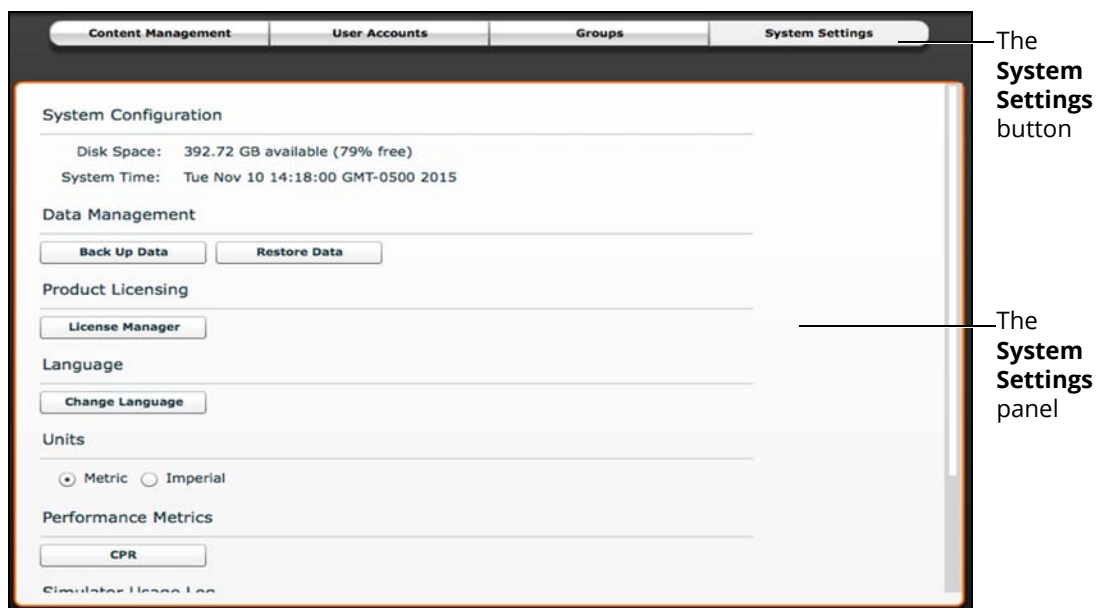
The System Settings Panel

TIP: *Height and weight can be set to display in Metric or Imperial units.*
Note: System Settings functions are available only to users with the System Management privilege.

System Configuration

Under System Configuration, Disk Space and System Time are displayed.

Data Management

The Data Management feature allows users to back up data to an external device. Users can also restore the backup data.

Backing Up Data

Users should back up data frequently to protect and store content and user data.

To back up data:

1. On the System Settings panel, click the **Back Up Data** button

The Back Up Data Button

2. Select a location to save the backed-up data
3. Click **Save**

IMPORTANT: *Always back up important content and data. A weekly backup should be done to protect content and user information.*

Restoring Data

IMPORTANT: *Restoring data ERASES all current data and replaces it with the backed-up data.*

Users can restore data when the backed-up data needs to be replaced on the software. Restoring data only restores the last backup and does NOT merge the backup data with the current data.

To restore backup data:

1. On the System Settings panel, click **Restore Data**

The Restore Data Button
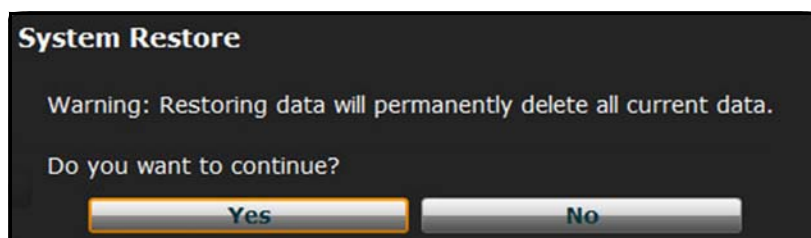
The System Restore Warning Box

IMPORTANT: *Restoring data ERASES all current data and replaces it with the backed-up data.*

2. Click **Yes**
3. Locate the appropriate .bak backup file to restore
4. Click Select

  Note: The computer may require a restart.

Product Licensing

To view product licensing information for your simulator or to enter a license key to activate your software, click **License Manager**.

Language

To change the language of the Müse software:

1. From the System Settings panel, under the Localization heading, Click **Change Language**
2. Select a language from the dialog box
3. Click **Accept**

Note: Only the English version of the User Guide is available via the software, regardless of the Müse language selection.

Units

Select **Metric** or **Imperial**.

Performance Metrics

Acceptable limits for fetal traction and key CPR parameters can be set from the System Settings panel.

To set the maximum acceptable fetal traction:

1. From the System Settings panel, under the Performance Metrics heading, Click **Fetal Traction**
2. From the dialog box, enter a threshold value
3. Click **OK**

To set CPR thresholds:

1. From the System Settings panel, under the Performance Metrics heading, click **CPR**

The CPR Settings Window

2. Adjust the settings as desired

3. Click **OK**

Simulator Usage Log

To keep a local record of simulator usage data, click **Opt In for Usage Logging**.

Error Log

The Error Log is available for technicians and is used when diagnosing the Müse software.

   IMPORTANT: *Do not clear the Error Log.*

Account Profile

From the Account Profile screen, users can view, update and reset personal profile information. Users can also view and add favorite SCEs from this screen.

Click the **Account Profile** button to access the Account Profile features.

The Account Profile Button
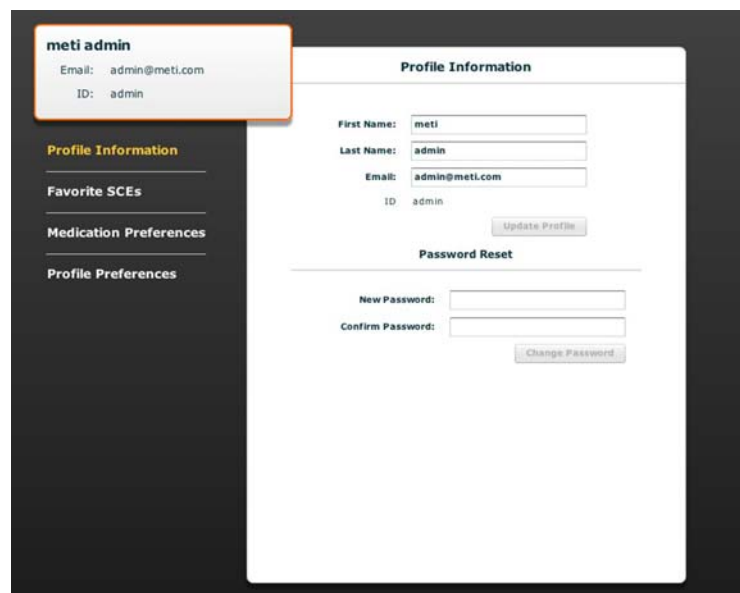
The Account Profile Screen

Profile Information

From the Account Profile screen, the Profile Information panel appears by default. If another panel has been selected, click **Profile Information** to return to the Profile Information panel.

From the Profile Information panel, users can change their profile information and reset their passwords.

The **Profile Information** link

The Profile Information panel
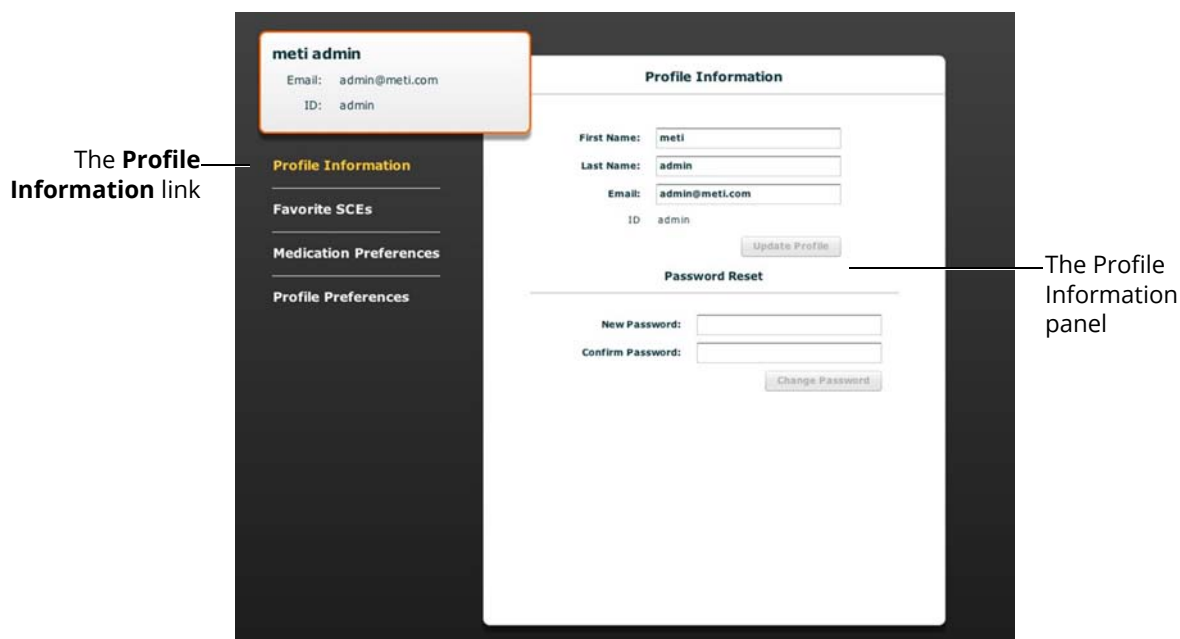
The Account Profile Screen

To change profile information, enter the new information in the appropriate fields and click **Update Profile** when finished.

To reset a password, enter the new password in the **New Password** field and re-enter the new password in the **Confirm Password** field. Click **Change Password** when finished.

IMPORTANT: *If you change your username or password, you MUST use the new username and/or password upon your next login. You cannot access the system with the old username or password once it has been changed.*

Favorite SCEs

To access the Favorite SCEs panel, click **Favorite SCEs** from the Account Profile screen. All of the logged-in user's favorite SCEs appear in the Favorite SCEs panel.

The **Favorite SCEs** link

The Favorite SCEs panel

The **Add Favorites** button
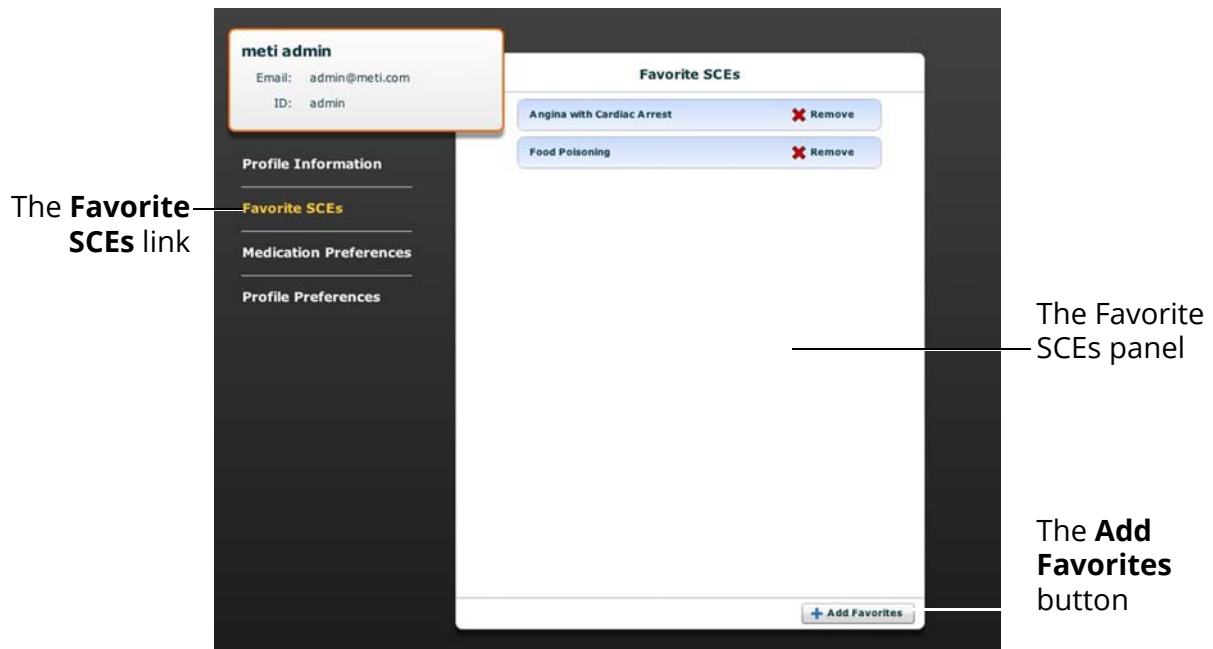
The Account Profile Screen

To add SCEs to the Favorite SCEs panel, click **Add Favorites**. The SCE Library appears. Select the desired SCE and it automatically appears in the Favorite SCEs panel.

To remove a SCE from the Favorite SCEs panel, click the **Remove** button next to the name of the SCE.

Medication Preferences

From the Medication Preferences panel, users can import customized medication response files created in the Pharmacology Editor software.

To access Medication Preferences, click **Medication Preferences** on the Account Profile screen.

The Medication Preferences panel appears.
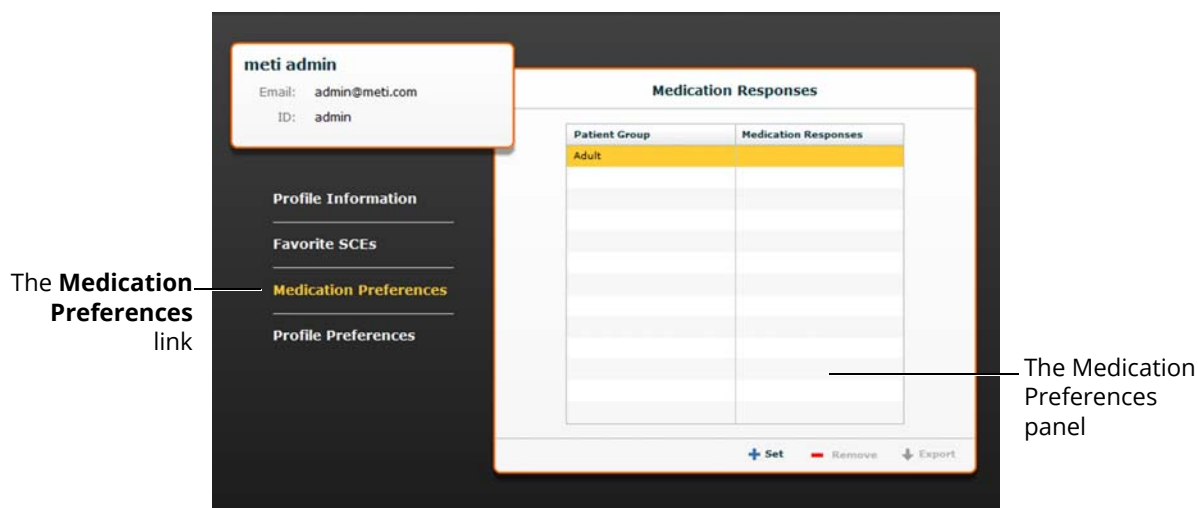
The Account Profile Screen

To import medication response files, click the **Set** button. The **Select File** dialog box appears. Select the medication response file to be added and click **Open** or **OK**.

Medication response files can also be removed or exported.

Profile Preferences

From the Profile Preferences panel, users can change the font size used in the software.

To access Profile Preferences, click **Profile Preferences** on the Account Profile screen.
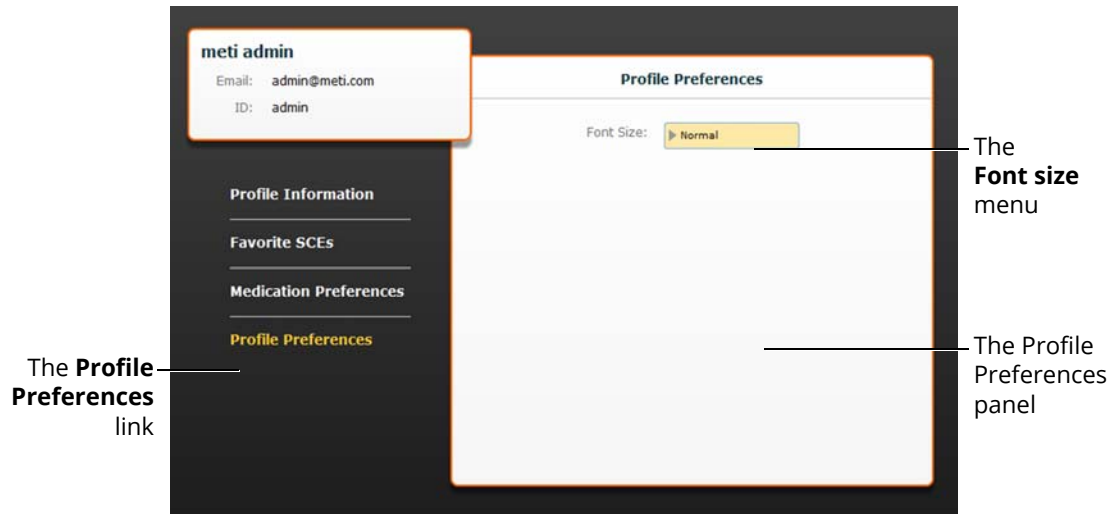
The Account Profile Screen

To change the font size, click on the **Font size** selection. From the **Font size** drop-down menu, select **Normal**, **Small** or **Large**.

USING THE TOUCHPRO PATIENT MONITOR

In this section, you will learn how to use the TouchPro software, which enables users to view the patient's physiology, expressed in waveforms and numeric values.

The TouchPro Patient Monitor software enables users to view patient physiology.

The software can be used from the Instructor Workstation or on another computer provided the computer has joined the simulator's wireless network.

IMPORTANT: *Only two TouchPro software screens can be open at a time.*

Scan or click the QR code to access the Using TouchPro video tutorial on caehealthcare.com.

Accessing the TouchPro Patient Monitor Software

Like the Müse software, the TouchPro Patient Monitor software is compatible with computers that have touch-screen capabilities.

To run the TouchPro Patient Monitor software, the Instructor Workstation must be connected to the simulator's network.

IMPORTANT: *An SCE must be running on the Müse software for any physiological data to be displayed on the TouchPro Patient Monitor software. The TouchPro Patient Monitor software can only show one Patient at a time.*

To launch TouchPro Patient Monitor from the Instructor Workstation:

1. With the Müse software running, open a new tab in the web browser and go to the **Home** page of the web browser

The **TouchPro** icon

The Müse Start Screen

2. Select the **TouchPro Patient Monitor** icon

The TouchPro Display

Note: The capnogram waveform is not displayed on the TouchPro Patient Monitor software from the Instructor Workstation. Capnogram information can be found on the clinical patient monitor if one is connected to the simulator.

Modifying the TouchPro Patient Monitor Display

The layout of the waveforms and numeric data shown on the software can be customized. The software can show up to six waveforms plus an additional four numeric readouts.

Selecting a Preconfigured Layout

There are five preconfigured CAE Layouts:

- **ICU-Arterial Line Only** - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, Pleth, and a numeric readout for Body Temperature
- **EMS-ED-Telemetry** - preconfigured with a waveform and numeric readout for ECG Lead II and numeric readouts for SpO_2, and NIBP (noninvasive blood pressure)
- **ICU-OR No CVP** - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, PAP and Pleth, and numeric readouts for NIBP, Blood Temperature, and Body Temperature
- **ICU-OR** - preconfigured with waveform and numeric readouts for ECG Lead II, ECG Lead V, ABP, PAP, CVP and Pleth, and numeric readouts for NIBP, Blood Temperature, and Body Temperature
- **Saturation-Pulse** - preconfigured with numeric readouts for SpO_2 and pulse

To select a preconfigured layout:

1. Click the **Settings** button in the bottom right corner of the display

The Settings Button
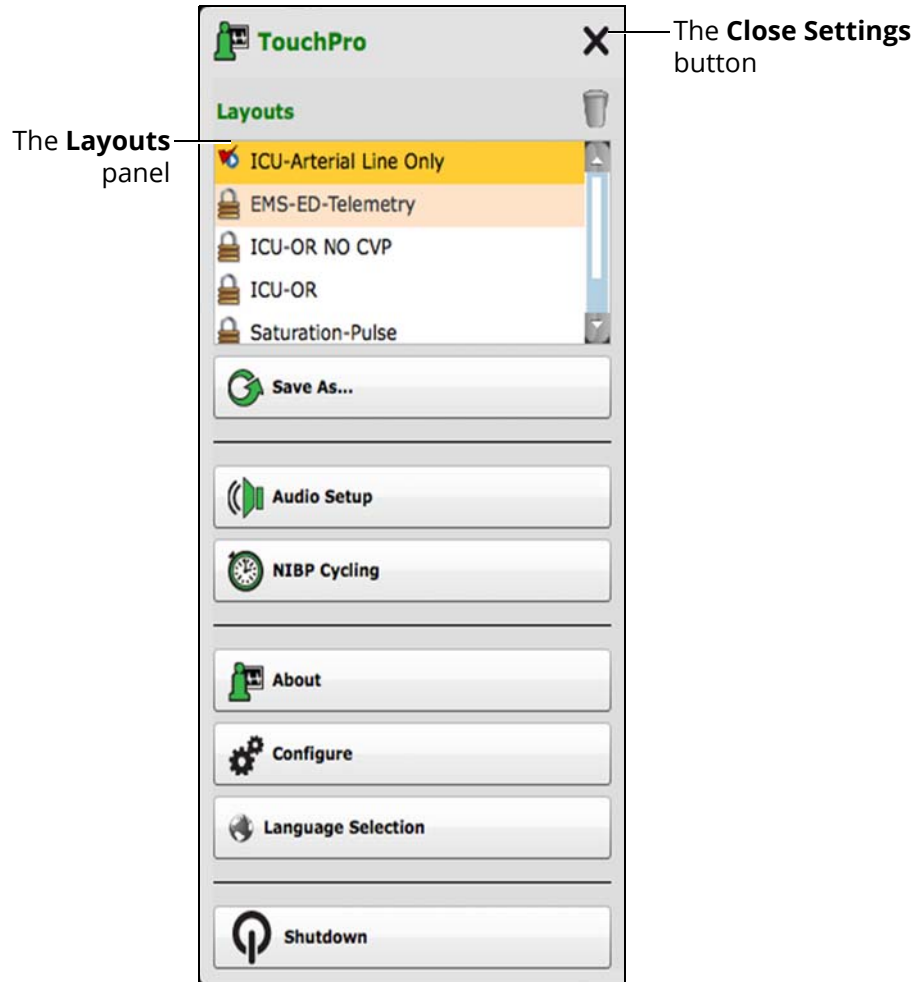
The **Close Settings** button

The **Layouts** panel

The TouchPro Settings Menu

2. Select a layout from the Layouts panel
3. Click the **Close Settings** button

Note: Preconfigured layouts must be enabled in the Müse TouchPro Setup for the currently running SCE to be accessible in the Layouts panel.

Changing a Waveform or Numeric Display

Waveforms and numeric displays can be changed to suit the user's needs.

To change a waveform or numeric display:

1. Click the waveform or numeric to be changed

The Wave Vital Selection Menu

2. Select the desired waveform or numeric

From the **Wave Vital Selection** menu, the alarm, color and scale can be set for the waveform using the **Set Alarm**, **Set Color** and **Set Scale** buttons. From the **Numeric Vital Selection** menu, the color and alarm for the numeric can also be established using the **Set Color** and **Set Alarm** buttons.

Adding a Waveform

The TouchPro software supports up to six waveforms.

To add a waveform:

1. Click the **Settings** button in the bottom right corner of the TouchPro display

The Settings Button

The **Add Waveform** and **Remove Waveform** buttons

An empty waveform field

The TouchPro Display

2. Click the **Add Waveform** (**+**) button in the location above which you want the empty waveform to appear
3. Click the empty waveform field
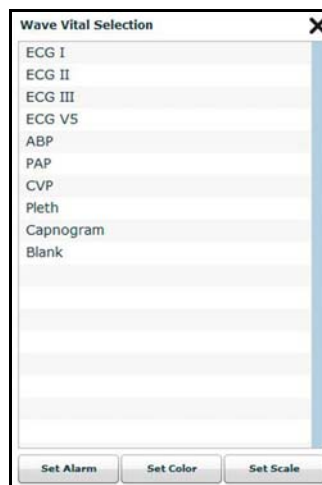
The Wave Vital Selection Menu

4. Select the desired waveform from the Wave Vital Selection menu

Adding a Numeric Display

The TouchPro software contains four numeric display fields. All four numeric display fields are located on one row beneath the waveform displays.

When fewer than four numeric readouts are being displayed, the remaining fields are blank.

To add or change a numeric display field:

1. Click an existing or a blank numeric display field

A blank numeric field

The TouchPro Display

The Numeric Vital Selection Menu

2. Select the desired numeric (scroll for all listings)

Moving a Waveform or Numeric Display

Waveforms and numerics can be moved on the screen to suit the user's needs.

To move a waveform or numeric, click the desired waveform or numeric and drag and drop the display to a desired location.

A dragged waveform
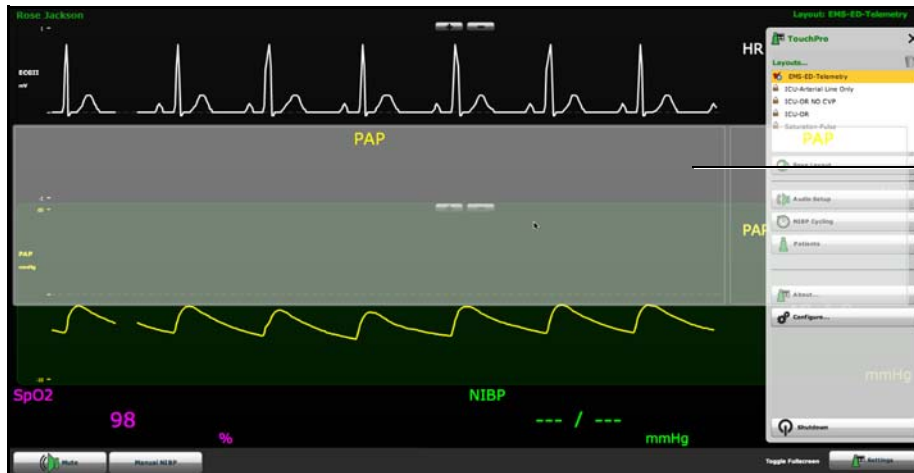
The TouchPro Display

Saving a Layout

Once a layout has been configured, it can be saved and reused.

To save a layout:

1. Ensure the desired waveforms and numerics are in place
2. Click **Settings**
3. Click **Save As**
4. In the Save Layout window, in the **Layout Name** field, enter a name for the layout

The **Layout Name** field
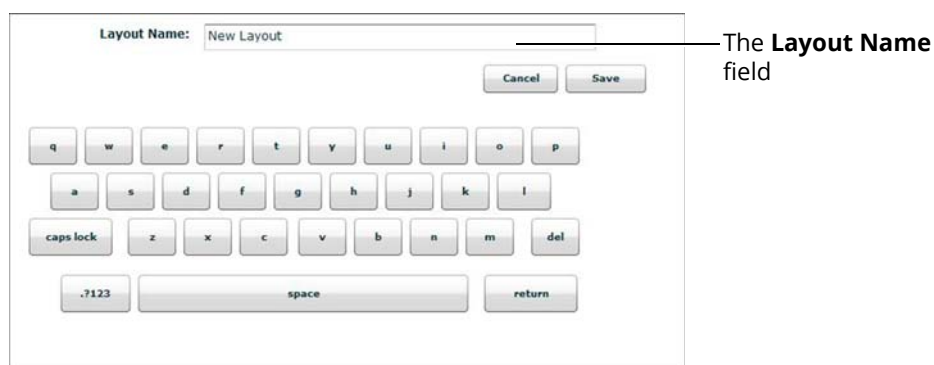
The Save Layout Window

5. Click **Save**
6. Click the **Close** button to exit the Settings menu

Saved layouts can be deleted from the Settings menu by dragging and dropping them in the Trash.

Note: When a layout is saved, it is available for use only with the current SCE. To enable the layout for use with any other SCE, enable the layout from the TouchPro Setup panel for the desired SCE.

Sounds

All sounds can be silenced by clicking the **Mute** button in the bottom left corner of the TouchPro display.

The Mute Button

To set up the audio for the TouchPro:

1. Click the **Settings** button in the bottom right corner of the TouchPro display

The Settings Button

2. From the Settings menu, click **Audio Setup**
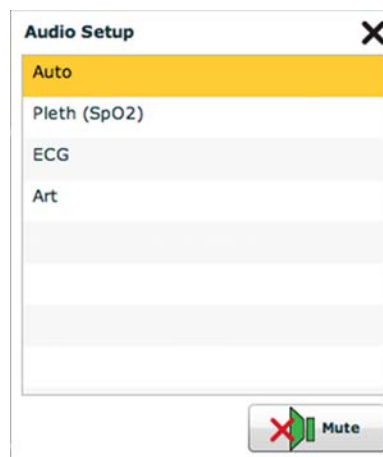
The Audio Setup Window

3. From the Audio Setup window, select a waveform to set it as the pulse sound

   Once a waveform is selected, the Audio Setup window automatically closes.

4. Click the **Mute** button from the Audio Setup window to mute all alarms. Click the **Mute** button again to return the alarms to their original state.

12-Lead ECG

To view a 12-lead ECG report, click the **12-Lead ECG** button at the bottom of the TouchPro screen.

The 12-Lead ECG Button

The **Close** button
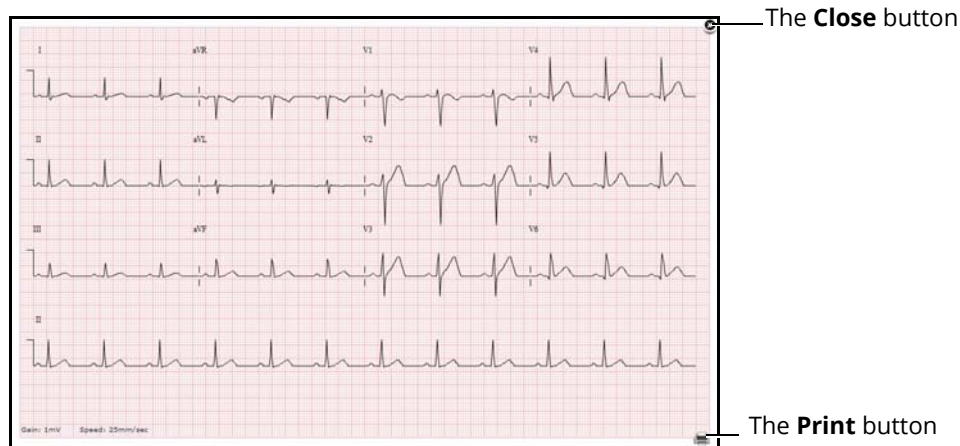
The **Print** button

A 12-Lead ECG Report

The report can be printed or saved by clicking the **Print** button in the bottom right corner of the 12-lead ECG report.

To close the report, click the **Close** button.

IMPORTANT: *Prior to saving the report as a PDF or printing to a network printer, the print presets must be adjusted. The page orientation must be set to Landscape and the margins must be set to .25 inches on all sides. These settings vary in location depending on the operating system (i.e., Macintosh or Windows).*

To save the report to a PDF file on a Macintosh Instructor Workstation:

1. From the 12-lead ECG report screen, click the **Print** button located in the bottom right corner of the 12-lead ECG report

The **Print** button

The 12-Lead Report Title Window

2. Enter a title for the 12-lead report
3. Click **Print**
4. On Page Setup Window, click **OK**

5. From the Print window, click the **PDF** drop-down menu in the lower left corner

6. From the drop-down menu, select the S**ave as PDF** option

7. In the Title field, enter the 12-lead report title

8. Click **Save**

   The report saves as a PDF on the Macintosh Instructor Workstation.

To save the report to a PDF file on a Windows Instructor Workstation:

1. From the 12-lead ECG report screen, click the **Print** button located in the bottom right corner of the 12-lead ECG report

2. From the drop-down menu, select Microsoft XPS Document Writer

To print a report:

1. From the 12-lead ECG report screen, click the **Print** button located in the bottom right corner of the 12-lead ECG report

The **Print** button

The 12-Lead Report Title Window

2. Enter a title for the 12-lead report

3. From the Printer drop-down menu, select the appropriate network printer

   Note: A network printer must be configured in order to appear as an option.

4. From the Print window, click the **Print** button

Snapshot

A vital signs history window can be displayed using the **Snapshot** button.

To capture the vital signs history:

1. Click the **Snapshot** button on the bottom of the TouchPro display
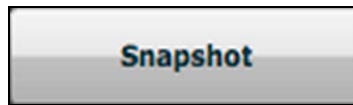
The Snapshot Button

The Capture Snapshot (refresh) button
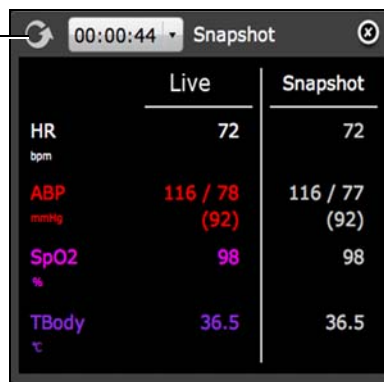
The Snapshot Window

2. To take another snapshot, click the Capture Snapshot (refresh) button

   IMPORTANT: *The Capture Snapshot (refresh) button is used to take all subsequent snapshots.*

   The time when the snapshot was taken is displayed in the simulation time dropdown.

3. Click the simulation time dropdown to display and select any snapshot time

The simulation time dropdown
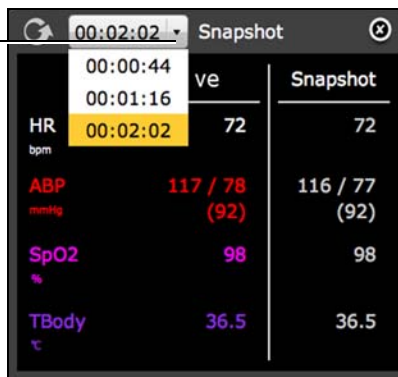
The Snapshot Window

4. Click the X to close the Snapshot window

NIBP Cycling and Manual NIBP

When non-invasive blood pressure (NIBP) is displayed, the patient's NIBP can be updated at specified intervals using NIBP Cycling, or the current NIBP can be displayed immediately using the **Manual NIBP** button.

NIBP Cycling can be used to set the patient's NIBP to be updated at regular intervals.

To set NIBP cycling:

1. Click the **Settings** button in the bottom right corner of the TouchPro display

The Settings Button

2. From the Settings menu, click **NIBP Cycling**
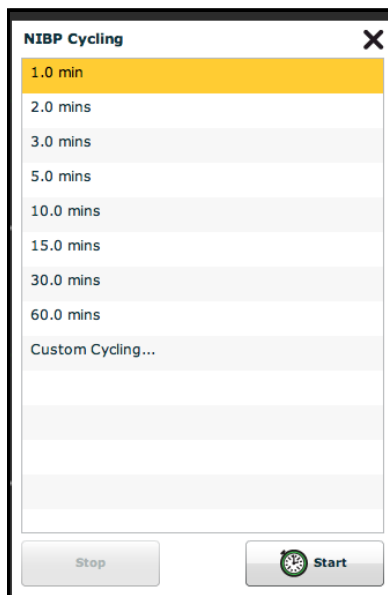
The NIBP Cycling Window

3. From the NIBP Cycling window, select the desired interval for the cycling
4. Click **Start**

Note: Custom cycling is also available.

CAEAthena

To display the patient's current NIBP, click the **Manual NIBP** button.

The **Manual NIBP** button

The TouchPro Display

Note: Manual NIBP can be used at any time during cycling. However, this turns off auto-cycling.

Configuring the TouchPro Software

The background color and alarm suspension time can be set from the TouchPro Configure panel.

To access the Configure panel:

1. Click the **Settings** button in the bottom, right corner of the TouchPro screen

The Settings Button

2. From the Settings menu, click the **Configure** button
3. From the Configure window, set the background color and alarm suspension time
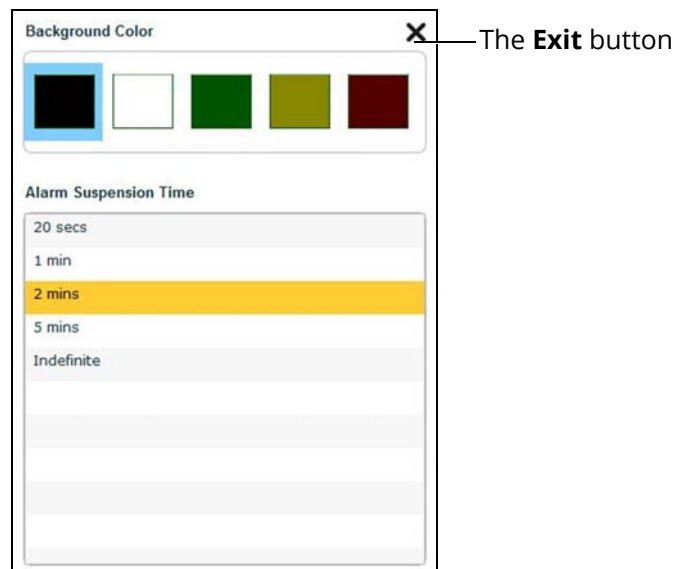
The **Exit** button

The Configure Window

4. Click the **Exit** button to exit the Configure window when finished

Changing the TouchPro Language

To change the language of the TouchPro software:

1. Click the **Settings** button in the bottom, right corner of the TouchPro screen

The Settings Button

2. From the Settings menu, click the **Language Selection** button
3. From the Language Selection window, select a language

The Language Selection Window

4. Click **Accept**

Exiting the TouchPro Software

To exit TouchPro:

1. Click the **Settings** button from the bottom, right corner of the TouchPro screen

The Settings Button

2. From the Settings menu, click **Shutdown**
3. Click **Shutdown**

USING VIVO

Vivo is the facilitator-driven software that puts you in full control of your simulations. This information will help you get started using the Vivo tablet with the simulator.

IMPORTANT: *Before running Vivo, make sure that no application of Müse is open for the simulator using Vivo.*

Only one application of either Vivo or Müse can be open at any given time across all platforms, laptop or tablet. For example: If Vivo is open, then Müse needs to be closed.
Be sure to close and exit Vivo when not in use.

Note: A mouse-click on a laptop replaces the "tap" or "swipe" used on tablets.

Remember to make sure the tablet is fully charged prior to each use.

Laptop Setup

Vivo can be run from a laptop using the Google© Chrome browser (Chrome). Chrome is the only supported browser to run Vivo.

To configure Chrome for Vivo:

1. Ensure Chrome is installed on your laptop

    Note: It may be necessary to download the Chrome browser from the Google website.

2. Ensure the simulator is powered on and your laptop WiFi is connected to the simulator

3. Open Chrome

    Note: To access Vivo through Chrome, you need the 2 or 3-digit IP number from your simulator network.
    You can find the IP number on the *Simulator Data Sheet* listing:
    SBC Network Setup - IP Address or by going to the Network/WiFi settings on the laptop and viewing the **IPv4** address.
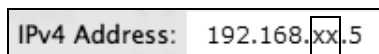
The 2 or 3-digit IP number

4. After obtaining the IP number, enter the web address **http://192.168.XX.5/vivo** into Chrome's address bar, replacing the **XX** with your IP number

    For example, if your IP number is 19, type *http://192.168.19.5/vivo*.

    After you enter the correct address, Vivo will launch.

5. Select the simulator

6. Select Run an SCE, then run on the fly SCE and **Begin Simulation**

    If Vivo is installed correctly, the simulator will start breathing and the manikin will respond to the Vivo tablet.

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Tablet Setup

1. Power on the simulator first, and wait at least 3 minutes while the simulator establishes a wireless network

   Note: The power light will turn solid when ready.

   TIP: *It is recommended to wait 2 minutes after the manikin power light is solid, before starting the tablet.*

2. Power on the Vivo tablet

   Note: The power button is located on the top-right side of the tablet.

Once the simulator and the tablet are both powered on, they automatically establish a WiFi connection.

TIP: *For the initial WiFi connection, it may be necessary to have the tablet very close to the simulator.*

For the initial (first-time) startup, or if the WiFi does not automatically connect, perform the following steps to establish a WiFi connection to the simulator:

1. Swipe down from the top of the tablet screen to access the menu heading
2. Tap or swipe down on the WiFi icon to access the menu

3. Tap the WiFi icon dropdown

Tap the simulator network (Example: ATHXXXX, where XXXX is the serial number for the unit).

4. If necessary, enter the password *caeadmin*, then tap **Connect**

5. Tap the tablet square ▣ to minimize the windows. It may be necessary to first swipe up from the bottom of the tablet screen to show the tablet square ▣ .

6. Swipe the window right or left (off the screen) to close

The WiFi icon will show it as connected (an exclamation point may show beside the icon, this is ok).

The Vivo tablet is connected and ready to use.

Tablet Tips

- A touch screen stylus may be helpful while using the tablet
- The tablet must have a WiFi connection to the simulator in order to run Vivo. To verify the Vivo tablet is connected to the simulator WiFi, swipe down from the top of the tablet screen to access the menu heading. Then, tap or swipe down on the WiFi icon to access the menu. The simulator should be shown under the WiFi icon.

The simulator connection—
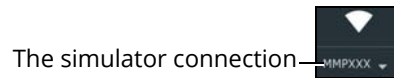
The WiFi Icon

- Depending on your location, it may be necessary to keep the tablet close to the simulator to maintain the WiFi connection
- Prior to running Vivo, it is recommended to lock the screen orientation in landscape view for optimal performance. To lock the screen in landscape view:
    - ◦ Hold the tablet landscape and swipe down from the top of the screen to access the menu heading. Then, tap or swipe down on the menu heading to access the menu.
    - ◦ Tap on the **Auto-rotate** icon to lock the landscape view

The **Auto-rotate** icon
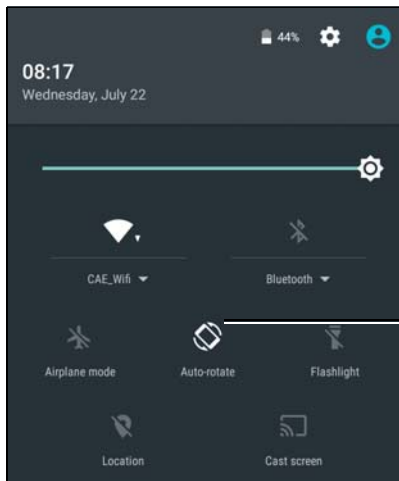
The Menu

- If Vivo is closed accidentally, tap the tablet square ■ to show any available running windows. If available, select the Vivo window.
- Various screens have a *back* button. Tap the **back** button to return to previous screen.

The Back Button

Using Vivo

The Run Screen

When an SCE is running, Vivo is facilitator-driven and fully adjustable. The top toolbar shows the play/pause/stop buttons, identifies what SCE is running, and shows the SCE clock.

The tile rows show the parameters and headers. Tile rows can be viewed or collapsed by tapping on the black header bar or on the dropdown of each row.

The bottom toolbar shows the Pathway(s) and countdown timer.
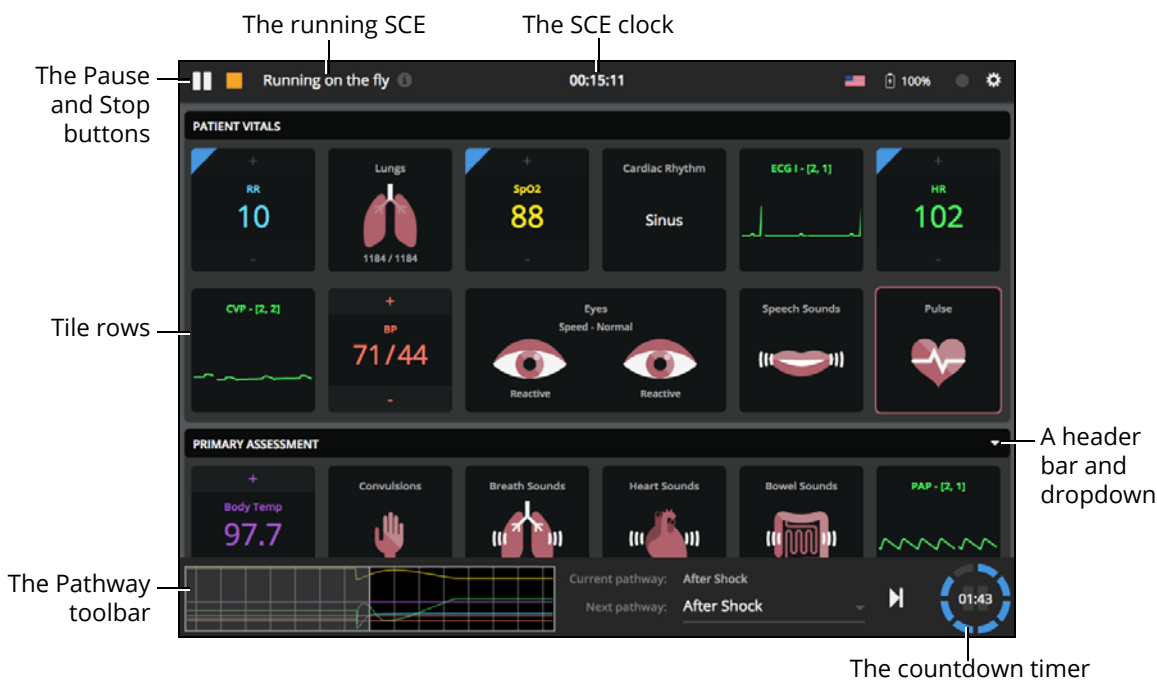
The Run Screen

TIP: *Vivo can also be used with a TouchPro™ Patient Monitor to display patient physiology.*

Tiles and Windows

Tap on a tile to adjust the parameters. The parameters window will open and can be applied as desired. Buttons, dropdowns, scroll lists, and slider bars are available based on each parameter.
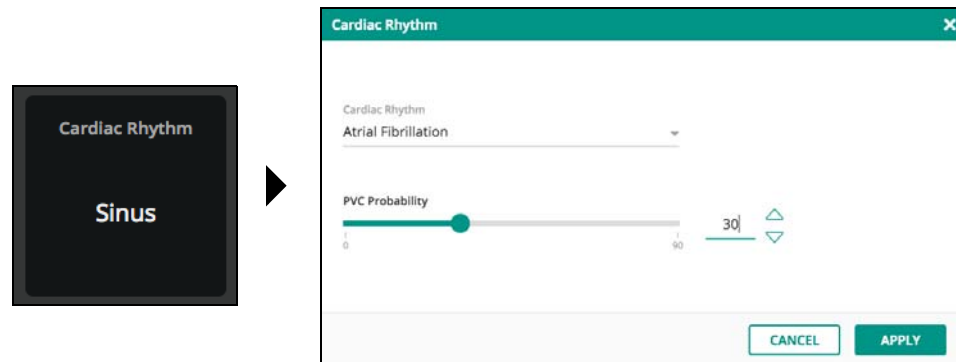
The Tile and Parameter Window

Examples

- For parameters with a **+** / **–** option, the parameter can be adjusted directly by tapping on the **+** or **–**

  A blue highlight in the corner of the parameter identifies that a change has been made to that parameter.
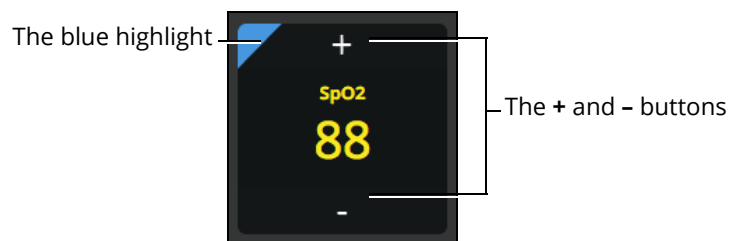
The Tile With + / – and Highlight

Note: When making a change to a parameter with a waveform, such as CVP, the Vivo tablet tile will display the change, then remain fixed (non-animated) on the tile display.

- An orange highlight in the corner of the tile identifies an automated change in the parameters displayed. The three controls that will override vitals and activate an automated change are:
  - Apnea
  - Pulseless Electrical Activity
  - Non-contractile cardiac rhythms

- The automated changes can be overridden, thereby making the orange highlights disappear
- The automated changes will return to the previous values when the associated control has been removed

The orange highlight
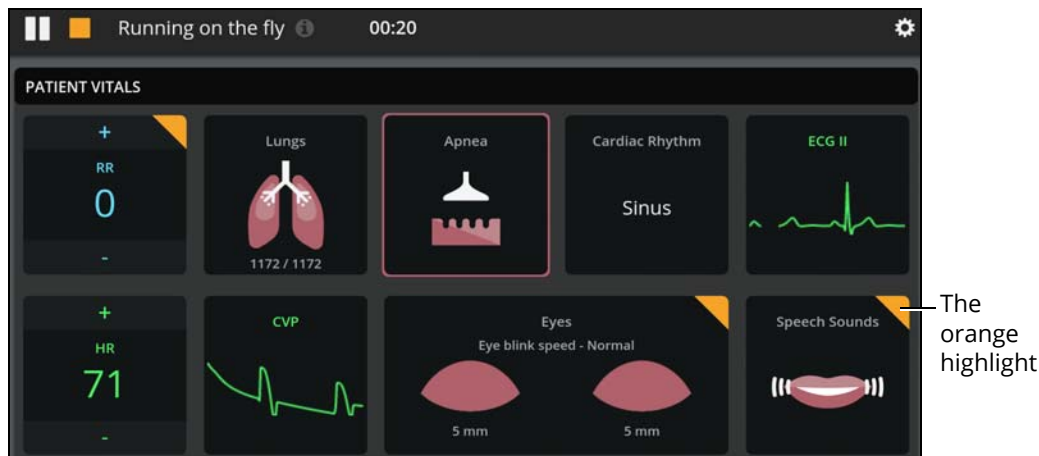
The Tiles With Automated Physiology Highlight

- For parameters with a left and right option (lungs, eyes) the left and right parameters can be adjusted independently or together

  For example, tap on either side or both sides of the Patient Vitals Lungs tile to highlight the selection.

The highlighted side

The Tile with One Side Highlighted

- Tiles with a notes icon allow for data capture. Tap the tile to open the data capture window

Refer to the *Right-Swipe and Left-Swipe* section for more information on the data capture window.
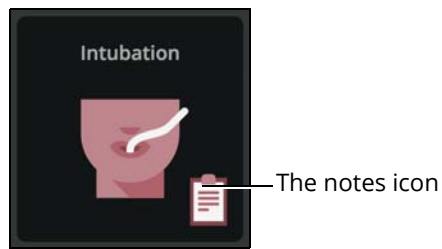
The notes icon

The Tile With Notes Icon

- Tap on the Eyes tile to open the parameters windows and control the eyes independently or together
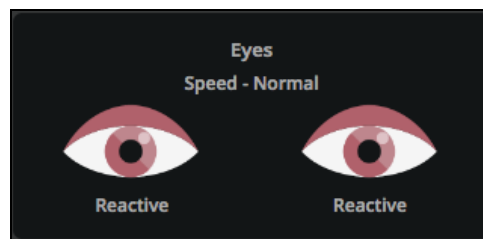
The Eyes Tile

Note: The blink speed can be adjusted, however the Vivo tablet tile does not display the eye blink animation.
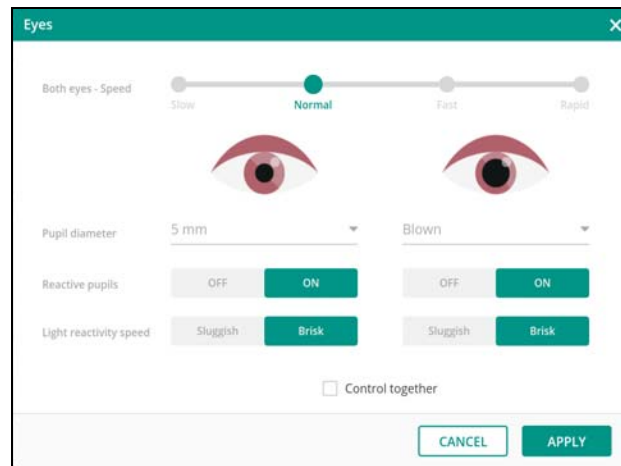
The Eyes Parameter Window

- Tap on the CPR tile to open the parameters window

The CPR Tile

The CPR parameters window displays the results when chest compression or ventilation is performed.

- ◦ Tap **Start/Stop Timer** to use the timer
- ◦ Tap **Change User** to reset the timer
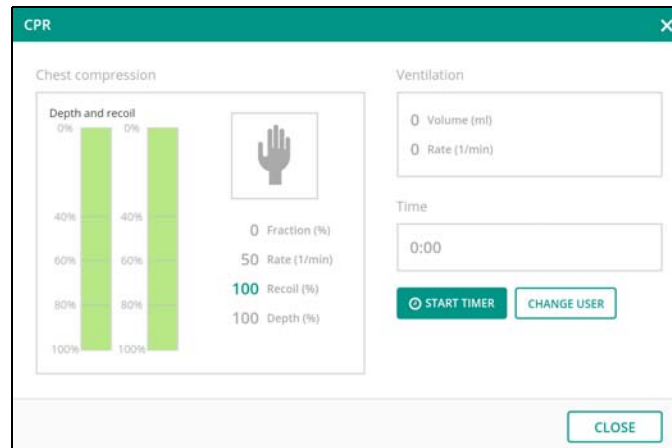
The CPR Parameter Window

Right-Swipe and Left-Swipe

Swipe right on the Run screen to open the **Medications** window. Then, tap **ADD MEDICATION** to select the drug, amount, and type. Custom amounts are also available to enter.

Note: Adding medications only enters that medication into the log and does not affect the physiology.

- • Tap the red **–** and then the red **X** to remove a drug
- • Tap the **X** or swipe the window left to close the window
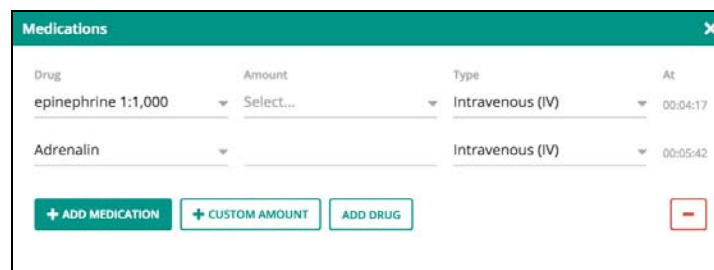
The Medications Window

Swipe left on the Run screen to open the data capture/checklist window. The data capture/checklist window allows for checkoffs and note taking.
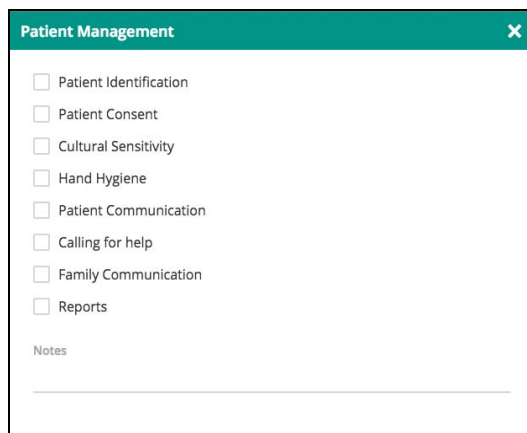
The Data Capture Window

Depending on the previous action, swiping left opens the data capture/checklist window for the most recently accessed data.

For example:

- If no right-swipe has been made, then the **Patient Management** window will open with a left-swipe
- If **Medications** are accessed with a right-swipe, then the **Drugs** window will open with a left-swipe
- If the **Intubation** tile (with notes icon) is accessed, then the **Intubation** window will open with a left-swipe

Tap the **X** or swipe the window right to close the window.

Pathways

The pathway toolbar is located at the bottom of the Vivo screen. The pathway toolbar shows the pathway predictor, the Current pathway, the Next pathway queue, and the countdown timer.

The Current pathway   The countdown timer

The Pathway Predictor   The Next pathway queue   The Play/Next icon
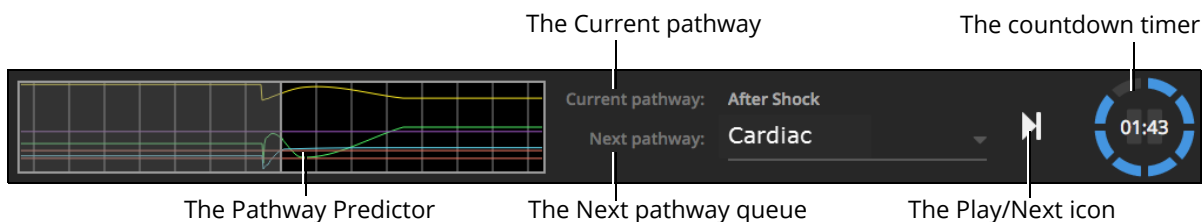
Note: Run on the fly SCEs will display "Current pathway" and "Next pathway". Preconfigured and saved SCEs will display "Current state" and "Next state".

Preconfigured and saved SCEs

IMPORTANT: *Vivo starts with a base patient. Tap on the Play/Next icon to begin the SCE.*
Then select a state in the **Next state** *dropdown to queue up the next state. Tap on the Play/Next icon to play that next state.*

The countdown timer shows the time remaining to the next state. Tap the countdown timer to pause and resume.

Run on the fly SCEs

Run on the fly SCEs have the same pathway features, plus the ability to adjust the pathway predictor.

Tap the pathway predictor to access the **Pathway Editor**. Pathways can be created, copied, run, and fully customized.

When parameters are in (or added) to the pathway, those parameters can be adjusted by dragging any point on the parameter to any position.

TIP: *If more than one parameter is in the pathway, be sure to tap and select the desired parameter* **tab** *before adjusting the parameter.*

The Pathway Editor

Stopping An SCE

To stop an SCE, tap on the stop button. Then tap **OK** on the verification popup.

The stop button —

PATIENT VITALS

RR
10

Lungs
1184 / 1184
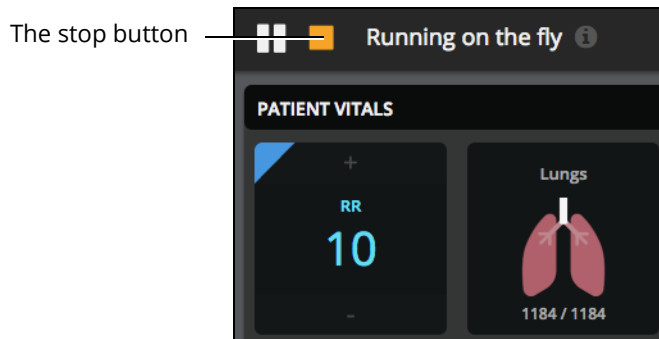
The Stop Button

The **Session Debriefing** window will appear.

Session debriefing

0:00	Patient started	
0:44	Pathway started , Ad hoc Pathway	
1:03	Pathway started , Ad hoc Pathway	
1:18	amiodarone , 150 mg, Intravenous (IV)	
1:57	acetaminophen , 500 mg, Intraosseous (IO)	
2:19	Dose prepared	
2:39	Patient stopped	

Started   2015-08-11 16:30:05.172
Duration   2:39
SCE   none
Patient   -

Legend   States
Captured data
Medications
Notes
Other

EXIT TO START SCREEN   START NEXT SESSION

The Debriefing Window

When finished debriefing, select **Exit To Start Screen** or **Start Next Session**.

IMPORTANT: *Be sure to complete debriefing before exiting the debriefing window. Returning to debriefing window or accessing a debriefing log is not available.*

Exiting Vivo

IMPORTANT: *Stop the running SCE and return to the Start screen prior to exiting Vivo.*

To exit Vivo on the Vivo tablet, tap the tablet square ◼ to shrink the window. It may be necessary to first swipe up from the bottom of the tablet screen to show the tablet square ◼ .
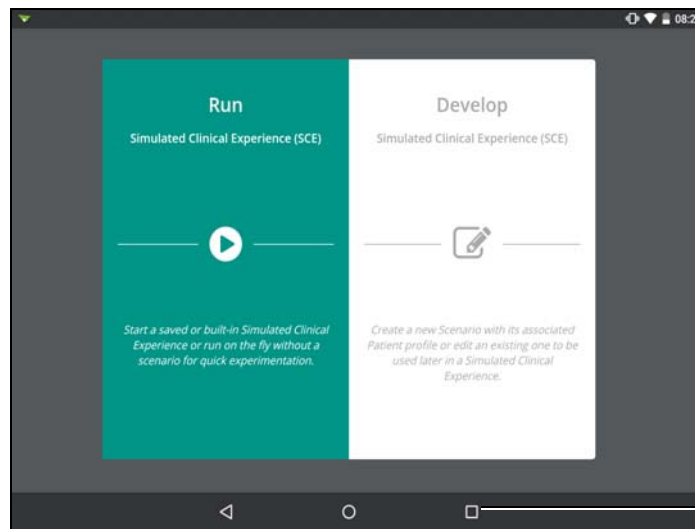
The tablet square

The Tablet

Swipe the Vivo window right or left (off the screen) to exit.
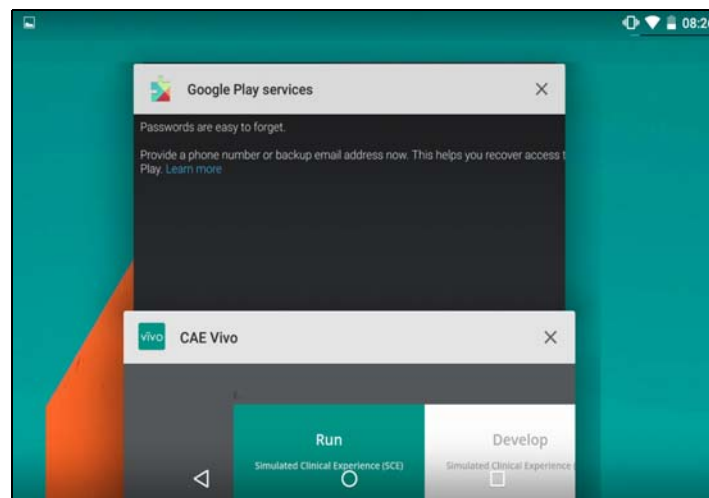
The Open Windows

To exit Vivo from the Chrome browser, close and exit the browser.

Clearing the Data Cache on the Vivo Tablet

For optimal performance, it may be necessary to occasionally clear the data cache on the Vivo tablet.

To clear the data cache and reset Vivo to the default state:

1. Ensure Vivo is exited and closed
2. On the tablet screen, open the **Settings** icon
3. Select **Apps** (under the **Device** tab)
4. Select Vivo
5. Tap **Clear Data**, then **OK** on the verification window
6. Tap the tablet square ■ to shrink the window, then swipe the Settings window right or left (off the screen) to exit

TIP: *Clearing the Vivo data cache will not delete any user-created SCEs.*

USING ATHENA

Once Athena has been set up, the software and an SCE started, the simulator is ready for learner interventions. From the Run screen, the features of Athena can be accessed. They are broken down into the following categories: Neurological, Respiratory, Cardiovascular, Fluids, and Sounds.
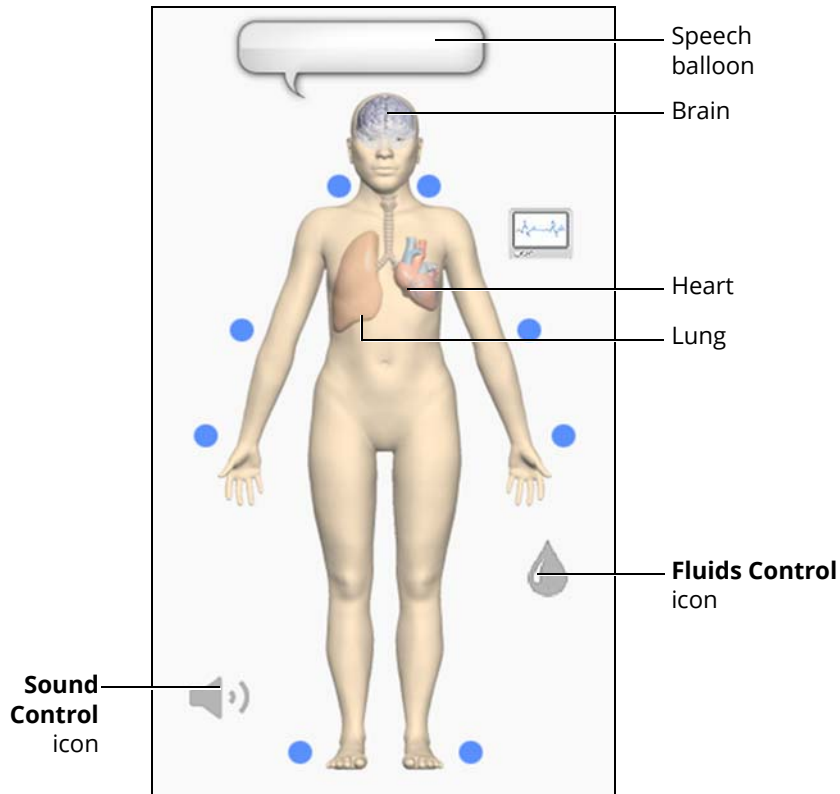
The Physiological Views

To access each view, click the appropriate organ or icon.

- For Neurological, click the brain
- For Respiratory, click the lung
- For Cardiovascular, click the heart
- For Fluids, click the **Fluids Control** icon
- For Sounds, click the **Sound Control** icon

Neurological Features

Athena can simulate a variety of neurological clinical indicators, such as seizures and reactive eyes. Neurological features are controlled from the Neurological view in Müse.

To access the Neurological view, from the **Run** screen, click the brain on the homunculus. The Neurological parameters appear.

The Neurological View

Neurological Features			
	Description	**Software Control**	**Manual Control**
Eyes	Each eye has reactive pupils and functional eyelids that blink and close.	The response to clinical intervention must be controlled by the instructor. VIEW: Neurological PARAMETER(S): Eye Controls	None required.

Neurological Features			
	Description	**Software Control**	**Manual Control**
Seizures	The manikin can simulate seizures with rhythmic movement of the arms and rapid blinking.	The response to clinical intervention must be controlled by the instructor. VIEW: Neurological PARAMETER(S): Seizures	None required.
Intracranial Pressure	Intracranial pressure value can be set and displayed on the Patient Status Display or the TouchPro Patient Monitor.	The response to clinical intervention must be controlled by the instructor. VIEW: Neurological PARAMETER(S): ICP	None required.
Neuromuscular Blockade	By default, neuromuscular blockade is modeled based on patient physiology. The modeled neuromuscular blockade value can be overridden by manually selecting a value.	If the NMB value is set greater than 30%, the eyes will automatically close. VIEW: Neurological PARAMETER(S): NMB	None required.
Temperature	Body and blood temperature can be set using the temperature parameters. Body and blood temperature can be displayed on the Patient Status Display.	The response to clinical intervention must be controlled by the instructor. VIEW: Neurological PARAMETER(S): Temperature: Body, Temperature: Blood	None required.

Eyes

Each eye has reactive pupils and eyelids that blink and close.

The settings for pupil diameter, light reactivity and blinking are located on the Neurological view.

The **Pupil Diameter** menus

The **Blinking** menus

Light reactivity options

The **Apply to Both Eyes** option

The **Blink Speed** menu

The Neurological View
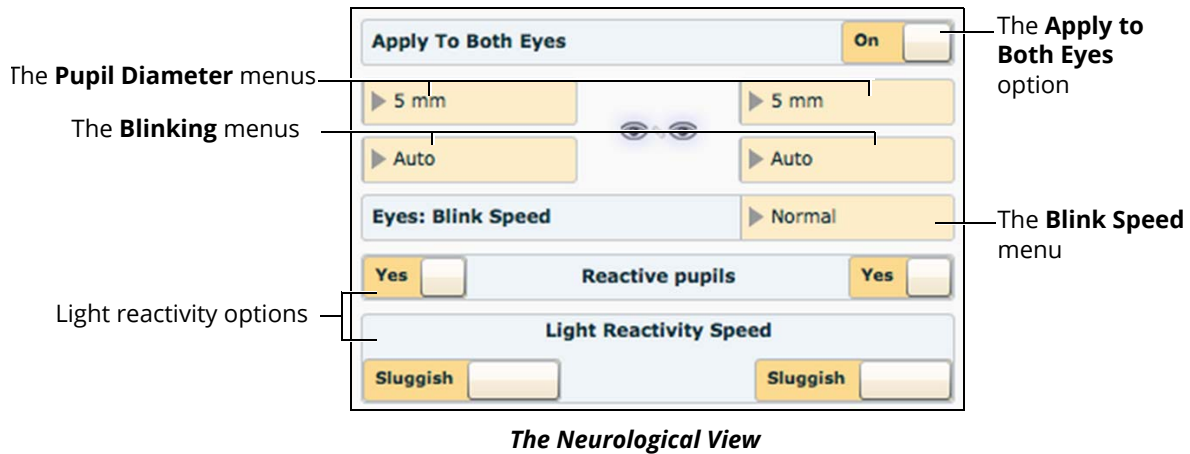
Both eyes can be controlled together by setting the **Apply To Both Eyes** option to **On**. When this option is selected, any changes made to one eye are also automatically applied to the other eye.

Currently, there are three pupil options that are used to control the baseline diameter of the pupils in both eyes: Pinpoint, Blown, or a Fixed Pupil Size from 3 mm to 8 mm.

The simulator's eyes can be set to **Blinking** or **Closed**. The default setting is **Auto**. With this setting, the eyes are either blinking or closed based on the patient's physiology. When the simulator's eyelids are closed, the eyes can still be manually opened for clinical inspection.

Additionally, eyelids can be programmed in scenarios to open and close spontaneously or can be fixed in the closed position.

Blinking frequency is controlled by the **Eyes: Blink Speed** menu and can be set to one of four speeds: **Normal** (the default), **Slow**, **Fast** and **Rapid**.

Setting the **Reactive pupils** option to **Yes** causes the pupils to re-size from the baseline in response to changes in light. **Light Reactivity Speed** can be set to **Sluggish** or **Brisk**.

Seizures

The female manikin simulates seizure activity when the feature is activated in Müse. To activate seizures, from the Neurological view, set the Seizures option to On. To deactivate seizures, set the Seizures option to Off.
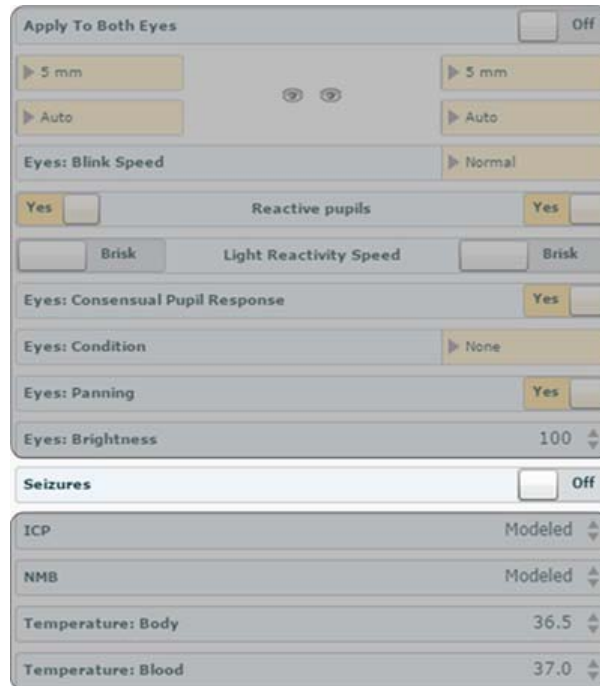
Seizures

Note: If eyes have been set to Closed or if neuromuscular blockage is set to greater than 30%, the eyes will remain closed when seizures are activated.

For more information on the ICP, NMB, and Temperature parameters, see the *Müse Parameter Descriptions* section of this user guide.

Respiratory Features

Athena has an anatomically realistic upper airway that supports endotracheal tube placement, right mainstem intubation, laryngoscopy, airway adjuncts, positive pressure ventilation, mechanical ventilation and a variety of other airway management techniques. The simulator also demonstrates exhalation and chest excursion.

Respiratory features are controlled from the Respiratory view in Müse. To access the Respiratory view, from the **Run** screen, click the lung on the human form. The basic Respiratory parameters appear. To view additional parameters, click the **Basic/Additional** switch.

The **Basic/Additional** switch
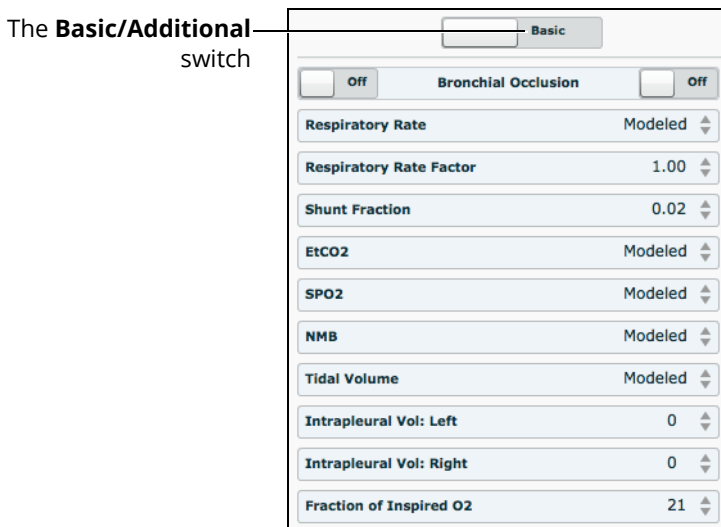
The Respiratory View

Respiratory Features			
	Description	**Software Control**	**Manual Control**
Airway Management and Ventilation	**Alveolar and arterial gas concentrations appropriately reflect the efficacy of ventilation and oxygen administration.**	**Oxygen administration input by the instructor.** **VIEW: Respiratory** **PARAMETER(S): Fraction of Inspired O_2**	**None required.**

Respiratory Features			
	Description	**Software Control**	**Manual Control**
Arterial Blood Gases	PaO_2, $PaCO_2$ and pH are continuously calculated and displayed when selected for the Patient Status Display	**None required, but adjustable** **VIEW: Respiratory** **PARAMETER(S): O_2 Consumption, CO_2 Production Factor**	**None required.**
Articulated Mandible	Allows for jaw thrust when the lower jaw is grasped in a clinically appropriate manner.	**None required.**	**None required.**
Bronchial Occlusion	Completely obstructs right and/ or left mainstem bronchi, simulating a lower airway obstruction (e.g., mucus plug). This yields an inability to ventilate the lungs.	**VIEW: Respiratory** **PARAMETER(S): Bronchial Occlusion**	**None required.**
Chest Excursion	Synchronized with ventilation (spontaneous or mechanical). Excursion depth proportional to tidal volume.	**None required.**	**None required.**
Exhalation	The simulator exhales air, exhibiting synchronized chest movement.	**None required.**	**None required.**
Pulse Oximetry	Oxyhemoglobin saturation (SpO_2) automatically correlates with the oxygen concentration in the lungs and the intrapulmonary shunt fraction.	**None required, but adjustable** **VIEW: Respiratory** **PARAMETER(S): SpO_2, Shunt Fraction**	**None required.**

Respiratory Features			
	Description	**Software Control**	**Manual Control**
Realistic Upper Airway	Allows direct laryngoscopy, oral intubation and use of specialty airway devices. Detects right mainstem intubation.	None required.	None required.
Spontaneous, Self-Regulating Breathing	Normal tidal breathing and pathophysiological conditions such as atelectasis, pneumothorax, asthma and COPD.	None required, but adjustable. **VIEW: Respiratory** **PARAMETER(S): Respiratory Rate, Respiratory Rate Factor, etc.**	None required.
Symmetric and Asymmetric Lung Ventilation	Tracheal, pathophysiologic conditions such as pneumothorax.	None required, but adjustable. VIEW: **Respiratory** **PARAMETER(S): Chest Wall Compliance Factor**	None required.
Trachea, Left and Right Mainstem Bronchi	Tracheal intubation results in bilateral chest excursion and breath sounds. Endobronchial intubation results in unilateral chest excursion and breath sounds.	None required.	None required.
Venous Blood Gases	PvO_2 and $PvCO_2$ are continuously calculated and displayed when selected for the Patient Status Display	None required, but adjustable **VIEW: Respiratory** **PARAMETER(S): $PACO_2$ Set-point, PET CO_2 to $PaCO_2$ Factor**	None required.

Realistic Upper Airway

The upper airway of the manikin is designed to allow for intubation and laryngoscopy. Oral intubation can be performed using a variety of airway devices, including LMAs, endotracheal tubes and oropharyngeal airways.

Sensors detect right mainstem intubation, and the action is recorded in the Events log of the Simulation Session. In addition, the simulator exhibits a right unilateral chest rise, and the appropriate physiological changes result.

Note: The first breath must be delivered in order for the sensors to detect or record right mainstem intubation.

IMPORTANT: A*irways can be damaged by improper insertion of an airway adjunct (e.g. endotracheal tube). To protect the airway, lubricate the adjunct prior to insertion using the cottonseed oil spray provided.*

Use ONLY the provided cottonseed oil to lubricate the adjunct. NEVER use a water-based lubricant because of resulting residue damage.

For supported airway adjunct and clinical supply sizes, see *Recommended Clinical Supply Sizes.*

Cardiovascular Features

Athena produces realistic heart sounds and a wide range of pathophysiologic conditions synchronized to the QRS complex of the ECG and audible with a standard stethoscope.

Cardiovascular features are controlled from the Cardiovascular view in Müse. To access the Cardiovascular view, from the **Run** screen, click the heart on the human form. The basic Cardiovascular parameters appear. To view additional parameters, click the **Basic/Additional** switch.

The **Basic/Additional** switch
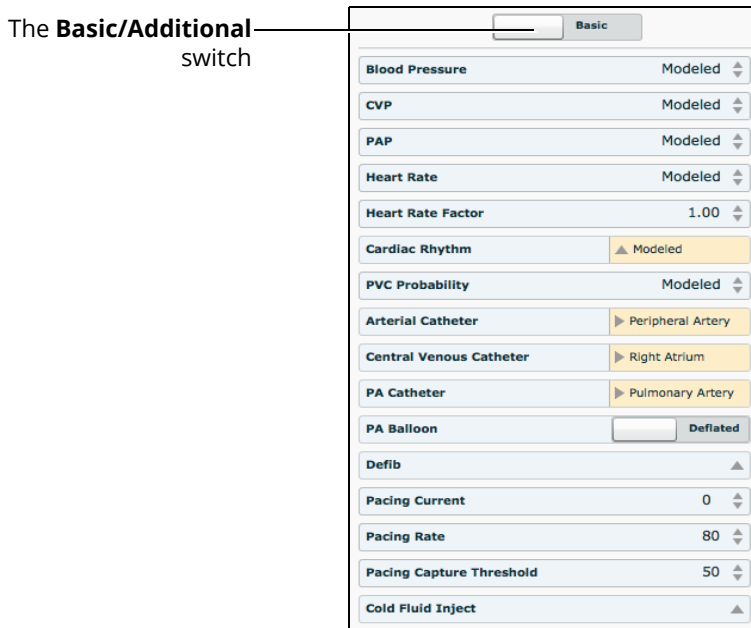
The Cardiovascular View

Cardiovascular Features				
		Description	Software Control	Manual Control
3- or 4-Lead ECG		ECG waveforms can be viewed on a standard monitor and/or on the Patient Status Display. Normal and abnormal cardiac rhythms are linked to patient physiology (e.g. blood pressure, cardiac output).	None required; specific rhythms can be selected. VIEW: Cardiovascular PARAMETER(S): Cardiac Rhythm	ECG monitor may be used.

Cardiovascular Features			
	Description	**Software Control**	**Manual Control**
Baroreceptor Reflex	Cardiovascular system automatically compensates for changing hemodynamic conditions.	None required, but adjustable. VIEW: Cardiovascular PARAMETER(S): Baroreceptor Maximum Pressure, Baroreceptor Minimum Pressure	None required.
Cardiac Pacing	A transthoracic cardiac pacemaker can be used with Athena. Pacing results in appropriate physiological changes in blood pressure and cardiac output.	The instructor can set the level at which electrical capture and mechanical capture occur. VIEW: Cardiovascular PARAMETER(S): Pacing Current, Pacing Rate, Pacing Capture Threshold	See *Pacing* on the following pages for cardiac pacing disk locations and instructions.
Cardiac Rhythms	The various cardiac rhythms can be selected.	The response to clinical intervention must be controlled by the instructor. VIEW: Cardiovascular PARAMETER(S): Cardiac Rhythm	None required.
Chest Compression	Effective chest compression results in artificial circulation, cardiac output, central and peripheral blood pressures, palpable pulses, and CO_2 return. The Müse CPR Monitor displays key compression parameters in real time.	None required, but adjustable. VIEW: Cardiovascular PARAMETER(S): Chest Compression Efficacy, CPR Monitor	Apply chest compressions.

Cardiovascular Features			
	Description	**Software Control**	**Manual Control**
Circulation	Normal and abnormal circulation (e.g. hypovolemia, hypervolemia and right/left heart failure) can be adjusted.	None required, but adjustable. VIEW: Cardiovascular PARAMETER(S): Systemic Vascular Resistance Factor	None required.
Defibrillation	Athena supports operation with a variety of manual and automatic external defibrillators.	Defibrillation can be simulated by the instructor. VIEW: Cardiovascular PARAMETER(S): Defib	See *Defibrillation* on the following pages for defibrillation disk locations and instructions.
Invasive Hemo dynamic Monitoring	Various hemodynamic physiological indicators are registered and can be monitored.	None required, but adjustable. VIEW: Cardiovascular PARAMETER(S): Arterial Catheter, Central Venous Catheter, PA Catheter	None required.
Manual Blood Pressure	Systemic blood pressure can be measured using the return-to-flow technique. Korotkoff sounds can also be auscultated.	None required.	See *Blood Pressure* for information on modified blood pressure cuff.
Myocardial Ischemia	Myocardial oxygen supply and demand automatically influence the cardiac rhythm, yielding response to hypoxemia.	None required, but adjustable. VIEW: Cardiovascular PARAMETER(S): Ischemic Index Sensitivity, Ischemic Index Averaging	None required.

Cardiovascular Features			
	Description	**Software Control**	**Manual Control**
Palpable Pulses	Carotid, brachial, radial and dorsalis pedis pulses can be palpated bilaterally and are synchronous with the cardiac cycle. A pulse deficit auto-matically occurs if the systolic arterial blood pressure falls below specified thresholds. The intensity of the pulse reflects current physiology or can be set to absent, weak, normal or bounding Note that carotid pulses do not have intensity levels.	None required, but adjustable. **VIEW: Cardiovascular** **PARAMETER(S): Pulse Locations, Pulse Deficit, Pulse Intensity**	None required.

Pulses

Eight pulse locations are activated, through sensors, by touch:

- Carotid (2)
- Brachial (2)
- Radial (2)
- Dorsalis Pedis (2)

Pulse palpation is recorded in the Events Log.

Note: Always ensure the skin is covering the pulse site(s) when using the manikin.

Pulses are visible and can be controlled from any physiological view. All pulses, unless altered by an SCE, are palpable by default. When a pulse is palpated, the event is recorded on the Events Log of the Simulation Session for later review.

To disable a pulse:

1. Click the pulse location on the human form

An enabled pulse

A disabled pulse
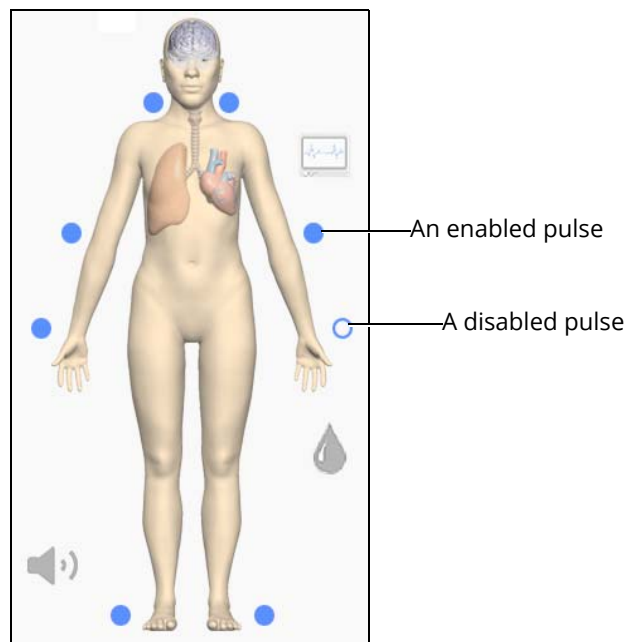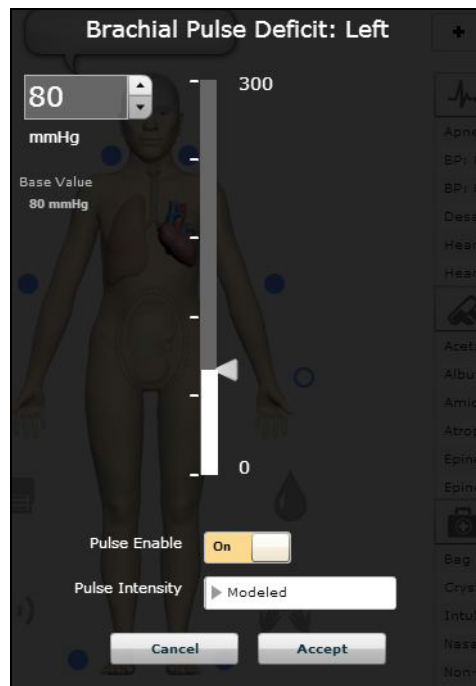
The Pulses

A Pulse Menu

2. Click the **Pulse Enable** switch to turn the pulse **Off**

3. Click **Accept**

   The pulse can be enabled again by accessing the pulse menu and clicking the **Pulse Enable** switch to turn the pulse **On**.

A pulse deficit occurs when the systolic arterial blood pressure falls below the default threshold indicated in the table below.

Palpable Pulse Thresholds			
Carotid	60 mmHg	Radial	90 mmHg
Brachial	80 mmHg	Dorsalis Pedis	80 mmHg

Pulse deficit and intensity can be modified from the pulse menu for each pulse.

4-Lead ECG

A 3-lead or 4-lead ECG is emitted from the appropriate positions for display on a standard monitor. A contact is available on the manikin's chest for each of four cables.

Lead port

Lead port

Lead port

Lead port
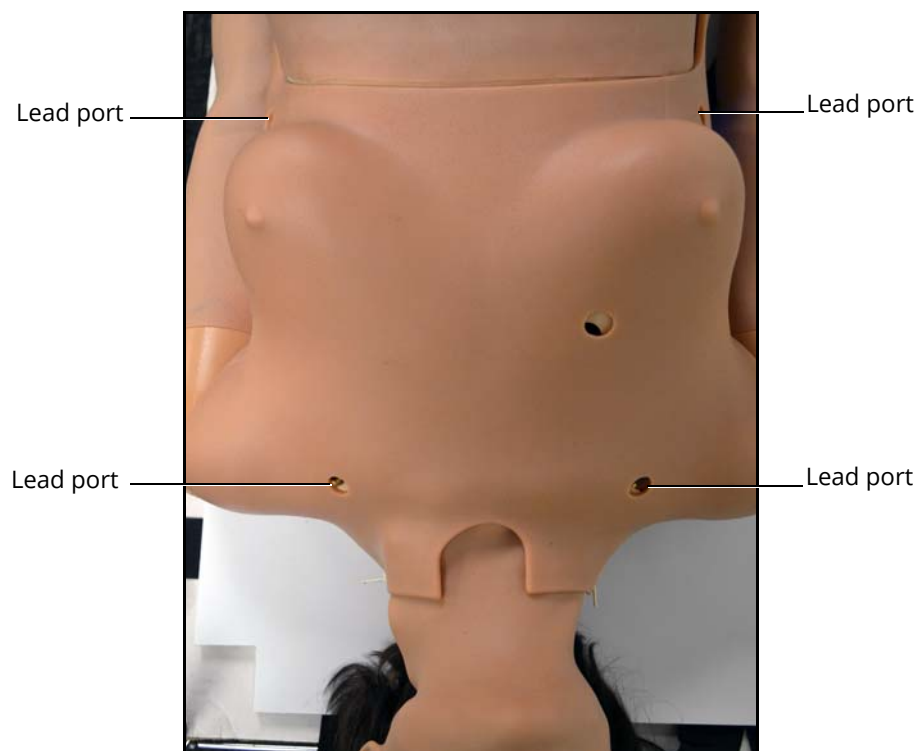
The 4-Lead ECG Ports

The simulator generates a normal sinus ECG, as well as a broad range of abnormalities such as myocardial ischemia, sinus tachycardia and bradycardia, ventricular fibrillation and asystole. The hemodynamic response to the arrhythmias is physiologically correct. Myocardial oxygen balance and cardiac ischemia automatically influence the cardiac rhythm resulting in a realistic and automatic response of the rhythm to hypoxemia. The degree of influence can be controlled or completely overridden by the instructor.

To use the ECG lead ports, locate the posts (provided with accessories) and screw each post onto a lead port.

Note: The inferior locations have an extender permanently in place.

Manual Blood Pressure

Blood pressure can be taken manually on either arm.

Non-invasive blood pressure monitoring techniques can be used by attaching a standard cuff that has been modified with a T-fitting and adapters.

To modify a standard cuff for use with the manikin:

1. Using a standard blood pressure cuff, cut the hose that connects to the pressure gauge
2. Insert one of the supplied adapter fittings into each of the open ends of the cut hose
3. Use a female fitting on one end and a male fitting on the remaining end
4. Insert the T-fitting into the hose adapters

The pressure gauge

The T-fitting end connection to NIBP port
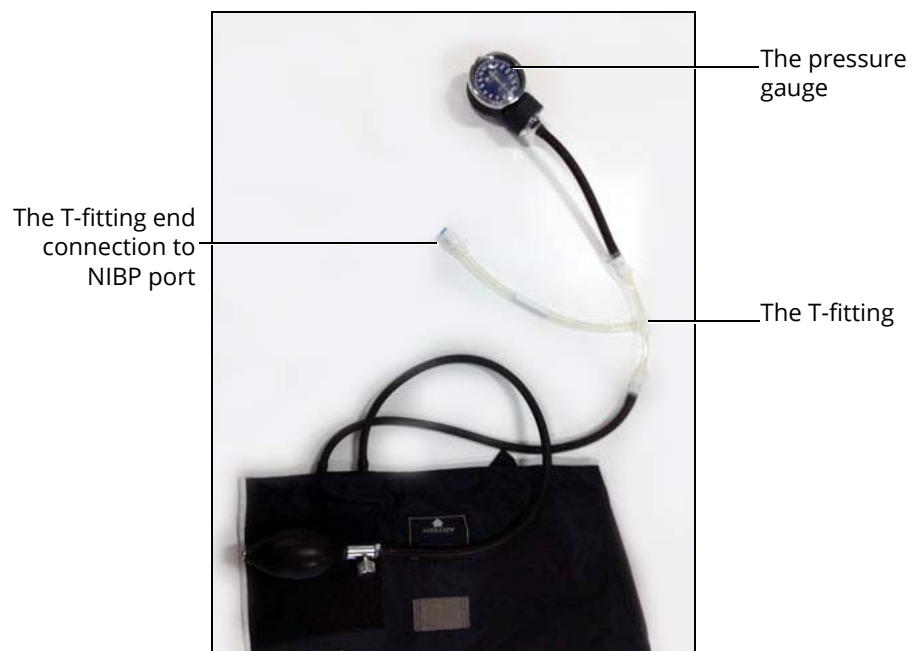
The T-fitting

The Blood Pressure Cuff with T-Fitting

5. Locate and connect the other end of the T-fitting to the NIBP port located on either side of the manikin's torso

The **NIBP** port

The Battery Compartment and Ports

The **NIBP** port
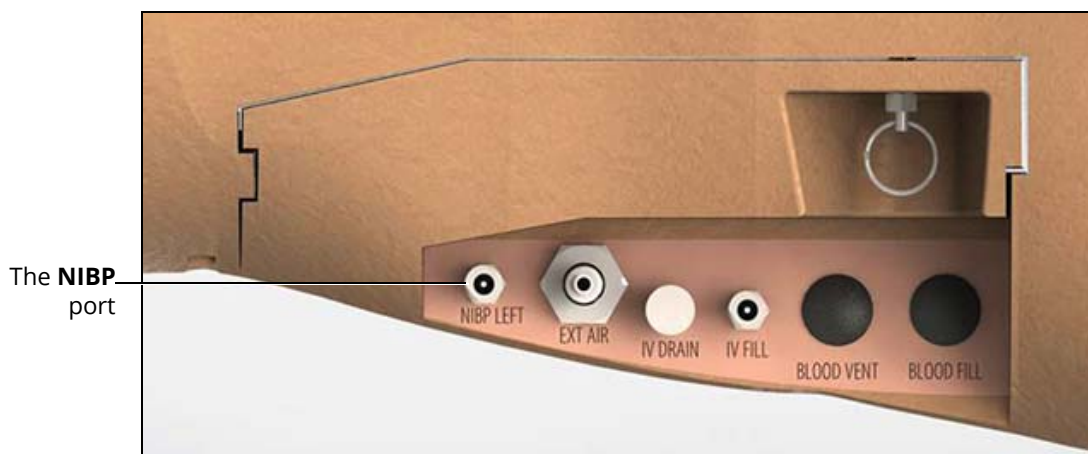
The Ports

Non-invasive blood pressure may now be taken using the return-to-flow technique.

6. Store the modified blood pressure cuff with the manikin

Note: Do not remove or modify the black port plugs.

Korotkoff Sounds

Korotkoff sounds can be auscultated on either arm.

To auscultate Korotkoff sounds,

1. Wrap the sphygmomanometer cuff around the arm on the same side as the connected NIBP port

2. Place the stethoscope just above the brachial pulse

3. Pump up the blood pressure cuff and let the cuff pressure drop slowly by opening the valve on the bulb slightly

4. Monitor the pressure displayed on the cuff gauge

All five phases should be recognized:

- **Phase I -** Clear, repetitive, tapping sounds (Systolic)
- **Phase II -** Longer beats, with some swishing sounds
- **Phase III -** Crisp, more intense rhythm sounds
- **Phase IV -** Muffled, less distinct sounds
- **Phase V -** Sounds disappear completely (Diastolic)

Defibrillation and Cardioversion

The female manikin is designed to safely absorb the energy discharged from manual and automatic defibrillators. Standard defibrillation energy levels should be used for positive learning reinforcement and to avoid negative training transfer.

However, use of a defibrillator for training purposes represents an operational hazard equivalent to use of a defibrillator on a real patient. Consequently, ALL SAFETY PRECAUTIONS for the use of defibrillators MUST BE FOLLOWED as if the simulator were a patient. Consult the specific defibrillator's User Manual for further information.

The following cautions should be observed:

- Manikin should be isolated and **NOT** plugged into electrical power when using defibrillation
- Defibrillation should be performed on the defibrillation electrodes only. If defibrillation is performed over any ECG electrode, high voltage may be present on the remaining connectors during the shock. This may also damage ECG circuitry. Avoid touching any nearby ECG posts.
- To prevent overheating, DO NOT provide more than three (3) defibrillation discharges in a sequence per minute during the training session (maximum 200 joules with biphasic defibrillation and 360 joules with a monophasic defibrillation). Avoid a large number of consecutive discharges as may damage the simulator. Leave at least 30 minutes recovery period after a sequence of more than nine consecutive discharges.
- Do NOT provide more than nine consecutive discharges over three minutes without recovering for 30 minutes before the next discharge as it may damage the simulator
- Do NOT let the simulator come in contact with electrically conductive surfaces or objects during defibrillation. A flame-supporting atmosphere, for example, with a high content of oxygen, should be avoided during defibrillation.
- Keep the simulator's chest dry. Special attention should be taken when using the urinary system features
- To prevent pitting of the chest skin electrode, do NOT apply conductive gel or conductive defibrillation pads intended for patient use
- Do NOT use cables or connectors having visible damage
- Do NOT spill fluids over any component inside the simulator torso. This could damage the system and may also present a possible hazard for the operator.
- When using a manual defibrillator, the ECG can be monitored via the defibrillator paddles. Coarse ventricular fibrillation and high-rate ventricular tachycardia cardiac rhythms are automatically recognized as "shockable" rhythms.
- With each defibrillation, the simulator automatically records the amount of energy discharged and the time defibrillation was performed. The simulated patient response to defibrillation is determined by the scenario script or instructor intervention. Thus, cardioversion is not automatically determined by the physiological models.
- The minimum electrical charge recognized by the circuitry within the simulator is 20 joules
- Monophasic and Biphasic defibrillators can be used with either paddles or hands-free connectors

- For paddle placement on the chest, the simulator comes with two anterior defibrillation disks (provided with accessories). Screw the disks onto the threaded connections or leave the threaded connections, as required.

The right defibrillation connection

The left defibrillation connection
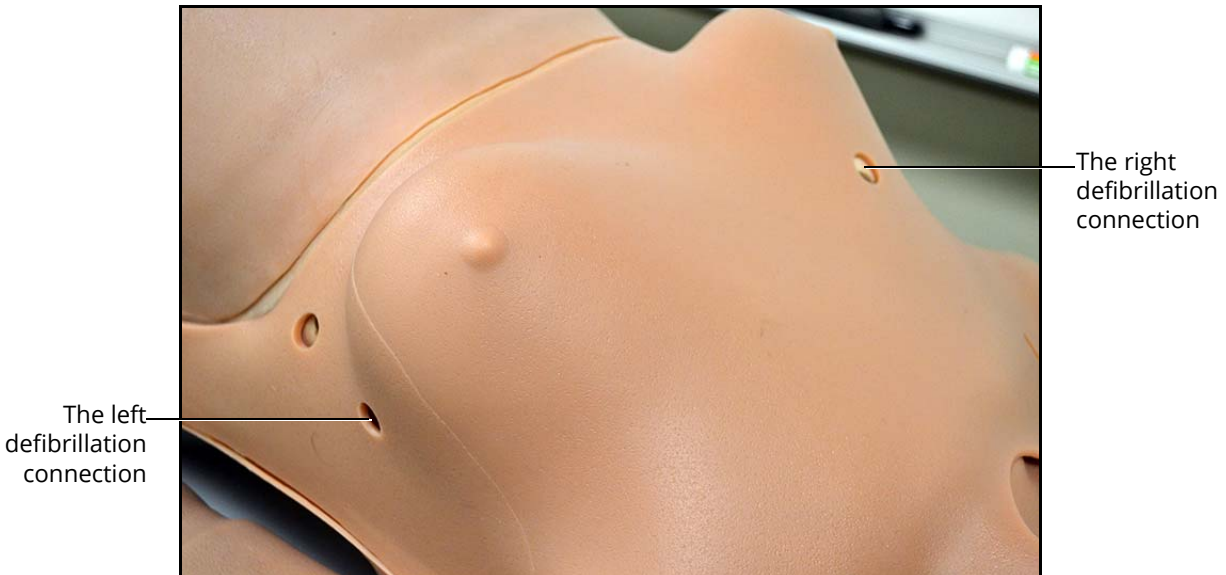
The Defibrillation Ports

Note: The Defib parameter, located on the Cardiovascular view, is also available for virtual defibrillation.

Cardiac Pacing

A standard transthoracic cardiac pacemaker can be connected to the simulator using the anterior defibrillation connection. The software automatically detects and responds to pacing signals from 20 to 200 mA, in increments of 10.

Three parameters can be used to simulate pacing within the software:

- **Pacing Capture Threshold** - determines the minimum pacing current necessary to pace the heart
- **Pacing Current** - simulates a specific amount of current discharged by an external cardiac pacemaker
- **Pacing Rate** - determines the cardiac rate when the Pacing Current is at or above the Pacing Capture Threshold

All three parameters are located on the Cardiovascular view.

Fluids

Athena is capable of IV fluid administration and urine output.

IMPORTANT: Use only clear distilled water, distilled water tinted with food coloring, or distilled water mixed with white vinegar (50/50) inside the manikin. Administration of any other type of fluid is NOT supported and may damage the system.

Bleeding and blood administration are available through the software only and are controlled from the Fluids view in Müse. To access the Fluids view, from the **Run** screen, click the blood droplet on the human form. The Fluids parameters appear.

Fluid Loss Blood	⏶⏷
Fluid Loss Plasma	⏶⏷
Colloid Infusion	⏶⏷
Crystalloid Infusion	⏶⏷
PRBC Infusion	⏶⏷
Whole Blood Infusion	⏶⏷
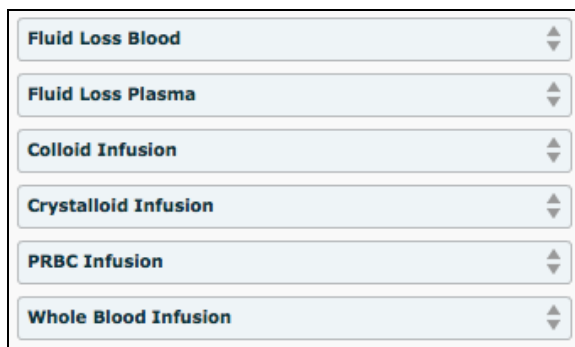
The Fluids View

Fluids			
	Description	**Software Control**	**Manual Control**
Blood Loss	The software can simulate blood loss, causing appropriate physiological changes in the patient.	VIEW: Fluids PARAMETER(S): Fluid Loss Blood, Fluid Loss Plasma	None required.
Urinary Catheterization	The simulator supports urinary catheterization. When catheterized, the simulator can produce urinary output of approximately 30-35 mL.	None required.	See *The Genitourinary System* on the following pages.

Fluids			
	Description	**Software Control**	**Manual Control**
IV Access	The simulator's right and left hands and arms provide intravenous access locations.	None required.	See *Medication and Fluid Administration* on the following pages.
IV Medication Administration	Bolus injections can be administered utilizing standard syringes while continuous IV infusions can be administered using infusion devices. Injections can be administered in the IV hands and arms bilaterally at the dorsal metacarpal, basilic, median antebrachial, cephalic, and median cubital locations.	Administered IV medications must be set by the instructor. Medications are administered via the Medications palette.	Up to 300 mL of administered IV fluid are collected in reclaim bags located in the simulator's arms. If additional fluid administration is desired, an empty IV bag and tubing can be connected to the IV Drain port located on the simulator's left side.
IV Fluid Administration	IV fluids can be administered in the IV hands and arms bilaterally at the dorsal metacarpal, basilic, median antebrachial, cephalic, and median cubital locations.	Administered IV fluids must be set by the instructor. VIEW: Fluids PARAMETER(S): Colloid Infusion, Crystalliod Infusion, PRBC Infusion, Whole Blood Infusion Fluid administration can also be achieved by using the Intervention palettes.	Up to 300 mL of administered IV fluid are collected in reclaim bags located in the simulator's arms. If additional fluid administration is desired, an empty IV bag and tubing can be connected to the IV Drain port located on the simulator's left side.

Hematology Model

The physiological model calculates hematocrit values (i.e. percentage of total blood hemoglobin) dynamically and continuously, taking into account blood and fluid losses, as well as the intravenous infusion of fluids such as whole blood, packed red blood cells, colloids and crystalloids.

Instructors can create patients with both normal and pathophysiological hematocrit levels. In addition, learners discover how administering various fluids affects hematocrit, the oxygen-carrying capacity of blood, and the resulting patient response.

The following important assumptions have been made in the design of the Hematology Model:

- Blood is comprised of two components: red blood cells and plasma

- Plasma is comprised of two components: colloid and crystalloid. The term colloid is used to describe substances that generate a clinically significant colloid osmotic pressure - for example, fresh frozen plasma, albumin and hetastarch. The term "crystalloid" is used to describe salt solutions for infusion - for example, normal saline, dextrose in water and Ringer's Lactate.

- The mixing of blood and its various constituents is instantaneous and homogeneous. In other words, one liter of crystalloid administered intravenously equilibrates immediately and homogeneously throughout the entire circulation.

- This Hematology Model does not distinguish between the differing clinical effects of colloids and crystalloids. For example, osmotic pressures and capillary leakage rates are not taken into account. Likewise, fluid kinetics and fluid distribution within the circulation and interstitial and intracellular spaces are also not modeled.

In the Hematology Model, the following model variables, definitions and relationships have been established:

- **Red Blood Cell Volume**: The volume of red blood cells within the circulation

- **Plasma Volume**: The volume of plasma within the circulation

- **Total Blood Volume:** The volume of blood (i.e. Red Blood Cell Volume + Plasma Volume) within the circulation

- **Blood Volume Loss:** The amount or rate of decrease in the total blood volume. A given amount or rate of blood loss proportionally decreases both the Red Blood Cell Volume and the Plasma Volume according to the current hematocrit.

- **Plasma Volume Loss:** The amount or rate of decrease in the plasma volume. A given amount or rate of plasma loss decreases the plasma volume without changing the red blood cell volume. Plasma Volume Loss refers collectively and generically to all plasma fluid losses, including evaporative, transcellular (e.g. ascites, pleural effusion), bowel and third space losses.

- **Hematocrit:** The ratio of Red Blood Cell Volume to Total Blood Volume, expressed as a percentage

The Genitourinary System

The simulator allows for the insertion of a 16 Fr urinary catheter and excretion of urine.

The genitourinary (GU) system must be primed prior to use.

IMPORTANT: Use only clear distilled water, distilled water tinted with food coloring, or distilled water mixed with white vinegar (50/50) inside the manikin. Administration of any other type of fluid is NOT supported and may damage the system.

Be sure to clean the system before storing the manikin.

For more information on cleaning the GU system, see *Cleaning the Genitourinary System* in the *Care and Maintenance* section.

Priming the Genitourinary System

Prior to catheterizing the simulator, the genitourinary (GU) system must be primed.

To prime the GU system:

1. Fill a syringe with distilled water (and clinically appropriate food coloring if desired)
2. Connect the syringe to the GU filling tool
3. Plug the GU filling tool into the **Urinary** port (colored yellow) located on the torso baffle inside the manikin
4. Slowly push in the distilled water until fluid drains into the overflow reservoir on the GU filling tool (approximately 70 mL +/- 10 mL)
5. Disconnect the GU filling tool from the **Urinary** port
6. Store the GU filling tool in a secure location
7. Use only the lift straps attached to the abdomen (tucked under skin) to lift and remove the abdomen from the manikin's torso
Note: The speaker cable will be connected to the manikin torso and may be removed for easier access.

The lift straps ——
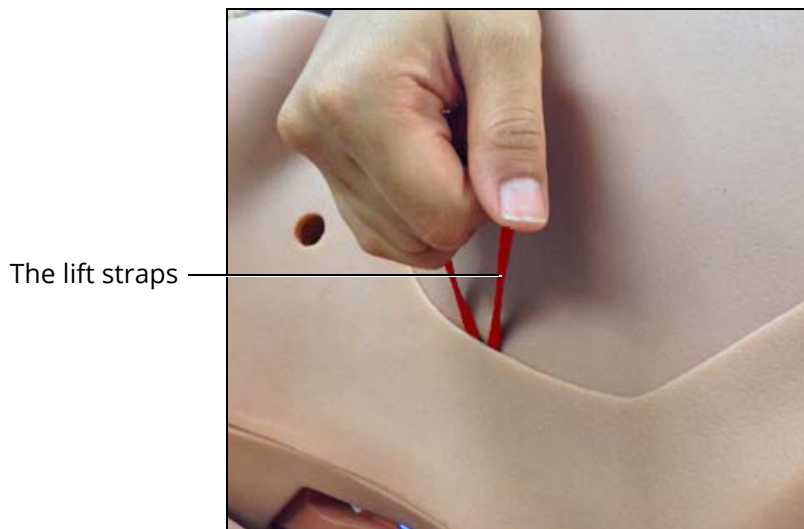
The Abdomen Removal

8. Fill a syringe with distilled water (and clinically appropriate food coloring if desired)
9. Connect the syringe to the GU filling tool

10. Plug the GU filling tool into the **Urinary** port (colored yellow) located on the torso baffle inside the manikin

The Urinary port

The Speaker connection

The Urinary Port

11. Slowly push in the distilled water until fluid drains into the overflow reservoir on the GU filling tool (approximately 70 mL +/- 10 mL)

12. Disconnect the GU filling tool from the **Urinary** port

13. Store the GU filling tool in a secure location for future use

14. Ensure the speaker cable is plugged into the corresponding connection inside the manikin's torso

15. Latch the abdomen shell into the manikin's torso and ensure the speaker cable is not pinched or constricted

The abdomen latch post

The manikin torso hole
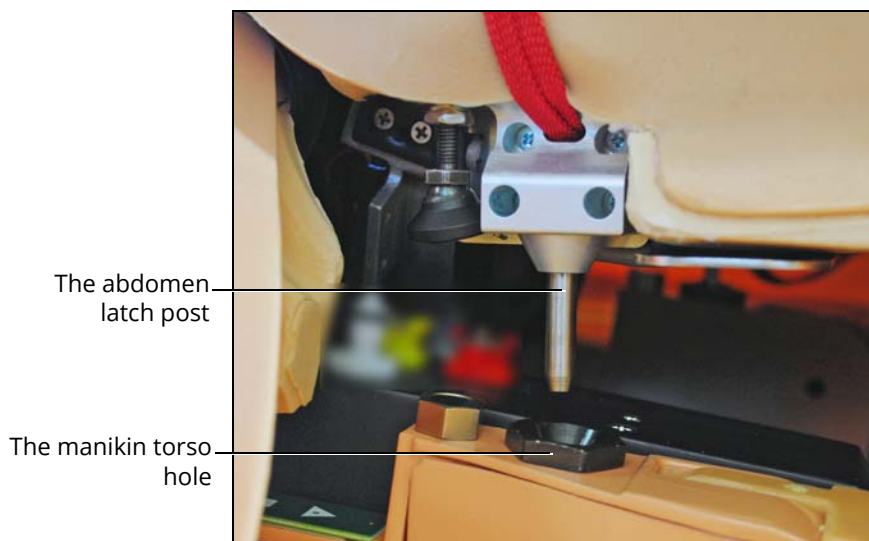
The Abdomen Placement

IMPORTANT: *Ensure the abdomen is properly installed and latched during all simulations.*

Note: Do not remove or modify the black port plugs.

For more information on draining and cleaning the GU system, see *Cleaning the Genitourinary System* **in the** *Care and Maintenance* **section.**

Inserting a Urinary Catheter

Once the GU system has been primed, catheterize the simulator using a standard 16 Fr urinary catheter lubricated with cottonseed oil spray.

When the catheter is inserted, simulated urine begins to flow until the internal bladder is empty.

Note: The urinary catheter needs to be inserted approximately 4 1/2" to achieve urine flow.

Priming the IV System

To prime the IV system:

1. Ensure the IV system is empty prior to filling; connect the 140 mL syringe to the IV drain port and withdraw fluid and/or air until a vacuum is formed
2. Fill a 50 mL syringe with distilled water (and clinically appropriate food coloring if desired for added realism)
3. Connect the filled syringe and priming tube to the **IV FILL** port on the left side of the simulator's torso

The **IV FILL** port

The Battery Compartment and Ports

The **IV FILL** port

The Ports

4. Depress the syringe until no water remains in the syringe and disconnect from the **IV FILL** port

WARNING: *If a flashback does not occur, do NOT inject any fluid and remove the needle immediately. Repeat the priming directions and **ensure you have inserted the needle properly into the simulated vein**.*

Note: Fluids and medications can be administered intravenously by attaching the tubing from a standard IV solution set to the desire IV access site. If administering more than 300 mL, connect an external empty IV bag and tubing to the IV DRAIN port located on the left side of the manikin's torso to prevent overfilling the simulator.

Note: Do not remove or modify the black port plugs.

Administering Suppositories

Up to five small, aspirin-sized suppositories can be administered via the simulator's rectum.

The suppositories must be removed and the rectum cleaned after administration.

For information on how to clean the rectum, see the *Care and Maintenance* section of this user guide.

Sounds

A variety of simulated sounds are available to enhance realism. A patient must be running in Müse for any sounds to be available.

Patient Speech

Patient speech can be achieved using the Speech Sounds feature in Müse or by using an external Wireless Voice Link (WVL).

Speech Sounds

The Speech Sounds features in Müse can be used to make the manikin vocalizations such as pain ratings, various phrases and utterances such as screaming and panting. Custom vocalizations recorded by the user and uploaded to Müse from the System Administration menu can also be played from the Speech Sounds menu.

To play a vocalization, click the Speech balloon.

The Speech Sounds Menu
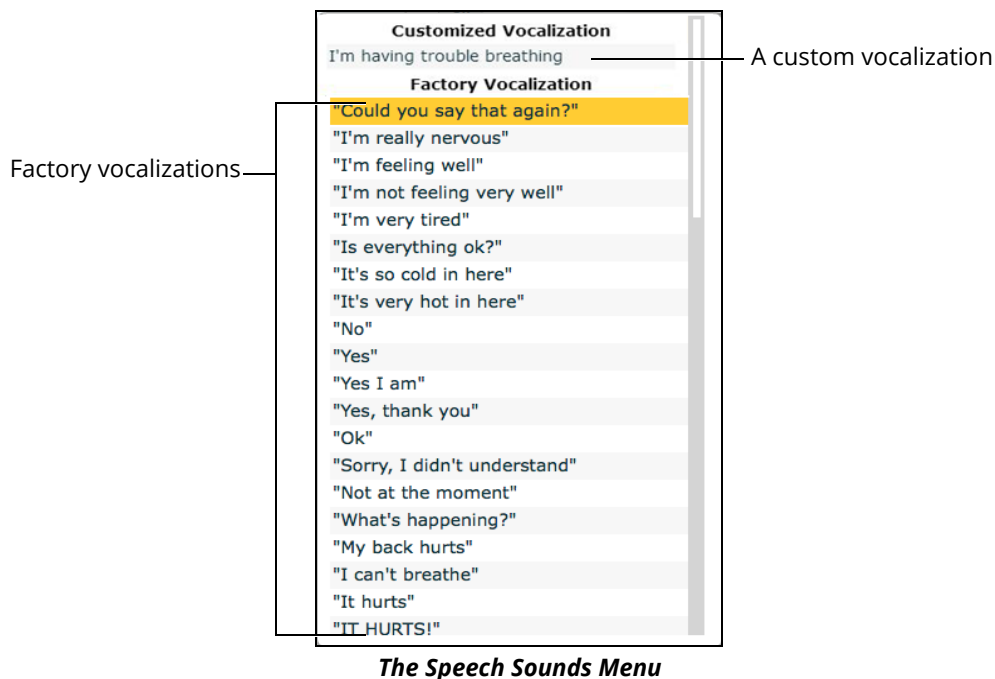
Select the desired vocalization.

To replay the last vocalization, click the **Play** button in the Speech balloon.
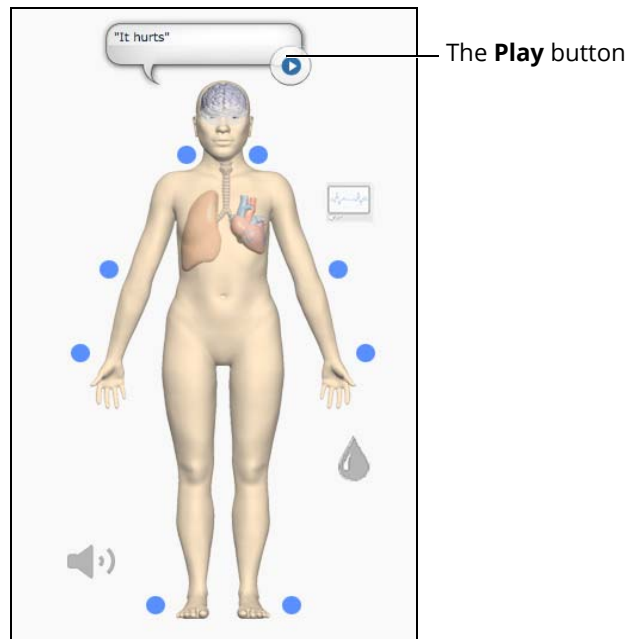
The **Play** button

The Speech Balloon with Play Button

Wireless Voice Capability

In addition to the pre-programmed speech, any response can be transmitted through the manikin speakers using the Wireless Voice Link.

For detailed instructions on using the wireless voice link, see the *Wireless Voice Link* section of this user guide.

Bowel Sounds

The Bowel Sounds menu can be used to control bowel sounds.

The bowel sounds can be adjusted by clicking the Sound Control icon 🔊 on the Run screen. When the Sounds panel appears, select **Bowel Sounds**. The Bowel Sounds menu appears.
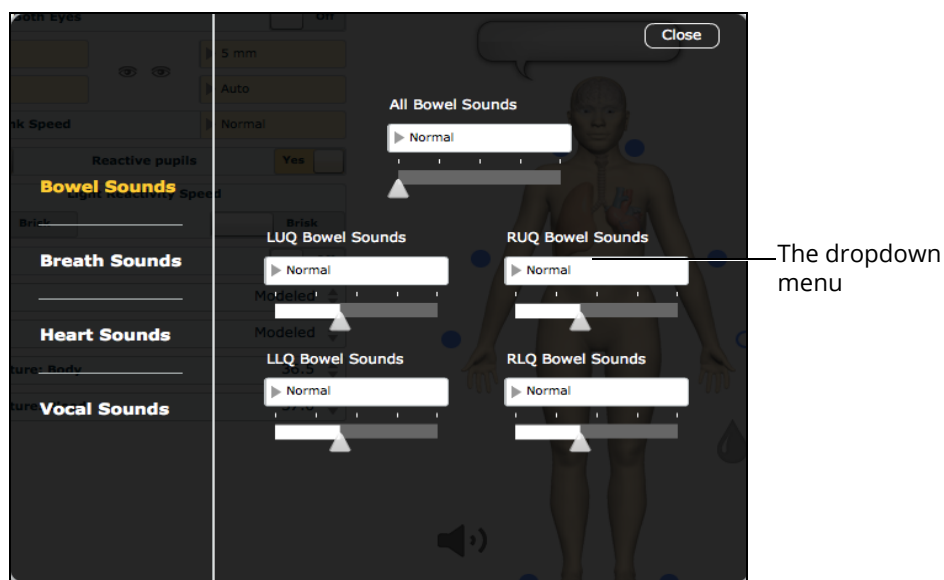
The Bowel Sounds Menu

Independent control of the type and volume of bowel sounds may be selected in each anatomical region. To affect the bowel sounds simultaneously in all anatomical regions, select **All Bowel Sounds** and the desired sound and volume.

Click any of the drop-down menus to change the type of sound. Click and drag the slider beneath the drop-down menu to adjust the volume.

Breath Sounds

Breath sounds are independently synchronized with ventilation of the left and right lungs. Fourteen speakers, eight anterior and six posterior, provide breath sounds that can be auscultated. Anterior and posterior sounds and each of the four quadrants of the torso can be set independently to produce a particular breath sound

Breath sounds can be adjusted by clicking the Sound Control 🔊 icon on the Run screen. When the Sounds panel appears, select **Breath Sounds**. The Breath Sounds menu appears.
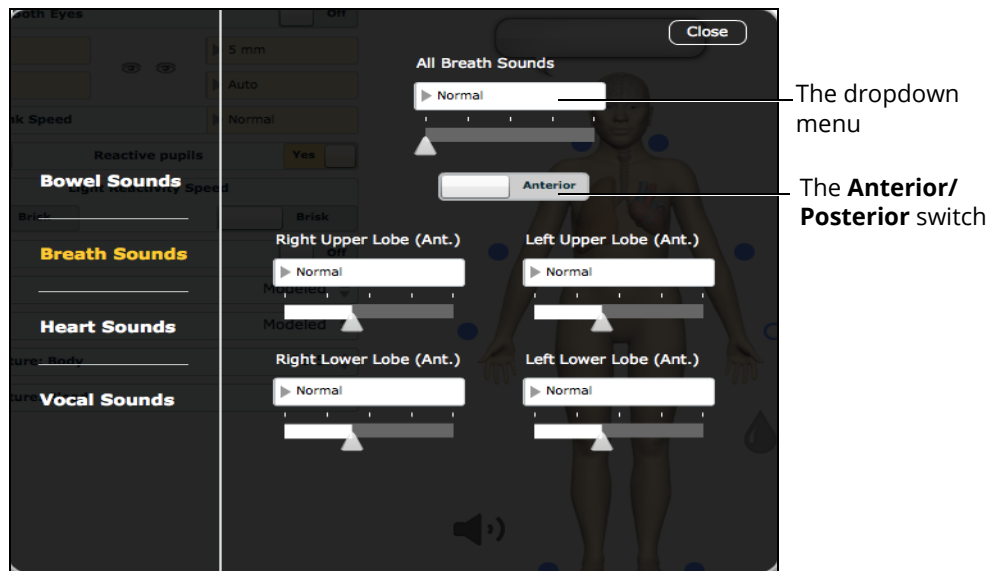
The Breath Sounds Menu

Use the **Anterior/Posterior** switch to toggle between anterior and posterior breath sounds.

Click any one of the drop-down menus that control one of the four quadrants to change the type of sound. Click and drag the slider for each location to adjust the volume.

Selecting a sound from the **All Breath Sounds** menu changes all posterior or anterior sounds.

Click and drag the slider to adjust the volume of all anterior or posterior quadrants.

The default volume level is 50%.

Heart Sounds

Heart sounds emanate from four speakers and are synchronized with the cardiac cycle. Heart sounds can be auscultated over the left and right sternal border, right lower sternal boarder and apex.

By default, heart sounds are set to the Normal sound.

Heart sounds can be adjusted by clicking the Sound Control 🔊 icon on the Run screen. When the Sounds panel appears, select **Heart Sounds**. The Heart Sounds menu appears.
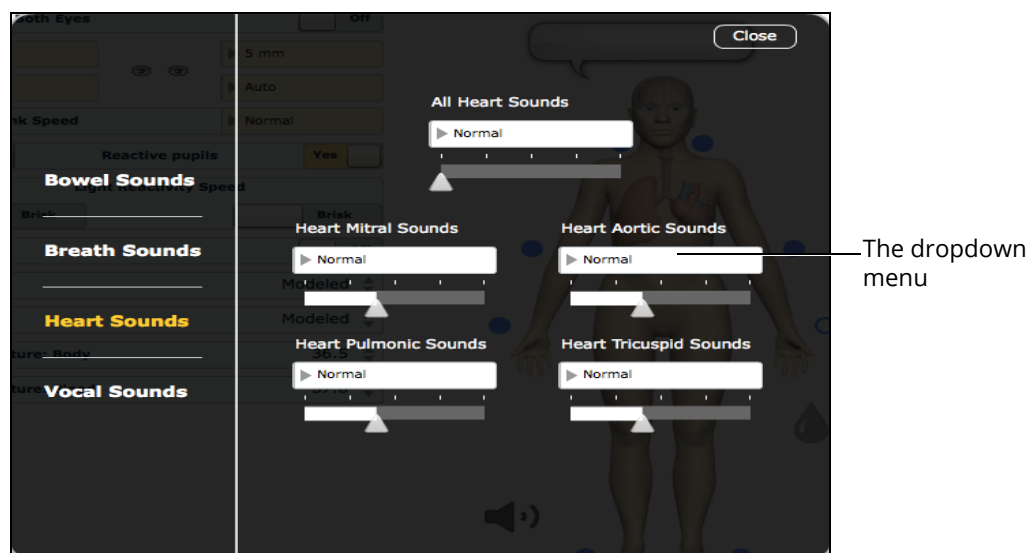
The Heart Sounds Menu

Click any of the drop-down menus to change the type of sound. Click and drag the slider beneath the drop-down menu to adjust the volume.

The default volume level is 50%.

Audible Breathing Sounds

Audible breathing sounds, such as wheezing and gasping, can be heard without the use of a stethoscope.

Audible breathing sounds can be adjusted by clicking the Sound Control 🔊 icon on the Run screen. When the Sounds panel appears, select **Audible Breathing Sounds**. The Audible Breathing Sounds menu appears.
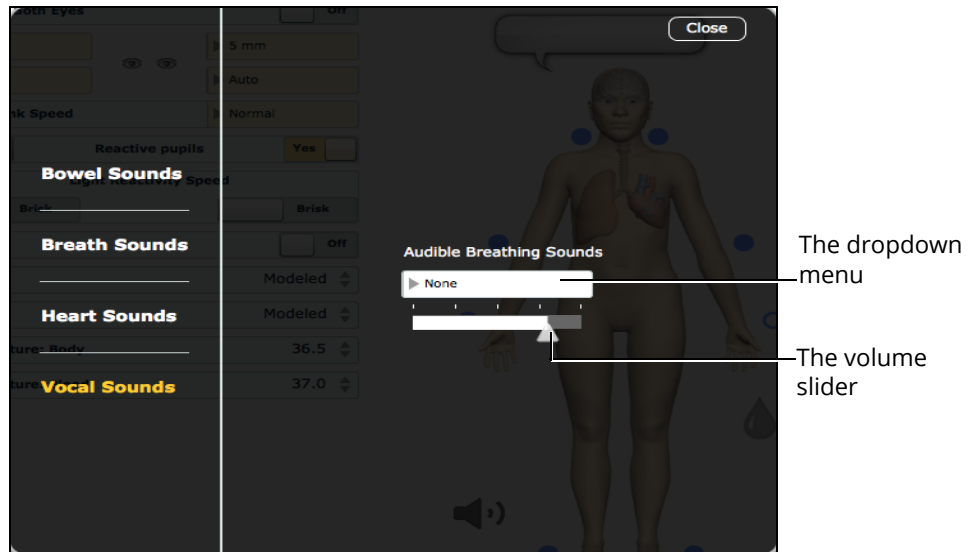
The Audible Breathing Sounds Menu

Click the **Audible Breath Sounds** drop-down menu to change the type of sound.

Click and drag the slider to adjust the volume.

By default, no breathing sound is selected.

The Default volume level is 30%.

Note: The Audible Breath Sounds volume control also applies to the speech sounds.

CARE AND MAINTENANCE

Maintaining the simulator requires careful treatment of the electronic and mechanical components. Each time the simulator is assembled or disassembled, make sure all components are properly handled and correctly removed from or placed into storage.

Note: Certain hardware components within the simulator and Instructor Workstation are not user serviceable. Consult CAE Customer Service to address any hardware maintenance concerns.

CAE Assurance Programs

General Information

CAE patient simulator products come with a one-year Assurance support and maintenance plan. All plans begin at the date of shipment or CAE installation. You may upgrade your first-year plan to an enhanced plan and receive remedial and planned maintenance. To prevent equipment downtime and delays after the plan expires, CAE encourages customers to purchase extended Assurance plans for all subsequent years.

Units Out of Plan

For units no longer under an Assurance plan that require repairs, the Time and Materials service plan applies. For more information, see *Time and Materials* section of this Care and Maintenance section.

To place an out-of-plan unit under a support and maintenance plan, CAE reserves the right to have the patient simulator inspected by a CAE-approved technician at the customer's expense. If necessary, the unit would have to be repaired at the customer's expense prior to issuance of a plan.

The repairs required as the result of the examination will be quoted on a time and material basis.

Plan Period

Assurance plans are not ordinarily offered for periods of less than one year. However, multiple-year plans may be arranged for up to an additional three years. Discounts are available for purchase of multiple-year plans.

Limitations of Plan

Your exclusive remedy for any defective patient simulators is limited to the repair or replacement of the defective patient simulator.

CAE may elect which remedy or combination of remedies to provide at its sole discretion. CAE shall have a reasonable time after determining that a defective material exists to repair or replace the identified defective material. CAE's replacement material will be manufactured from new and/or serviceable parts. CAE's Assurance plan applies to repaired or replaced materials for the balance of the applicable period of the original support and maintenance plan or ninety days from the date of shipment of a repaired or replaced material, whichever is longer. CAE warrants its labor for 30 days or the balance at the applicable period of the original support and maintenance plan, whichever is greater.

CAE shall not be liable under this Assurance plan for incidental or consequential damages, or in the event of any unauthorized repairs or modifications have been made or attempted, or when the product, or any part thereof, has been damaged by accident, misuse or abuse. This plan does not cover normal wear or tear, staining, discoloration or other cosmetic irregularities that do not impede or degrade product performance. Any damage or malfunction as a result of the installation of software or hardware, not authorized by CAE, will be repaired under the Time and Materials service plan (see *Time and Materials* section).

CAE's Assurance plans do not cover products that have been received improperly packaged, altered or physically damaged. Products will be inspected upon receipt.

Some states in the USA do not allow the exclusion or limitations of incidental or consequential damages, so the limitations above may not apply to you. The Assurance plan gives you specific legal rights and you may also have other rights, which vary from state to state.

Return Materials Authorization (RMA)

No product may be returned directly to CAE without first contacting CAE for an RMA number. If it is determined that the product may be defective, the customer will be given an RMA number and instructions for returning the product. An unauthorized return (e.g., one for which an RMA number has not been issued) will be returned at the customer's expense. Authorized shipments are to be shipped prepaid to the address on the RMA. The original box and packaging materials should be kept for storing or shipping your product. To request an RMA, please contact Customer Service.

Training for Life™

With CAE's Training for Life, you now have access to free and unlimited beginner to advanced simulator training courses for everyone on your staff with the purchase of a CAE Assurance plan. This benefit extends to everyone in your institution for the life of your simulator. Training for Life offers you the opportunity to refresh your skills, learn current best practices, and ensure you are getting maximum training value from your simulator. Training for Life includes access to all courses taught by our clinical experts and certified technicians.

System Software Upgrade Support

Customers with current support and maintenance plans are entitled to receive updates and upgrades to applications software previously purchased. Installation of the system software is the user's responsibility.

The System Software Upgrade Support includes software upgrades for base software and purchased optional learning modules.

Note: This does not apply for major upgrades or technological enhancements.

Time and Materials

For those systems not under a support and maintenance plan, service will be provided as required on a Time and Materials basis:

The principal period of on-site support (customer's local time) is:

- Monday through Friday, 8:00 AM to 5:00 PM (customer's time zone)
- Holiday and non-business days excluded
- Support outside principal period is billed at the premium rate (hourly rate x 1.5)

A minimum of 48 hours notice is required for scheduling an on-site support call. Urgent on-site support with less than 48 hours notice will be charged at the premium hourly rate.

On-site time is described as the time period commencing from arrival at customer site through departure from customer site.

How to Contact Customer Service

For customer service, please contact CAE.

CAE Customer Service Headquarters - United States and Latin America

Monday - Friday from 7:00 a.m. to 6:00 p.m. ET
Toll Free:+1 (866) 462-7920
24-hour Hotline:+1 (941) 342-5605
Fax:+1 (941) 342-5600
Email:customerservice@caehealthcare.com
Website: www.caehealthcare.com

CAE Customer Service - Canada

Monday - Friday from 8:00 a.m. to 5:00 p.m. ET
Toll Free:+1 (877) 223-6273
Email:can.service@caehealthcare.com

CAE Customer Service - Europe, Middle East and Africa

Monday - Friday from 8:00 a.m. to 5:00 p.m. CET
Phone:+49-(0) 6131 4950354
Fax:+49 (0) 6131 4950351
Email:international.service@caehealthcare.com

CAE Customer Service - United Kingdom and Ireland

Monday - Friday from 9:00 a.m. to 5:00 p.m. GMT
Phone:+44(0)800-917-1851
Email:uk.service@caehealthcare.com

Note: Principal hours of operation exclude holidays and non-business days.

IMPORTANT: *Technical and clinical phone support are available ONLY for products with active support and maintenance plans.*

Breakdown

After each use, the simulator should be properly disassembled and stored in a secure place. To ensure that the simulator remains in good working condition, follow the prescribed CAE breakdown procedures below.

Breakdown Steps	
1	Clean the Simulator and Fluid Systems
2	Shut Down the Software
3	Power Off the Simulator
4	Power Off the Fetus

Step 1: Clean the Simulator and Fluid Systems

Each time the airway is used during simulation, it must be cleaned of lubricant and fluids with a soft cloth.

Each time the following are used during simulation, they must be cleaned of lubricant and fluids with a soft cloth:

- Maternal airway
- Birth canals
- Cervices
- Abdomen
- Fetus

If internal fluid systems were used during simulation (vaginal bleeding, IV fluids, epidural, genitourinary fluids), the fluid must be drained from the simulator and the fluid systems used must be cleaned.

For more information on cleaning the fluids, refer to the section *Cleaning the Internal Systems*.

Step 2: Shut Down the Software

To shut down the Müse software:

1. Stop any running SCEs
2. Click the Account Name in the lower, right-hand corner of the screen

   The **Logout** dialog box appears.
3. Click **Logout** to exit the software

To shut down the TouchPro Patient Monitor software:

1. Click the **Settings** button in the bottom, right-hand corner of the TouchPro Patient Monitor screen
2. From the Settings menu, click **Shutdown**
3. Click **Shutdown**

Step 2: Power Off the Simulator

Press the power button, on the right-side of the simulator's torso for two seconds.

It will take a moment to cycle down and the indicator light will turn off when the simulator is completely shut down.

Maintenance Advice

Simple care and maintenance helps to ensure that the simulator stays in good working condition. Many problems are caused by inadequate or improper maintenance. Perform a thorough check of the various components each time the simulator is used.

General Simulator Care

Follow these general simulator care guidelines to protect and care for the simulator:

- Avoid the use of writing instruments and sharp objects near the patient simulator to prevent unattractive markings on or tears in the skin

- Lubricate airway adjuncts and urinary catheters with cottonseed oil spray (and NOT a water-based lubricant) prior to insertion

- A mild detergent and warm water will remove most marks and stains. Gently rub the soiled area with a soft cloth. Do NOT use ABRASIVE soaps or pads.

- Prior to using moulage of any kind, CAE suggests the application of a very light coating of petroleum jelly, followed by a light dusting of baby powder to the simulator's skin. This application makes cleaning the skin easier.

- If any of the genitourinary or IV features on the manikin have been used, drain and clean the simulator as described in the following pages. Failure to drain and clean the systems may cause problems with the system.

Store the Simulator

When in regular use, the simulator breakdown procedure and general cleanup are sufficient to prepare the simulator for storage.

In addition, be certain to follow these instructions:

- Storage temperature should not exceed 122° F (50° C) or fall below 39° F (4° C)

- If a soft-sided simulator case is being used, the simulator should lay flat on its back

- The simulator should NEVER be stored or shipped with fluids in the system

Care for Electronic Equipment

- Do NOT use any of the computer components associated with this system for any other use

- Do NOT connect the computer components to any network of any kind

- Install any CAE software updates as soon as they become available

Inspect the Airway

The manikin is equipped with an anatomically accurate airway that supports the practice of various airway management techniques. In the process of performing these techniques improperly or aggressively, the upper airway can be damaged. While such damage may be readily apparent (manifested as a leak in the breathing circuit) when the simulator is connected to a ventilator, it may not be obvious during spontaneous or bag and mask ventilation.

Because damage can occur, occasional visual inspection of the airway is recommended. Using the light of a laryngoscope blade or a flashlight, visually examine both the upper and lower airway. While tears in the upper airway resulting from intubation may be obvious, needle holes in the lower bronchi may not be readily apparent.

If damage to the airway is found, small cuts or tears may be reparable. However, for permanent repair of damaged simulators contact CAE Customer Service.

Charging the Batteries

To charge the simulator batteries using the AC adapter:

1. Connect the AC adapter into the port located on the right side of the manikin's torso (located next to the power button)

The AC adapter connection

The AC Adapter Connection

2. Connect the electrical plug on the other end of the AC adapter to a power source

Three manikin battery indicator lights are located on the left side of the manikin.

- **All three indicator lights are illuminated and not blinking:** The manikin's batteries are fully charged
- **Two indicator lights are illuminated and not blinking:** The manikin's batteries have less than 50% power remaining
- **One indicator light is illuminated and not blinking:** The manikin's batteries have less than 20% power remaining
- **One indicator light is illuminated and blinking:** The manikin's batteries have less than 15% power remaining
- **One light is illuminating at one time in sequence from left to right:** The manikin's batteries are charging

Note: The batteries charge at a slower rate if the simulator is powered on while the AC adapter is plugged in.

An external battery charger can be purchased to charge the batteries outside of the simulator.

WARNING: *If the simulator is still in use, ensure that the AC adapter is plugged into the simulator and a working power source prior to removing both batteries.*

To charge the simulator batteries using the external battery charger:

1. Locate the battery compartment cover on the left side of the manikin's torso
2. Pull down on the silver security pin and pull the cover away from the torso
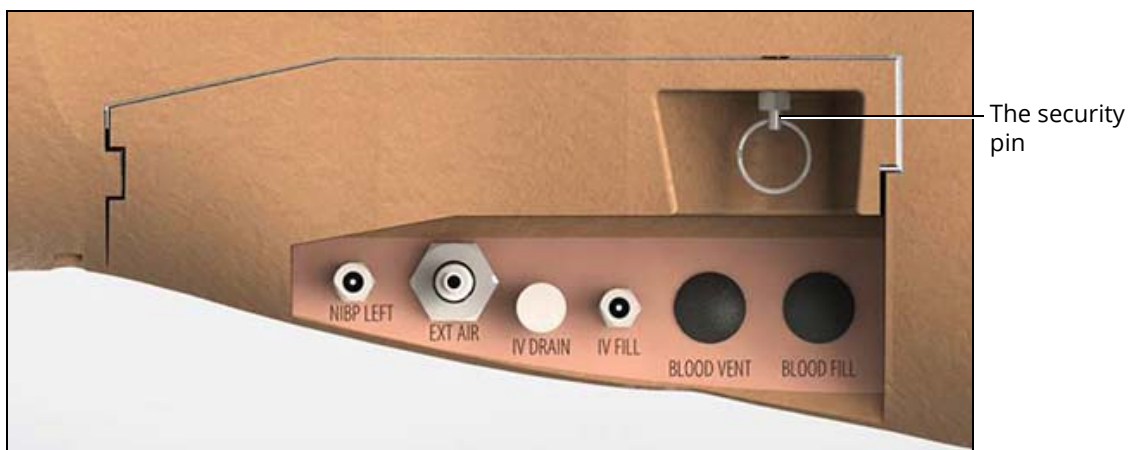
The Battery Compartment and Ports with Cover

The cover is removed and the batteries are visible in the manikin.

3. Remove the batteries from the simulator by pulling on the tabs and lifting the batteries out of the battery compartment

   Note: Ensure that the battery tab is accessible and not tucked into the battery compartment.

4. Plug the external charger into a power source
5. Insert the batteries into the external charger charging station

Batteries require approximately four hours to fully charge.

Note: Batteries will lose charge over time when left in a stored, unused simulator. When storing the simulator for an extended amount of time, remove the batteries from the simulator.

Clean the Internal Systems

The internal systems of the manikin must be cleaned after each simulation session. Only the systems that were used need to be cleaned.

Cleaning the IV System

To clean the IV system:

1. Connect an empty 140 mL syringe to the **IV DRAIN** port located on the left side of the simulator's torso

The **IV DRAIN** port
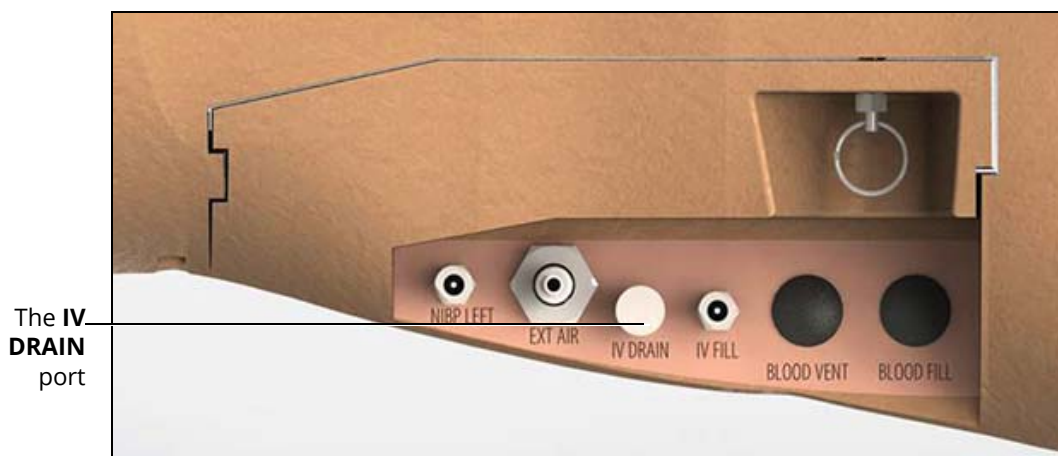
The Ports

2. Slowly withdraw air from the port until a vacuum is formed. If only clear fluid was injected into the IV system during use, the cleaning procedure is complete.

IMPORTANT: *If colored fluid was injected in the IV system, complete the Priming the IV System instructions in the Using Athena section with clear fluids and complete the Cleaning the IV system instructions for a second time.*

Cleaning the Genitourinary System

To clean the genitourinary system:

> Use only the lift straps attached to the abdomen (tucked under skin) to lift and remove the abdomen from the manikin's torso.
> **Note:** The speaker cable will be connected to the manikin torso and may be removed for easier access.
> For more information on abdomen removal, refer to the section *The Genitourinary System.*

3. Connect the syringe to the GU filling tool

4. Plug the GU filling tool into the **Urinary** port (colored yellow) located on the torso baffle inside the manikin

5. Ensure a urinary catheter is inserted and place the exposed end of the catheter in a basin to catch the fluid

6. If distilled water tinted with food coloring was used, fill the syringe with 50 mL clear distilled water and flush the water through the GU filling tool connected to the **Urinary** port located on the torso baffle inside the manikin. Continue flushing until the waste water is completely clear.

7. Fill the syringe with air and slowly push air through the GU filling tool connected to the **Urinary** port until no more water drains into the basin

8. Disconnect the GU filling tool from the **Urinary** port and remove the urinary catheter

9. Ensure the speaker cable is plugged into the corresponding connection inside the manikin's torso

10. Latch the abdomen shell into the manikin's torso and ensure the speaker cable is not pinched or constricted

IMPORTANT: *Ensure the abdomen is properly installed and latched during all simulations.*

Clean the Rectum

To clean the rectum:

1. Remove the rectal plug from back of lower torso

2. Fill a syringe with distilled water and push water through the anus

3. Repeat as necessary until suppositories are extracted (if applicable)

4. Insert the rectal plug back in place

Draining Condensation from the Simulator

As part of a regular preventive maintenance schedule, condensation should be drained from the simulator.

Depending on environmental conditions, moisture may condense inside the compressed air lines and tanks within the simulator. It is recommended that this fluid be drained every 40 hours of operation. In outside, high humidity conditions, the system should be drained more frequently.

To drain condensation:

1. Locate the Condensation Drain Hose (included with accessories)

The Condensation Drain Hose

2. Bring the hose and a small bucket to the simulator location
3. Bend the simulator's right knee to lift the thigh to at least a 45-degree angle
4. Power on the simulator, but do not start Müse. Allow enough time for the internal compressor to pressurize the system. (The pump will turn off automatically.)
5. Power off the simulator
6. Place the tubing end of the Condensation Drain Hose into the small bucket and then connect the gray fitting onto the simulator's **EXT AIR** port, located on the left side of the simulator, with a push and twist motion. There will be a sudden release of pressure into the bucket. Any condensation within the system will drain with this exhaust.
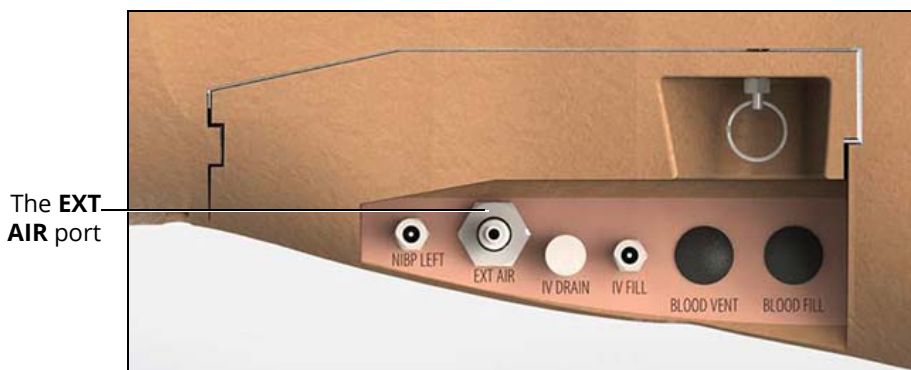
The Ports

7. Disconnect the Condensation Drain Hose from the simulator

CONDITION GUIDELINES FOR PROGRAMMING HPS

This section is intended to help you select Müse conditions to achieve desired vital signs within each programmed state. All four conditions should be programmed into each state in the order presented below:

- Respiratory: Desaturation
- Cardiovascular: Blood Pressure
- Cardiovascular Heart Rate
- Respiratory: Respiratory Rate

The Müse software is physiologically driven. When using multiple conditions (e.g., Desaturation + Hypertension + Tachycardia + Tachypnea), physiological regulatory mechanisms such as the baroreceptor reflex and ventilatory control cause compensatory changes within parameters. To achieve the desired vital sign, select one condition level, above (greater) or below (less), to achieve the desired physiological effect.

Respiratory: Desaturation

Desaturation	SpO$_2$ Value
Reset	98%
High 90s	96-97%
Mid 90s	94-96%
Low 90s	91-93%
High 80s	87-90%
Mid 80s	84-86%
Low 80s	80-83%
High 70s	77-80%
Mid 70s	74-77%
Low 70s	69-71%
Less than 70	<69%

Cardiovascular: Blood Pressure

Hypertension		Hypotension	
Reset	110s/70s	Reset	110s/70s
Increased	120s/80s	Decreased	100s/70s
Pre-Borderline	130s/80s	Pre-Borderline	100s/60s
Borderline	140s/90s	Borderline	90s/50s
Mild	150s/90s	Mild	80s/40s
Moderate	160s/100s	Moderate	70s/40s
Severe	170s/100s	Severe	60s/30s
Profound	190s/110s	Profound	50s/30s
Extreme	220s/120s	Extreme	40s/30s

Cardiovascular: Heart Rate

Tachycardia		Bradycardia	
Reset	70s	Reset	70s
Increased	High 70s	Decreased	Mid 60s
Elevated	80s	Pre-Borderline	Low 60s
Pre-Borderline	90s	Borderline	Mid 50s
Borderline	100s	Intermediate	Low 50s
Intermediate	110s	Mild	High 40s
Mild	120s	Moderate	Mid 40s
Moderate	130s	Severe	Low 40s
Severe	140s	Extreme	Mid 30s
Supra	150s	Acute	Low 30s
Profound	160s		
Extreme	170s		
Acute	High 170s		

Respiratory: Respiratory Rate

Tachypnea		Bradypnea	
Reset	11	Reset	11
Increased	15	Increased	10
Elevated	18	Intermediate	9
Borderline	20	Mild	7
Intermediate	22	Moderate	6
Mild	25	Severe	5
Moderate	28	Profound	3
Severe	31	Extreme	2
Profound	33		
Extreme	36		

MÜSE PARAMETER DESCRIPTIONS

Neurological - Parameters

The Athena simulator can simulate a variety of neurological clinical indicators.

Neurological Parameters
Apply to Both Eyes
Eyes: Pupil Control
Eyes: Blinking
Eyes: Blink Speed
Reactive Pupils
Light Reactivity Speed
Eyes: Consensual Pupil Response
Eyes: Condition
Eyes: Panning
Eyes: Brightness
Convulsions (Optional)
Seizures
ICP
NMB
Temperature: Body
Temperature: Blood

Eyes: Pupil Control

The pupil control parameters are used to control the diameter of the pupils in the eyes. Each eye has reactive pupils and functional eyelids that blink.

Currently, there are four pupil options that are used to control the diameter of the pupils in both eyes: Modeled, Reactive, Blown or a Fixed Pupil Size (2 mm to 8 mm).

When the Eyes are set to Reactive, the pupils re-size in response to changes in lighting condition. If both pupils are set to Reactive, both pupils re-size in a consensual manner.

If the Eyes are set to Modeled, the pupil size is driven by the pharmacology of morphine. In this mode, the baseline pupil size is 4.7 mm. With increasing effector site concentration of morphine, the pupils constrict (up to a maximum constriction of 2.8 mm). A dose of 4.6 mg of morphine results in 50% of the maximum effect (a pupil size of 3.75 mm). The reactivity to light is absent for this option and is only available in the Reactive mode. Presently, when the Modeled option is selected, only morphine has an effect on pupil size. The pupillary response to other drugs can be made "on the fly" or scripted using the Scenario Designer.

Other settings allow the user to fix one or both pupils to a specific size.

> **Default:** Reactive

Eyes: Blinking

In **Auto** mode the eyes are normally blinking. However, the eyes will automatically close under any of the following conditions:

- SpO2 < 75%
- Spontaneous minute ventilation < 1500 mL
- Neuromuscular blockade (NMB) > 30%
- Non-pulsatile cardiac rhythm

In **Auto** mode, the eyelids are normally blinking under the following conditions: SpO_2 is greater than 80% systolic blood pressure (SBP) is greater than 70 mmHg and neuromuscular blockade (NMB) is less than 30%.

The **Blinking** and **Closed** settings allow the user to have one or both eyes either blinking or closed and override the automatic response.

> **Default:** Auto

The **Slow**, **Normal** and **Fast** parameters control the eyelid blinking frequency. Presently, blinking frequency is not linked to the physiological models. However, the response can be done "on the fly" or scripted using the Scenario Designer.

> **Default:** Normal

Eyes: Blink Speed

The **Blink Speed** parameter controls the eyelid blinking frequency and can be set to **Slow**, **Normal**, or **Fast**. Presently, blinking frequency is not linked to the physiological models. However, the response can be done "on the fly" or scripted using the Scenario Designer.

Default: Normal

Reactive Pupils

The **Reactive pupils** parameter determines whether pupils re-size in response to changes in light. When **Reactive** is selected, pupils re-size in response to changes in light.

Reactive Options:

- Reactive
- Modeled
- 2 mm
- 3 mm
- 4 mm
- 5 mm
- 6 mm
- 7 mm
- 8 mm
- Blown

    Default: Reactive
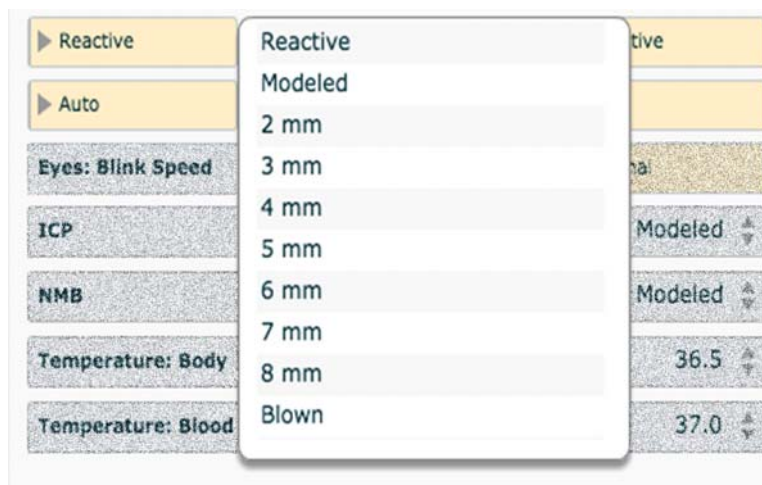
The Reactive Pupils Options

When the Reactive Eyes option is selected, shining a light in either eye will cause the pupils to expand or contract based on amount of light received.

Light Reactivity Speed

The **Light Reactivity Speed** parameter determines the speed at which the eyes react to light when the **Reactive pupils** parameter is set to **Yes**. **Light Reactivity Speed** can be set to **Sluggish** or **Brisk**.

    Default: Brisk

Eyes: Consensual Pupil Response

Setting the **Consensual Pupil Response** option to **Yes** enables synchronized pupil reactivity between both eyes. When enabled (default action), shining a light in either eye will cause the opposite eye to also react. When disabled, only the pupil of the eye where light is shined will react.

> **Default:** Yes

Eyes: Condition

Eight (8) eye Conditions are available for selection in the neurological patient controls window in Muse:

1. None (both eyes)
2. Jaundice (both eyes)
3. Bloodshot (both eyes)
4. Hemorrhage (right eye)
5. Hemorrhage (both eyes)
6. Keyhole Pupil (right eye)
7. Cataracts (both eyes)
8. Droopy Eyelids (both eyes)

> **Default:** None

Eyes: Brightness

Click the **Brightness** option to launch a slider which controls the brightness of the OLED displays. Brightness can be adjusted between 0 and 100.

> **Default:** 100

Eyes: Panning

Panning enables random eye movement (left to right).

> **Default:** Yes

Seizures

The **Seizures** parameter is used to simulate the presence of seizures. They are either **On** or **Off**.

> **Default:** Off

Intracranial Pressure (ICP)

The ICP parameter is used to set the ICP displayed as a numeric value on the Patient Status Display and on the TouchPro monitor. The value is **Modeled** by default.

> **Default**: Modeled
>
> **Range:** 0 mmHg - 65.0 mmHg

Neuromuscular Blockade (NMB)

The pharmacokinetic and pharmacodynamic models based on the neuromuscular blocking agents administered and the time course of their injection automatically determines the degree of NMB. For some educational applications, however, the instructor may wish to set a fixed degree of neuromuscular blockade that remains stable for an indefinite period. This can be accomplished using the **NMB** parameter. The default setting instructs the pharmacologic models to determine the degree of neuromuscular blockade based upon the drugs injected and their pharmacologic properties.

When a numeric value is assigned to this parameter, the degree of NMB is set to that level. For example, 80% NMB causes the simulator to set the degree of NMB to 80%, regardless of the presence (or absence) of neuromuscular blocking drugs. Clinically, the spontaneous tidal volume is markedly reduced. If NMB is set to greater than 30%, the eyes will automatically close when in the Auto mode.

> **Default**: Modeled
>
> **Range:** 0% - 100%

Temperature: Body

The temperature measured at the body surface can be set using this parameter and can be displayed on the Patient Status Display and TouchPro software.

The body temperature is not linked to the physiologic models. However, changes can be made "on the fly" or scripted using the Scenario Designer.

> **Default**: 36.5° C
>
> **Range**: 32.0° C - 42.0° C

Temperature: Blood

The arterial blood temperature can be set using the **Temperature: Blood** parameter. The arterial blood temperature can then be displayed on the Patient Status Display and TouchPro software. Note that changes in arterial temperature may alter the position of the standard oxyhemoglobin dissociation curve (shift). As temperature increases or pH decreases, more oxygen is released from hemoglobin and thus the patient's saturation decreases. The inverse is also true.

> **Default**: 37° C
>
> **Range**: 32.0° C - 42.0° C

Respiratory – Basic Parameters

Respiratory Parameters – Basic
Swollen Tongue
Airway Occluder
Laryngospasm
Upper Airway Obstruction
Needle Decompression
Bronchial Occlusion (Left and Right)
Respiratory Rate
Respiratory Rate Factor
Shunt Fraction
EtCO$_2$
SpO$_2$
NMB
Tidal Volume
Flail Chest
Intrapleural Volume: Left Intrapleural Volume: Right
Trismus
Fraction of Inspired O$_2$
Chest Tube Flow: Left Chest Tube Flow: Right

Bronchial Occlusion (Left and Right)

Turning on the **Bronchial Occlusion** parameter completely obstructs the right or left bronchi, simulating a lower airway obstruction (e.g., mucus plug).

Right and left bronchi can be occluded individually.

> **Default:** Off

Respiratory Rate

The **Respiratory Rate** parameter is used to set the respiratory rate to a given number of breaths per minute. Once set, arterial oxygen and carbon dioxide values have no effect on the resulting respiratory rate, but continue to influence other components of the physiological models. The patient continues to breathe at the set number of breaths per minute, regardless of the arterial oxygen or carbon dioxide levels.

For example, when the respiratory rate is set to 10 breaths per minute, the respiratory rate remains at 10 breaths per minute, regardless of arterial oxygen or carbon dioxide levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by altering the tidal volume, either automatically via the model-driven controls or when the **Tidal Volume** parameter is adjusted.

> **Default**: Modeled
>
> **Range**: 0 breaths per minute - 40 breaths per minute

Respiratory Rate Factor

The **Respiratory Rate Factor** parameter (along with the **Tidal Volume Factor** parameter) is used to change the baseline respiratory rate (before the control-of-breathing and drug influences are taken into account). A value of 2 doubles the baseline respiratory rate. A value of 0.5 decreases the baseline respiratory rate by 50%. Changing the respiratory rate using this parameter maintains the physiological models.

> **Default**: 1
>
> **Range**: 0.01 - 6.00

TIP: *First decrease the respiratory gain factor to reduce the influence of the respiratory control mechanism on the respiratory rate and tidal volume.*

EtCO$_2$

The **EtCO$_2$** parameter is used to set the end-tidal CO_2 to a fixed numeric value, measured in mmHg, regardless of the minute ventilation. The end exhalation point of the capnogram waveform will also reflect the set end-tidal CO_2 value. Setting the EtCO$_2$ has no effect on the arterial carbon dioxide values (PaCO$_2$), respiratory rate or tidal volume.

For example, when the EtCO$_2$ is set to 50 mmHg, the numeric end-tidal CO_2 will display a value of 50 mmHg and the capnogram waveform rises to an end-tidal of 50 mmHg. However, the respiratory rate and tidal volume will remain the same unless the **Respiratory Rate** and/or the **Tidal Volume** parameter(s) is adjusted.

> **Default**: Modeled
>
> **Range**: 0 mmHg – 100 mmHg

Shunt Fraction

The Shunt Fraction parameter is frequently used to assist in desaturating a patient. This parameter creates a physiologic "bypass" of the normal pulmonary circulation, resulting in changes in O_2, CO_2 and anesthetic gases at the alveolar level. Typically, values of 0.1 to 0.4 are needed to create large alveolar-arterial oxygen gradients sufficient to cause arterial hypoxemia.

> **Default**: 0.02
> **Range**: 0.00 - 0.50

TIP: *If the parameter is set high (0.5), the patient desaturates rapidly and responds negatively to the administration of supplemental O_2.*

SpO$_2$

The SpO$_2$ parameter is used to override the normal pulmonary circulation and set the SpO$_2$ at a fixed numeric value, regardless of the oxygen applied. Resetting to **Modeled** returns control of the underlying SpO$_2$ to the physiological models. If SpO$_2$ is set to less than 75%, the eyes will automatically close when in the Auto mode.

> **Default:** Modeled
> **Range:** 0% - 100%

Neuromuscular Blockade (NMB)

The degree of NMB is automatically determined by pharmacokinetic and pharmacodynamic models, which are based on the neuromuscular blocking agents administered and the time course of their injection. For some educational applications, however, the instructor may wish to set a fixed degree of neuromuscular blockade that remains stable for an indefinite period. This can be accomplished using the **NMB** parameter. The default setting instructs the pharmacologic models to determine the degree of neuromuscular blockade based upon the drugs injected and their pharmacologic properties.

When a numeric value is assigned to this parameter, the degree of NMB is set to that level. For example, 80% NMB causes the simulator to set the degree of NMB to 80%, regardless of the presence (or absence) of neuromuscular blocking drugs. Clinically, the spontaneous tidal volume is markedly reduced. If NMB is set to greater than 30%, the eyes will automatically close when in the Auto mode.

> **Default**: Modeled
> **Range**: 0% - 100%

Tidal Volume

The **Tidal Volume** parameter is used to set the tidal volume to a given volume per breath. Once Tidal Volume is set to a numeric value, arterial oxygen and carbon dioxide values have no effect on the tidal volume, but continue to influence other components of the physiological models.

For example, with the tidal volume set to 600 mL in the adult simulator, the tidal volume remains a constant (set) 600 mL even in the event of falling arterial oxygen levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by altering the respiratory rate, either automatically via the model-driven controls or when the **Respiratory Rate** parameter is adjusted.

> **Default**: Modeled
>
> **Range**: 0 mL- 2500 mL

Intrapleural Volume (Vol): (Left and Right)

The **Intrapleural Vol** parameters allow intrapleural volume to accumulate, for example, as happens during pneumothorax, hydrothorax or hemothorax.

To simulate a pneumothorax, set the corresponding **Intrapleural Vol** to a value greater than 0 mL. Values more than 1500 mL reduce the corresponding lung volume significantly. Breath sounds and chest rise are automatically diminished on the appropriate side due to decreased ventilation of the affected lung.

> **Default**: 0
>
> **Range**: 0 mL - 2500 mL

Fraction of Inspired O_2 (FiO$_2$)

This parameter is used to simulate changes in the **FiO$_2$,** such as would occur with the administration of supplemental oxygen.

> **Default**: 21%
>
> **Range**: 0% - 100%

Respiratory – Additional Parameters

Respiratory Parameters – Additional
Respiratory Rate
Tidal Volume
Tidal Volume Factor
pH Shift
PEEP
O_2 Consumption
CO_2 Production Factor
$PaCO_2$ Set-point
PaO_2 Set-point
I to E Ratio (1:X)
$PetCO_2$-$PaCO_2$ Factor
Respiratory Gain Factor
Respiratory Quotient
Volume/Rate Control Factor
Chest Wall Capacity
Chest Wall Compliance Factor
Distended Chest Wall Compliance Factor
Functional Residual Capacity
Lung Compliance Factor: Left Lung Compliance Factor: Right
Venous CO_2 Shift
Bronchial Resistance Factor: Left Bronchial Resistance Factor: Right
Alveolar Enflurane
Fraction of Inspired Enflurane
Alveolar Halothane
Fraction of Inspired Halothane
Alveolar Isoflurane
Fraction of Inspired Isoflurane
Alveolar Nitrous Oxide

Respiratory Parameters – Additional
Fraction of Inspired Nitrous Oxide
Alveolar Sevoflurane
Fraction of Inspired Sevoflurane

Respiratory Rate

The **Respiratory Rate** parameter is used to set the respiratory rate to a given number of breaths per minute. Once set, arterial oxygen and carbon dioxide values have no effect on the resulting respiratory rate, but continue to influence other components of the physiological models. The patient continues to breathe at the set number of breaths per minute, regardless of the arterial oxygen or carbon dioxide levels.

For example, when the respiratory rate is set to 10 breaths per minute, the respiratory rate remains at 10 breaths per minute, regardless of arterial oxygen or carbon dioxide levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by altering the tidal volume, either automatically via the model-driven controls or when the **Tidal Volume** parameter is adjusted.

> **Default**: Modeled
>
> **Range**: 0 breaths per minute - 40 breaths per minute

Tidal Volume

The **Tidal Volume** parameter is used to set the tidal volume to a given volume per breath. Once tidal volume is set to a numeric value, arterial oxygen and carbon dioxide values have no effect on the tidal volume, but continue to influence other components of the physiological models.

For example, with the tidal volume set to 600 mL in the adult simulator, the tidal volume remains a constant (set) 600 mL even in the event of falling arterial oxygen levels. In such situations, the patient can only respond to arterial oxygen or carbon dioxide levels by altering the respiratory rate, either automatically via the model-driven controls or when the **Respiratory Rate** parameter is adjusted.

> **Default**: Modeled
>
> **Range**: 0 mL - 2500 mL

Tidal Volume Factor

The **Tidal Volume Factor** (along with the **Respiratory Rate Factor**) parameter is used to change the baseline tidal volume (before the control-of-breathing and drug influences are taken into account). A value of 2 doubles the baseline tidal volume. A value of 0.5 decreases the baseline tidal volume by 50%.

> **Default**: 1
>
> **Range**: 0.10 - 4.00

TIP: *First decrease the respiratory gain factor to reduce the influence of the respiratory control mechanism on the respiratory rate and tidal volume.*

pH Shift

The **pH Shift** parameter is used to create a metabolic acidosis or metabolic alkalosis under script control.

The default pH value displayed on the Patient Status Display or TouchPro software is dependent on respiratory arterial CO_2 values. Under default conditions ($PaCO_2$ = 40 mmHg), the pH is approximately 7.4. Rising arterial CO_2 produces a subsequent drop in pH, while falling arterial CO_2 levels result in rising pH values.

To simulate pH changes with metabolic changes (acidosis or alkalosis), the **pH Shift** value is a mathematical addition to (or subtraction) from the displayed pH value to that which is desired.

> **Default**: 0
>
> **Range**: -(0.50) - 0.50

Positive End Expiratory Pressure (PEEP)

The PEEP parameter specifies the amount of positive end expiratory pressure applied during mechanical ventilation. Setting this parameter results in clinically appropriate intrathoracic pressures and hemodynamic responses.

> **Default:** 0.0 cmH_2O
>
> **Range:** 0.0 cmH_2O - 25.0 cmH_2O

O_2 Consumption

The **O_2 Consumption** parameter is used to change the rate of consumption of oxygen and production of carbon dioxide. When **O_2 Consumption** is increased and used with increased **Shunt Fraction**, profound levels of hypoxia can be achieved rapidly.

> **Default**: 250 mL per minute
>
> **Range**: 0 mL per minute - 2000 mL per minute

CO_2 Production Factor

The **CO_2 Production Factor** parameter allows for the manipulation of metabolic CO_2 production to simulate a variety of pathophysiological conditions. CO_2 production is determined by the **O_2 Consumption** and **Respiratory Quotient** settings. A CO_2 Production Factor value of 2 doubles the CO_2 production, while a value of 0.5 decreases the CO_2 production by 50%.

> **Default:** 1
>
> **Range**: 0.50 - 4.00

PaCO$_2$ Set-point

The **PaCO$_2$ Set-point** parameter is a set-point for PaCO$_2$. The control-of-breathing model adjusts tidal volume and respiratory rate in order to bring the PaCO$_2$ toward this set-point. Factors that influence the success of this control effort include baseline tidal volume, baseline respiratory rate, respiratory gain, O$_2$ consumption, respiratory quotient, lung compliances, chest wall compliance, bronchial resistances, the presence of artificial airways in the simulator and the inspired gas mixture.

When the **PaCO$_2$ Set-point** is set to a new value, the physiological controls adjust the simulator's respiratory pattern in an attempt to attain the desired set-point. For example, when the set-point is raised from 40 to 50 mmHg, there is a transitory decrease in respiratory rate and tidal volume, as the physiological controls attempt to drive the PaCO$_2$ toward 50 mmHg. When the PaCO$_2$ reaches the new set-point, the simulator's respiratory rate and tidal volume should return to normal values.

> **Default**: 40 mmHg
>
> **Range**: 20.0 mmHg - 70.0 mmHg

PaO$_2$ Set-point

The **PaO$_2$ Set-point** parameter is a set-point for PaO$_2$. When PaO$_2$ is below the set-point value, progressive stimulation of spontaneous minute ventilation occurs. Both tidal volume and respiratory rate rise, which under appropriate conditions results in PaO$_2$ moving closer to the set-point. Factors that influence this control effort include baseline tidal volume, baseline respiratory rate, respiratory gain, O$_2$ consumption, respiratory quotient, lung compliances, chest wall compliance, bronchial resistances, the presence of artificial airways in the simulator and the inspired gas mixture. Minute ventilation is not affected for PaO$_2$ above the set-point.

For example, if **PaO$_2$ Set-point** is set to 100 mmHg and PaO$_2$ drops to 90 mmHg, ventilatory stimulation occurs. When the PaO$_2$ reaches the new set-point, the simulator's respiratory rate and tidal volume are again controlled to maintain PaCO$_2$ at the PaCO$_2$ set-point. Also, see **PaCO$_2$ Set-point**.

> **Default**: 100.00 mmHg
>
> **Range**: 20.0 mmHg - 100.0 mmHg

I to E Ratio (1:X)

The **I to E Ratio (1:X)** parameter sets the inspiratory-expiratory (I:E) ratio for spontaneous ventilation. At the default setting, the time for exhalation is twice that of inhalation.

> **Default**: 2
>
> **Range**: 0.5 - 7.0

PetCO$_2$ - PaCO$_2$ Factor

The **PetCO$_2$ - PaCO$_2$ Factor** adjusts the end-tidal CO$_2$ relative to the PaCO$_2$. At the default value of 1, PetCO$_2$ very closely approximates PaCO$_2$. When **PetCO$_2$ - PaCO$_2$ Factor** is set at a value of 2, PetCO$_2$ is approximately one half of PaCO$_2$. PetCO$_2$ depends on CO$_2$ production and alveolar ventilation. Because the alveolar dead space is not modeled physically in the hardware, the responses to changes in mechanical ventilation settings may not be exact. The use of the Onset feature (e.g., onset over a 1-minute period) is recommended for this parameter.

> **Default**: 1
>
> **Range**: 0.9 - 10.0

Respiratory Gain Factor

The **Respiratory Gain Factor** determines how strong an influence arterial CO$_2$ levels have on the simulated patient's tidal volume and respiratory rate. Under default conditions (value = 1), when arterial CO$_2$ levels rise, the patient's respiratory rate and tidal volume show a transitory increase in an attempt to return the patient to the physiological control CO$_2$ set-point. If the **Respiratory Gain Factor** is increased to more than 1, the patient has a more pronounced response, while values less than 1 correspond to a blunted response.

> **Default**: 1
>
> **Range**: 0.00 - 10.00

Respiratory Quotient

Respiratory Quotient is the rate of carbon dioxide production divided by the rate of oxygen consumption. Changes to the **Respiratory Quotient** parameter alter the rate of carbon dioxide production relative to the rate of oxygen consumption.

> **Default**: 0.8
>
> **Range**: 0.70 - 1.10

Volume/Rate Control Factor

Ventilatory responses to increased arterial carbon dioxide or decreased arterial oxygen may take the form of increased tidal volume, increased respiratory rate, or both. The **Volume/Rate Control Factor** determines these relative changes. At a value of 1, increased and decreased ventilatory drive affect tidal volume and respiratory rate equally. When the **Volume/Rate Control Factor** is greater than 1, increased or decreased minute ventilation is predominantly achieved by changes in tidal volume. When the **Volume/Rate Control Factor** is less than 1, ventilatory changes are affected primarily by changes in respiratory rate.

For example, set the **Volume/Rate Control Factor** to 0.1 and increase the shunt fraction to 0.4 to decrease the arterial O$_2$. The patient responds to falling arterial oxygen levels with increased minute ventilation. Increasing the respiratory rate with minimal increase in tidal volume produces this.

> **Default**: 1
>
> **Range**: 0.1 - 10.0

Chest Wall Capacity

The **Chest Wall Capacity** parameter sets the total (combined) intrapleural and lung volumes at which the chest wall is considered distended. Also, see **Chest Wall Compliance Factor** and **Distended Chest Wall Compliance Factor**.

>**Default**: 3900
>
>**Range**: 1500 - 3900

Chest Wall Compliance Factor

The **Chest Wall Compliance Factor** parameter describes the interaction of the chest wall with the lungs. The **Chest Wall Compliance Factor** parameter defines the volume-pressure relationship in the normal operating lung volumes. Once distended, however, the chest wall rapidly becomes much less compliant (i.e., much "stiffer") and resistant to further inflation.

>**Default**: 1
>
>**Range**: 0.15 - 10.00

Distended Chest Wall Compliance Factor

The **Distended Chest Wall Compliance Factor** parameter, along with the **Chest Wall Compliance Factor** parameter, describes the interaction of the chest wall with the lungs. The **Chest Wall Compliance Factor** parameter defines the volume-pressure relationship in normal lung volumes. Once distended, however, the chest wall rapidly becomes much "stiffer" and resistant to further inflation.

The **Distended Chest Wall Compliance Factor** parameter must be set to a low value for increased intrapleural volumes to result in elevated inspiratory pressures with positive pressure ventilation. Also, see **Intrapleural Volume (Vol): (Left and Right).**

>**Default**: 1
>
>**Range**: 0.10 - 10.00

Functional Residual Capacity

The **Functional Residual Capacity** parameter sets the combined left and right lung volume remaining at the end of a normal, spontaneous exhalation. This parameter influences the speed of desaturation during apnea.

>**Default**: 2300 mL
>
>**Range**: 500 mL - 4000 mL

Lung Compliance Factor: (Left and Right)

These two parameters independently set the left and right lung compliance. **Lung Compliance Factor** determines how easily the lungs inflate. Low compliance factors (less than 1) create "stiff" lungs (such as in acute respiratory distress syndrome or pulmonary edema) requiring more pressure for expansion. High compliance factors (greater than 1) create "loose" lungs that easily inflate with less pressure.

>　　**Default**: 1
>　　**Range**: 0.15 - 10.00

Venous CO_2 Shift

The **Venous CO_2 Shift** parameter affects the partial pressure of CO_2 in the venous blood. Changing this parameter allows large and rapid shifts in total body CO_2 concentration. Increases in alveolar and arterial CO_2 follow rapidly in a physiologically correct magnitude and time course.

This parameter is useful for giving a "bolus" of CO_2 to the venous system. The alveolar and arterial CO_2 levels rise rapidly in response to the added carbon dioxide but soon return to "pre-bolus" levels as increased ventilation efforts work to eliminate the added CO_2. Therefore, the rise in CO_2 levels is only transitory. This parameter can be used to simulate external CO_2 administration such as that used during laparoscopy.

>　　**Default**: 0 mmHg
>　　**Range**: 0.0 mmHg - 60.0 mmHg

Bronchial Resistance Factor (Left and Right)

The **Bronchial Resistance Factor** parameter can be used to set the rate of left and right bronchial resistance individually. The rate of resistance can also be set to occur over time.

>　　**Default:** 1
>　　**Range:** 0.00 - 250,000.00

Alveolar Enflurane

The **Alveolar Enflurane** parameter is used to simulate the presence of enflurane in the alveolar space without using real anesthetic vapors. The enflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression).

Using this parameter bypasses pharmacokinetics, real and instructor-specified inspired fractions, venous content, lung perfusion and ventilation. This parameter can be used to focus on cardiorespiratory effects (pharmacodynamics).

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

>　　**Default**: Modeled
>　　**Range**: 0.00% - 5.00%

Fraction of Inspired Enflurane

The **Fraction of Inspired Enflurane** parameter is used to simulate the amount of enflurane set in the anesthetic vaporizer and is used to calculate alveolar enflurane.

This parameter has a faster effect on physiology than anesthesia machine settings, because mixing in the breathing circuit is not simulated.

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

> **Default**: 0%
>
> **Range**: 0.00% - 5.00%

Alveolar Halothane

The **Alveolar Halothane** parameter is used to simulate the presence of halothane in the alveolar space without using real anesthetic vapors. The halothane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression).

Using this parameter bypasses pharmacokinetics, real and instructor-specified inspired fractions, venous content, lung perfusion and ventilation. This parameter can be used to focus on cardiorespiratory effects (pharmacodynamics).

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

> **Default**: Modeled
>
> **Range**: 0.00% - 5.00%

Fraction of Inspired Halothane

The **Fraction of Inspired Halothane** parameter is used to simulate the amount of halothane set in the anesthetic vaporizer and is used to calculate alveolar halothane.

This parameter has a faster effect on physiology than anesthesia machine settings, because mixing in the breathing circuit is not simulated.

Note: Müse does not verify a 100% sum of all fractions, because this would require all fractions to be set.

> **Default**: 0%
>
> **Range**: 0.00% - 5.00%

Alveolar Isoflurane

The **Alveolar Isoflurane** parameter is used to simulate the presence of isoflurane in the alveolar space without using real anesthetic vapors. The isoflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression).

Using this parameter bypasses pharmacokinetics, real and instructor-specified inspired fractions, venous content, lung perfusion and ventilation. This parameter can be used to focus on cardiorespiratory effects (pharmacodynamics).

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

>**Default**: Modeled
>**Range**: 0.00% - 5.00%

Fraction of Inspired Isoflurane

The **Fraction of Inspired Isoflurane** parameter is used to simulate the amount of isoflurane set in the anesthetic vaporizer and is used to calculate alveolar isoflurane.

This parameter has a faster effect on physiology than anesthesia machine settings, because mixing in the breathing circuit is not simulated.

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

>**Default:** 0%
>**Range:** 0.00% - 5.00%

Alveolar Nitrous Oxide

The **Alveolar Nitrous Oxide** parameter is used to simulate the amount of nitrous oxide set in the anesthetic vaporizer and is used to calculate alveolar nitrous oxide.

Using this parameter bypasses pharmacokinetics, real and instructor-specified inspired fractions, venous content, lung perfusion and ventilation. This parameter can be used to focus on cardiorespiratory effects (pharmacodynamics).

Note: Muse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

>**Default**: 0.00%
>**Range**: 0.00% - 80.0%

Fraction of Inspired Nitrous Oxide

The **Fraction of Inspired Nitrous Oxide** parameter is used to simulate the amount of nitrous oxide set in the anesthetic vaporizer and is used to calculate alveolar nitrous oxide.

This parameter has a faster effect on physiology than anesthesia machine settings, because mixing in the breathing circuit is not simulated.

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

> **Default**: 0%
>
> **Range**: 0.00% - 80.0%

Alveolar Sevoflurane

The **Alveolar Sevoflurane** parameter is used to simulate the presence of sevoflurane in the alveolar space without using real anesthetic vapors. The sevoflurane percentage is input to the drug models to achieve the expected pharmacodynamic effects (e.g., respiratory depression).

Using this parameter bypasses pharmacokinetics, real and instructor-specified inspired fractions, venous content, lung perfusion and ventilation. This parameter can be used to focus on cardiorespiratory effects (pharmacodynamics).

Note: Müse does not verify a 100% sum of all fractions, because this would require all fractions to be set.

> **Default**: Modeled
>
> **Range**: 0.00% - 8.00%

Fraction of Inspired Sevoflurane

The **Fraction of Inspired Sevoflurane** parameter is used to simulate the amount of sevoflurane set in the anesthetic vaporizer and is used to calculate alveolar sevoflurane.

This parameter has a faster effect on physiology than anesthesia machine settings, because mixing in the breathing circuit is not simulated.

Note: Müse does not verify a 100 % sum of all fractions, because this would require all fractions to be set.

> **Default**: 0%
>
> **Range:** 0.00% - 8.00%

Cardiovascular – Basic Parameters

Cardiovascular Parameters – Basic
Blood Pressure
CVP
PAP
PCWP (Pulmonary Capillary Wedge Pressure)
Heart Rate
Heart Rate Factor
Cardiac Output
Cardiac Rhythm
Pulseless Electrical Activity
PVC Probability
Arterial Catheter
Central Venous Catheter
PA Catheter
PA Balloon
Defib
Pacing Current
Pacing Rate
Pacing Capture Threshold
Cold Fluid Inject

Blood Pressure

The **Blood Pressure** parameter is used to override the physiological modeling for blood pressure. The systolic and diastolic blood pressures can both be set to fixed numeric values, regardless of interventions performed. Resetting the parameter to **Modeled** returns control of the underlying blood pressure to the physiological models.

> **Default:** Modeled

> **Range:** Systolic 20 mmHg - 300 mmHg
> Diastolic 10 mmHg - 300 mmHg

Central Venous Pressure (CVP)

The **CVP** parameter is used to set the CVP baseline and atrial contraction amplitude to fixed numeric values, thereby overriding the physiologic modeling for central venous pressure. Once set, intravascular volume changes have no effect on the CVP. In addition, once an override is applied, changes in tidal volume have no effect on the CVP waveform with the exception of an apneic patient where the minimum and maximum would be the same value since there is no inspiration or expiration. Depending on the volume status of the patient, the minimum/maximum value can be shifted up or down.

The available CVP controls are as follows:

- Minimum Diastolic: Baseline of the CVP at the end of an inspiration
- Maximum Diastolic: Baseline of the CVP at the end of an exhalation
- Pulse Amplitude: Size of the CVP wave during atrial contraction

For the override to take effect, the **Central Venous Catheter** must be set to the *Intrathoracic Vein*.

For example, with the minimum diastolic set to 5 mmHg, maximum diastolic set to 15 mmHg and pulse amplitude set to 2 mmHg, the CVP baseline is 15 mmHg, dipping to 5 mmHg with each inhalation, and the amplitude of the wave is 2 mmHg with each atrial contraction. The CVP baseline remains the same even in the event of intravascular volume changes and the depth of each dip due to inhalation remains at 5 mmHg even in the event of tidal volume changes. However, if the respiratory rate increases or decreases, the frequency of the dips will show a corresponding increase or decrease.

Default: Modeled

Range: Minimum Diastolic -10 mmHg – 25 mmHg

Maximum Diastolic -10 mmHg – 25 mmHg

Pulse Amplitude 0 mmHg – 50 mmHg

Pulmonary Artery Pressure (PAP)

The **PAP** parameter is used to override the physiological modeling for pulmonary artery pressure. The systolic and diastolic pressures can both be set to fixed numeric values, regardless of interventions performed. Resetting the parameter to **Modeled** returns control of the underlying pulmonary artery pressure to the physiological models.

Default: Modeled

Range: Systolic 0 mmHg - 50 mmHg

Diastolic 0 mmHg - 50 mmHg

Pulmonary Capillary Wedge Pressure (PCWP)

The **PCWP** parameter is used to display the patient's pulmonary capillary wedge pressure. It is used to simulate the pressure as measured by wedging a pulmonary catheter with an inflated balloon into a small pulmonary arterial branch.

Default: Modeled

Range: -10 mmHg - 100 mmHg

Heart Rate

The **Heart Rate** parameter is used to set the heart rate to a given (fixed) number of beats per minute. Once the heart rate is set to a numeric value, administered drugs or intravascular volume changes have no effect on the heart rate, but continue to influence other components of the physiological models. Use this parameter to "fix" or set the heart rate to a specific number.

> **Default**: Modeled
>
> **Range**: 30 beats per minute - 220 beats per minute

Heart Rate Factor

The **Heart Rate Factor** parameter is used to change the baseline heart rate before physiological controls are taken into account. A value of 2 doubles the baseline heart rate, while a value of 0.5 decreases the heart rate by 50%. Use this parameter to raise or lower the heart rate.

> **Default**: 1
>
> **Range:** 0.10 - 4.00

Cardiac Output

The **Cardiac Output** parameter displays the volume of blood pumped by the heart per minute. **Cardiac Output** is a function of heart rate (the number of heart beats per minute) and stroke volume (the volume of blood pumped out of the heart with each beat). **Cardiac Output** does not affect the rest of the physiology. For example, if cardiac output is set to zero, it will be shown on the TouchPro as zero, but the patient will still have a blood pressure and pulses.

> **Default:** Modeled
>
> **Range:** 0 L/min - 30 L/min

Cardiac Rhythm

The **Cardiac Rhythm** parameter is used to change the patient's underlying cardiac rhythm displayed on the Patient Status Display or TouchPro patient monitor. To change the cardiac rhythm, click the **Cardiac Rhythm** parameter and select the desired rhythm from the available list. If a number appears following the cardiac rhythm on the list, this overrides the heart rate to the rate indicated.

For cardiac rhythms without a number, the **Heart Rate Factor** parameter can be used to independently control the heart rate.

>**Default**: Modeled
>
>**Options:** Modeled
>
>Asystole
>
>Atrial Enlargement, Left
>
>Atrial Enlargement, Right
>
>Atrial Fibrillation
>
>Atrial Fibrillation: HR 120
>
>Atrial Fibrillation: HR 80
>
>Atrial Flutter
>
>Atrial Flutter: HR 150
>
>Atrial Flutter with 2:1 AV Conduction
>
>Atrial Tachycardia
>
>
>AV Block, First-Degree
>
>AV Block, Second-Degree, Mobitz I
>
>AV Block, Second-Degree, Mobitz II
>
>AV Block, Third-Degree
>
>
>Bundle Branch Block, Incomplete Right
>
>Bundle Branch Block, Left
>
>Bundle Branch Block, Left with PVCs 25%
>
>Bundle Branch Block, Left with PVCs
>
>Bundle Branch Block, Right
>
>
>Hypercalcemia
>
>
>Hyperkalemia (Mild)
>
>Hyperkalemia (Moderate)
>
>Hyperkalemia (Severe)

Hypertrophy, Biventricular

Hypertrophy, Left Ventricular

Hypertrophy, Right Ventricular

Hypocalcemia

Hypokalemia

Hypothermia

Junctional

Junctional: HR 50

Long QT Syndrome

Mobitz Type I: Wenckebach

Mobitz Type II

Modeled

STEMI Anterior

STEMI Anterolateral

STEMI Inferior

STEMI Lateral

STEMI Posterior

STEMI Septal

STEMI LBB

Myocardial Ischemia, Mild

Myocardial Ischemia, Moderate

Myocardial Ischemia, Moderate with PVCs 10%

Myocardial Ischemia, Moderate with PVCs 25%

Myocardial Ischemia, Moderate with PVCs

Myocardial Ischemia, Severe

Normal Junctional
Normal Junctional: HR 50

NSTEMI
NSTEMI with PVCs 10%
NSTEMI with PVCs 25%

Paroxysmal Junctional Tachycardia
Paroxysmal Junctional Tachycardia: HR 130

PEA: Pulseless Electrical Activity

Pericarditis

Premature Atrial Contraction
Premature Ventricular Contraction 10%
Premature Ventricular Contraction 25%

Sinus
Sinus Bradycardia
Sinus Bradycardia: HR 40
Sinus Tachycardia
Sinus Tachycardia: HR 120
Sinus with PAC
Sinus with PVCs: 10%
Sinus with PVCs: 25%

ST Elevation with Chest Pain

Third Degree AV Block

Torsade de Pointes

Trifascicular Block

Ventricular Fibrillation, Coarse

Ventricular Fibrillation, Fine

Ventricular Tachycardia

Ventricular Tachycardia: HR 151

Ventricular Tachycardia, Pulseless

Ventricular Tachycardia, Pulseless: HR 151

Wellen's Syndrome

WPW Syndrome, Left Lateral Pathway

Pulseless Electrical Activity

The **Pulseless Electrical Activity** parameter triggers a clinical condition characterized by unresponsiveness and lack of palpable pulse in the presence of organized cardiac electrical activity. It is either ON or OFF.

Default: Off

PVC Probability

The **PVC Probability** parameter represents the percentage of cardiac cycles containing a premature ventricular contraction (contraction of the ventricles that occurs earlier than usual because of abnormal electrical activity of the ventricles).

Default: Modeled

Range: 0% - 90%

Arterial Catheter

The arterial pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the arterial pressure waveform, if desired. The **Left Ventricle** position is useful for simulating cardiac catheterization procedures, or for demonstrating left ventricular end-diastolic pressure and its relationship to pulmonary artery occlusion ("wedge") and central venous pressure.

Default: Peripheral Artery

Options: Atmosphere

Peripheral Artery

Left Ventricle

Central Venous Catheter

The venous pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the central venous pressure waveform, if desired (e.g., beginning of an SCE with an "unmonitored" patient).

> **Default**: Right Atrium
>
> **Options:** Atmosphere
>
> > Extrathoracic Vein
> >
> > Intrthoracic Vein
> >
> > Right Atrium

Pulmonary Artery (PA) Catheter

The pulmonary artery pressure displayed on the Patient Status Display or TouchPro software is set using this parameter. A non-pulsatile, "zero" pressure signal is emitted when the **Atmosphere** position is selected and can be used to simulate zeroing a pressure transducer. This may also be used to remove the pulmonary artery pressure waveform, if desired (e.g., beginning of an SCE with an "unmonitored" patient). The pulmonary artery catheter can be "floated" into position by sequencing through the right heart positions. This may also be scripted into a scenario using the Scenario Designer.

> **Default**: Pulmonary Artery
>
> **Options:** Atmosphere
>
> > Intrathoracic Vein
> >
> > Right Atrium
> >
> > Right Ventricle
> >
> > Pulmonary Artery

Pulmonary Artery (PA) Balloon

Inflation of the pulmonary artery catheter balloon is simulated by switching to the **Inflated** option of the **PA Balloon** parameter. The appropriate pulmonary artery occlusion or "wedge" waveform is then displayed on the Patient Status Display or TouchPro software.

> **Default**: Deflated
>
> **Options:** Deflated
>
> > Inflated

Defibrillation (Defib)

The **Defib** parameter is used to simulate a specified amount of energy discharged via an external cardiac defibrillator. Setting this parameter results in the characteristic spike in the ECG, followed by a return to the pre-defibrillation rhythm. **Defib** has no direct effect on the electrical conduction system of the heart. Thus, synchronized cardioversion may be done "on the fly" or scripted using the Scenario Designer.

> **Default**: 0 Joules
>
> **Range**: 0 Joules - 360 Joules

Pacing Current

The **Pacing Current** parameter is used to simulate a specified amount of current discharged via an external cardiac pacer. Setting this parameter results in the characteristic pacing signal on the ECG waveform when the pacing current is at or above the capture threshold. Also, see **Pacing Capture Threshold**.

> **Default**: 0 mA
>
> **Range**: 0 mA - 200 mA

Pacing Rate

The **Pacing Rate** parameter determines the cardiac rate (in beats/minute) when the pacing current is at or above the pacing capture threshold. Also, see **Pacing Current** and **Pacing Capture Threshold**.

> **Default**: 80 beats per minute
>
> **Range**: 0 beats per minute - 119 beats per minute

Pacing Capture Threshold

The **Pacing Capture Threshold** parameter determines the minimum pacing current necessary to pace the heart via an external cardiac pacer. Also see **Pacing Current**. Pacing current values below the pacing capture threshold have no effect on the patient's heart rate.

> **Default**: 50 mA
>
> **Range**: 0 mA - 119 mA

Cold Fluid Inject

The Cold Fluid Inject parameter is used to simulate the injection of 10 mL saline into the pulmonary artery (PA) catheter. The appropriate Thermodilution waveform and cardiac output measurement are then displayed on the TouchPro software.

Cardiovascular – Additional Parameters

Cardiovascular Parameters – Additional
Baroreceptor Maximum Pressure
Baroreceptor Minimum Pressure
Left Ventricle Contractility Factor
Right Ventricle Contractility Factor
Systemic Vascular Resistance Factor
Venous Capacity Factor
Systemic Arteries Compliance Factor
Pulmonary Arteries Compliance Factor
Pulmonary Vasculature Resistance Factor
Venous Return Resistance Factor
Baroreceptor Gain (Overall) Factor
Baroreceptor Gain (Cardiac) Factor
Baroreceptor Gain (Peripheral) Factor
Chest Compression Efficacy
Tamponade Volume
Ischemic Index Sensitivity
Ischemic Index Averaging
Aortic Valve Resistance Factor
Mitral Valve Resistance Factor
Pulmonic Valve Resistance Factor

Baroreceptor Maximum Pressure

Baroreceptor maximum pressure defines the mean arterial pressure (MAP) at which the baroreceptor inhibitory activity on the heart and systemic vasculature is maximal. When a simulated patient's MAP increases above baseline pressure, the baroreceptor response exerts greater inhibitory controls on the MAP (e.g., reduction in heart rate) in an attempt to return the MAP to the patient's baseline pressure. However, these controls have an upper limit, and this "maximum pressure" is defined as the baroreceptor maximum pressure.

In other words, as the MAP increases, the physiological controls (i.e., baroreceptor response) work to bring the pressure back toward baseline, primarily by reducing the heart rate. For every 5 mmHg increase in MAP, the heart rate may decrease by 2 beats per minute in an attempt to keep the MAP in check. However, there is an upper limit ("maximum pressure"), after which these controls are no longer effective. Once the MAP reaches the baroreceptor maximum pressure, there is no additional reduction in heart rate if the pressure continues to rise. For example, should the pressure continue to rise, the heart rate would <u>not</u> show a corresponding slowing.

The MAP set-point is exactly between baroreceptor maximum pressure and baroreceptor minimum pressure.

> **Default**: 112 mmHg
>
> **Range**: 40 mmHg - 220 mmHg

Baroreceptor Minimum Pressure

Baroreceptor minimum pressure defines the mean arterial pressure (MAP) at which the baroreceptor inhibitory activity on the heart and systemic vasculature is minimal. When a simulated patient's MAP decreases below baseline pressure, the baroreceptor response exerts inhibitory controls on the MAP (e.g., increase in heart rate) in an attempt to return the MAP to the patient's baseline pressure. However, these controls have a lower limit, and this "minimum pressure" is defined as the baroreceptor minimum pressure.

In other words, as the MAP decreases, the physiological controls (i.e., baroreceptor response) work to bring the pressure back toward baseline, primarily by increasing the heart rate. For every 5 mmHg decrease in MAP, the heart rate may increase by 2 beats per minute in an attempt to keep the MAP in check. However, there is a lower limit ("minimum pressure"), after which these controls are no longer effective. Once the MAP reaches the baroreceptor minimum pressure, there is no additional increase in heart rate if the pressure continues to fall. For example, should the pressure continue to fall, the heart rate would <u>not</u> show a corresponding increase.

The MAP set-point is exactly between baroreceptor maximum pressure and baroreceptor minimum pressure.

> **Default**: 72 mmHg
>
> **Range**: 20 mmHg - 160 mmHg

Left Ventricle Contractility Factor

The **Left Ventricle Contractility Factor** parameter adjusts the contractility of the left ventricle and has a direct effect on cardiac output and blood pressure. Use this parameter to raise or lower the cardiac output.

> **Default**: 1
>
> **Range**: 0 - 10.00

Right Ventricle Contractility Factor

The **Right Ventricle Contractility Factor** parameter adjusts the contractility of the right ventricle and has a direct effect on pulmonary artery pressure and an inverse effect on central venous pressure. Use this parameter to raise or lower pulmonary artery pressure (PAP) or to change the central venous pressure (CVP).

> **Default**: 1
>
> **Range**: 0 - 10.00

Systemic Vascular Resistance Factor

The Systemic Vascular Resistance Factor parameter adjusts the baseline systemic vascular resistance. Raising the value increases the systemic vascular resistance while lowering the value decreases the vascular resistance.

Raising the parameter value is analogous to increasing the resistance to blood flow through the systemic vasculature. Under such conditions, the arterial blood pressure (ABP) increases, and the heart rate may decrease due to feedback from the physiological control mechanisms.

> **Default**: 1
>
> **Range**: 0.10 - 10.00

Venous Capacity Factor

The **Venous Capacity Factor** parameter adjusts the volume of blood contained in the unstretched venous system without an increase in venous pressure. Raising the value decreases the venous capacitance (vasodilatation and decreased vascular tone), while lowering the value increases the venous capacitance (vasoconstriction and increased vascular tone).

The volume of blood in the venous system has an inverse relationship to the blood pressure. Lowering the value is analogous to a "shift" in blood from the venous system to the arterial system, and this shift, when coordinated with increased systemic vascular resistance, results in an increase in blood pressure [arterial blood pressure (ABP), pulmonary artery pressure (PAP) and central venous pressure (CVP)].

> **Default**: 1
>
> **Range**: 0.10 - 100.00

Systemic Arteries Compliance Factor

The **Systemic Arteries Compliance Factor** parameter adjusts the pulse pressure (difference between systolic and diastolic pressures) of the simulated patient's systemic blood pressure. Increases in the compliance factor result in a decreased (narrower) pulse pressure, while smaller values increase the pulse pressure. Additionally, when the pulse pressure increases as a result of a reduced compliance factor, both systolic and diastolic pressures increase. Conversely, with a narrower pulse pressure (higher compliance factor), both the systolic and diastolic blood pressures also drop.

> **Default**: 1
>
> **Range**: 0.20 - 5.00

Pulmonary Arteries Compliance Factor

The **Pulmonary Arteries Compliance Factor** parameter adjusts the pulse pressure (difference between systolic and diastolic pressures) of the simulated patient's pulmonary blood pressure. Increases in the compliance factor decrease (narrow) the pulse pressure, while smaller values increase the pulse pressure. Additionally, when the pulse pressure increases as a result of a reduced compliance factor, both systolic and diastolic pulmonary pressures increase. Conversely, with a narrower pulse pressure (higher compliance factor) both the systolic and diastolic pulmonary pressures also drop.

> **Default**: 1
>
> **Range**: 0.20 - 5.00

Pulmonary Vasculature Resistance Factor

The **Pulmonary Vasculature Resistance Factor** parameter adjusts the baseline pulmonary vascular resistance. Raising the value increases the pulmonary vascular resistance, while lowering the value decreases the vascular resistance.

Raising the parameter value is analogous to increasing the resistance to blood flow through the pulmonary vasculature. Under such conditions, the pulmonary artery pressure (PAP) and central venous pressure (CVP) increase due to back-pressure through the right side of the heart.

> **Default**: 1
>
> **Range**: 0.10 - 10.00

Venous Return Resistance Factor

The **Venous Return Resistance Factor** parameter adjusts the resistance between the extrathoracic and intrathoracic venous compartments. Raising the value increases the resistance, while lowering the value decreases the resistance.

With less blood returning to the heart, there is a reduced volume entering the ventricles prior to ventricular contraction. This results in a drop in the cardiac output and decrease in arterial blood pressures. The heart rate increases due to feedback from the physiological control mechanisms in an attempt to maintain adequate blood pressures.

> **Default**: 1
>
> **Range**: 0.10 - 100.00

Baroreceptor Gain (Overall) Factor

The **Baroreceptor Gain (Overall) Factor** parameter adjusts the influence of mean arterial pressure (MAP) on heart rate, contractility, systemic vascular resistance and venous capacity. Use this parameter to adjust how vigorously the heart and vasculature respond to blood pressure changes. The degree of increase in heart rate or vascular response is influenced by the baroreceptor gain (overall) factor.

For example, when blood pressure falls, the heart rate increases, the arteries increase their vascular tone (resistance) and there is less pooling of the blood in the venous system, all in an attempt to maintain adequate blood pressure. A baroreceptor gain (overall) factor value of less than 1 corresponds to baroreceptor depression. A baroreceptor gain (overall) factor value greater than 1 leads to a stronger response to MAP changes.

> **Default**: 1
>
> **Range**: 0.00 - 100.00

Baroreceptor Gain (Cardiac) Factor

The **Baroreceptor Gain (Cardiac) Factor** parameter selectively adjusts the influence of mean arterial pressure (MAP) on the heart rate and contractility, influencing how much the heart rate increases or decreases with changes in blood pressure. Use this parameter to adjust how vigorously the heart responds to blood pressure changes.

A baroreceptor gain (cardiac) factor of less than 1 corresponds to baroreflex depression (e.g., less heart rate response to MAP changes). A value greater than 1 leads to a stronger response to MAP changes.

> **Default**: 1
>
> **Range**: 0.00 - 10.00

Baroreceptor Gain (Peripheral) Factor

The **Baroreceptor Gain (Peripheral) Factor** parameter adjusts the influence of mean arterial pressure (MAP) on systemic vascular resistance and venous capacity, influencing how much the vasculature responds to changes in blood pressure.

For example, when blood pressure falls, the arteries increase their vascular tone (resistance), and there is less pooling of the blood in the venous system, in an attempt to maintain adequate blood pressure. A factor of less than 1 corresponds to baroreflex depression (e.g., less systemic vascular resistance response to MAP changes). A value greater than 1 leads to a stronger response to MAP changes.

> **Default**: 1
>
> **Range**: 1.00 - 10.00

Chest Compression Efficacy

The **Chest Compression Efficacy** parameter is used to determine the effectiveness of chest compressions administered by the caregiver. The 100% setting indicates that chest compressions are completely effective, while the 0% setting prevents them from having any effect on intrathoracic pressure.

> **Default:** 100%
>
> **Options:** 100%
>
> 0%

Tamponade Volume

The Tamponade Volume parameter is used to set the amount of fluid or blood that is building up in the space between the myocardium and the pericardium, causing a cardiac tamponade.

> **Default**: 0 mL
>
> **Range**: 0 mL - 500 mL

Ischemic Index Sensitivity

The **Ischemic Index Sensitivity** parameter determines the relative sensitivity of the simulated patient to myocardial ischemia. A lower ischemic index sensitivity value corresponds to less sensitivity to an unfavorable oxygen supply/demand ratio (i.e., poor oxygenation with high heart rate). A patient with a low value is less sensitive to poor oxygenation, takes longer to go into the "death spiral" and, therefore, survives longer.

> **Default**: 0.45
>
> **Range**: 0.10 - 5.00

Model-Driven ECG Rhythm	Ischemic Index (I.I.)
Normal Sinus Rhythm (NSR)	I.I. ≥ 0.90
Mild ST Segment Depression	0.90 > I.I. ≥ 0.70
Moderate ST Segment Depression	0.70 > I.I. ≥ 0.60
Premature Ventricular Contractions (PVCs)	0.60 > I.I. ≥ 0.40
Ventricular Tachycardia (VTach)	0.40 > I.I.
Ventricular Fibrillation (VFib)	1 minute after VTach
Asystole	1 minute after VFib

The patient's response to myocardial ischemia may be altered using the **Ischemic Index Sensitivity** parameter found on the Cardiovascular view. To make the patient less sensitive to ischemia, lower the value below the default setting. To make the patient more sensitive, increase the value above the default setting. These changes are then reflected in the patient's Ischemic Index, as shown in the table above.

Ischemic Index Averaging

Ischemic index averaging determines how quickly myocardial ischemia develops in the presence of an unfavorable oxygen supply/demand ratio or how rapidly it resolves when myocardial oxygenation becomes favorable. By decreasing the averaging time (i.e., value toward 0.5), ischemia has a faster onset if there is a poor oxygen supply to the heart or a faster resolution with favorable oxygenation. Increasing the averaging time (i.e., value toward 0.99) means ischemia takes longer to develop or longer to resolve.

Use this parameter to speed up the recovery from the model-driven "death spiral." By setting the parameter to 0.5, a patient pulls out of the "death spiral" at a faster rate than with a setting of 0.99. However, the favorable conditions (i.e., better oxygenation and/or lower heart rate) must exist before the number is made smaller. If not, the patient's descent increases at a faster rate.

> **Default**: 0.99
>
> **Range**: 0.50 - 1.00

Aortic Valve Resistance Factor

The **Aortic Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the aortic valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the aortic valve.

> **Default**: 1
>
> **Range**: 1 - 1000

Mitral Valve Resistance Factor

The **Mitral Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the mitral valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the mitral valve.

> **Default**: 1
>
> **Range**: 1 - 1000

Pulmonic Valve Resistance Factor

The **Pulmonic Valve Resistance Factor** parameter is used to adjust the resistance to blood flow across the pulmonic valve. Increasing the value to greater than 1 corresponds to increased resistance to blood flow through the pulmonic valve.

> **Default**: 1
>
> **Range**: 1 - 1000

WIRELESS VOICE LINK

This information is intended to assist in preparing Wireless Voice Link (WVL) devices for use in conjunction with Athena.

Voice Over Internet Protocol (VoIP)

The simulator may be equipped with VoIP features that allow the facilitator to:

- Communicate through the manikin
- Communicate to additional participants (e.g. other facilitators, proctors, or observers)

The VoIP feature includes the following elements

- Headset
- Voice Communication controls integrated into Müse
- Voice Communications controls in a standalone software

Voice Over Internet Protocol (VoIP) Headset

The simulator comes with one (1) headset:

VoIP Headset

The headset has a noise canceling microphone and offers mono sound through one speaker to allow the facilitator to remain aware of their environment.

The headset

- is wired and connects to the facilitator laptop vis USB
- includes speaker volume and microphone mute controls integrated into the USB cable

Additional headsets are available for purchase from CAE. The capability to use your own headset is also supported. This includes wireless models. If you have questions regarding the compatibility of your headset please contact CAER Healthcare customer service.

For additional information on the headset please consult the manufacturer's website.

Voice Communications Controls in Müse

The voice communications controls are located in a supplemental toolbar at the top of the Müse software.

To speak as the manikin, click and hold down the **Speak as Manikin** button. This can also be achieved by holding down the spacebar on the computer keyboard.

Note: When speaking as the manikin. all incoming communications will be locked. It is recommended that you hold down the Speak as Manikin button only as long as necessary.

To speak to participants, click and hold down the **Speak to Participants** button. To keep the communication channel with participants open without holding down the button, use **Open Mic**.

The **Mute Everyone** button mutes all incoming communications.

The **Open Mic** button   The **Mute Everyone** button

The **Speak as Manikin** button

The **Speak to All Participants** button   The **Collapse Tool** button

The **Advanced Controls** button
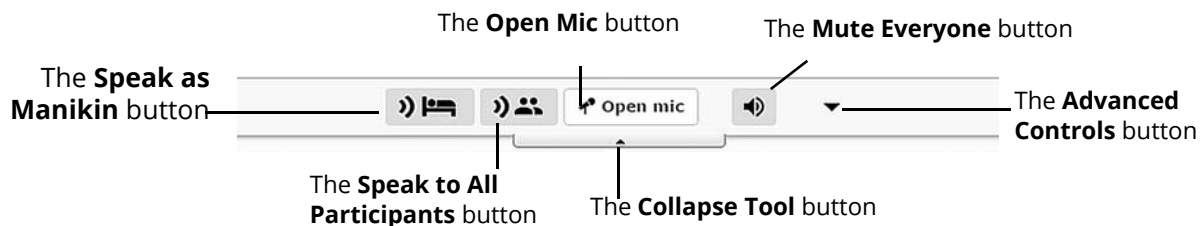
Supplemental Toolbar

Clicking the **Advanced Controls** button opens the **Advanced Controls** tool.

Voice Communication Controls in Standalone Software

Additional participants can be added to the voice communications network. Each additional participant will need a dedicated computer as well ads their own headset. Additional participants can access the voice communication controls by the following steps:

1. Connect their dedicated computer to the simulator's WiFI network. See "Connect to the Wireless Network" section of the user guide for additional details.

2. Launch a supported web browser and navigate to the Müse splash page (i.e. http:// 1932.198.XX.5 where "XX" is the simulator's IP address

3. Click the "Voice Communications" link in the top right corner of the Müse splash page

The controls in the standalone voice communication software are identical to those in the Müse toolbar except that the toolbar is always expanded and the **Advanced Controls** are always visible.

Advanced Controls Tool
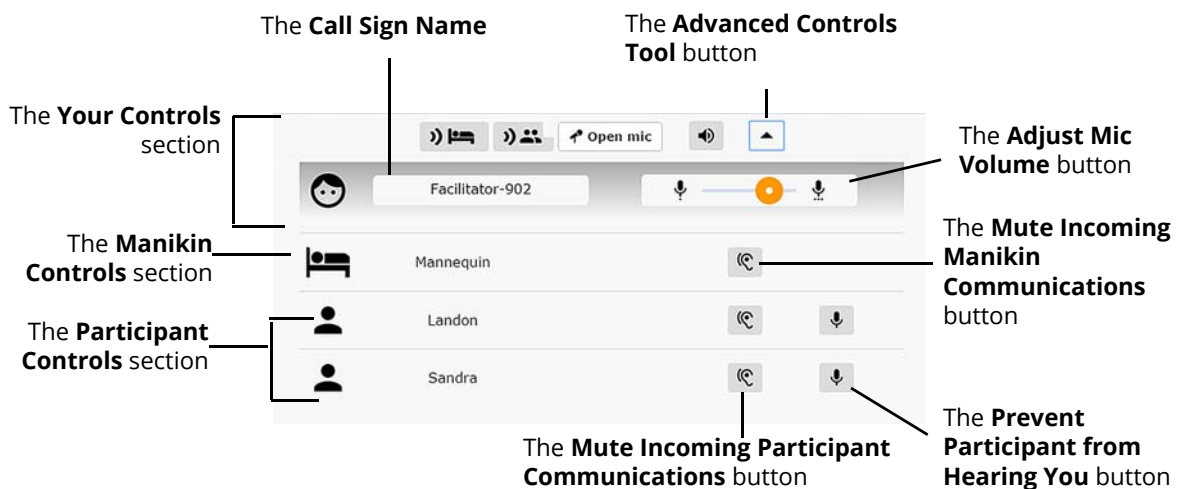
Advanced Controls Tool

- **Call Sign Name:** Is automatically attributed (e.g. Facilitator-902). Your call sign name can be edited by clicking it and typing a new one.

- **Advanced Controls Button:** Clicking the Advanced Controls button on the supplemental toolbar opens the Advanced Controls tool. Clicking it a second time collapses the Advanced Controls tool.

- **Adjust Mic Volume Slider:** Allows your mic volume (i.e. gain) to be adjusted. This is applicable to both speaking as the manikin and speaking to participants.

- **Mute Incoming Manikin Communication Button:** Mutes all communications from the mic located in the manikin. Clicking it a second time unmutes communications from the manikin.

  Participant Controls:

  ∘ **Prevent Participant From Hearing You Button:** Prevents that participant from hearing you. Clicking it a second time allows them to hear you again

  ∘ **Mute Incoming Participant Communication Button:** Mutes communications from that specific participant. Clicking it a second time allows you to hear them again.

Cautions and Warnings

This device complies with part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

1. This device may not cause interference
2. This device must accept any interference, including interference that may cause undesired operation of the device

Cet appareil est conforme aux normes d'Industrie Canada exempts de licence RSS (s). Son fonctionnement est soumis aux deux conditions suivantes:

1. Cet appareil ne doit pas provoquer d'interférences
2. Cet appareil doit accepter toute interférence, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil

Any modifications made to this device without the express approval of CAE could void the user's authority to operate this equipment.

What's Included

The WVL package includes the following items:

- Wireless Voice Link Handset (1)
- Olympus ME52W Standalone Microphone (1)
- AAA Alkaline Batteries (2)
- Quick Start Guide (1)

How Wireless Voice Link Works

The WVL is a radio pair that operates in the 2.4 GHz unlicensed radio band. The handset communicates wirelessly with the base station located inside the simulator. The base station converts the digitized microphone stream from the handset and outputs it via the base station to the headphone and line out jacks. The output projects through the head speakers inside the simulator.

To accommodate multiple WVL pairs in close proximity, each WVL is assigned two RF channels on which to operate. The RF channels divide up the 2.400 – 2.4835 GHz spectrum in 80 single frequencies to prevent the WVLs from interfering with each other.

Due to the nature of the unlicensed 2.4 GHz band, there may be other devices such as Wi-Fi, microwave ovens or Bluetooth® radios operating in the 2.4 GHz band as well. Therefore, two channels are used to transmit the audio stream redundantly to avoid interference. In case there is an interference in one channel, the other can be used to extract the audio stream.

To operate correctly, both the handset and base station should be set to the same frequency using the DIP switches located in the devices. If the interference is too high, the WVL firmware has the ability to change channels automatically to avoid interruption. This process occurs simultaneously in both the handset and the base station without the need for user intervention. The units revert back to the original frequency set on the DIP switches when both devices are restarted using the power switch.

Recommendations for Use

To receive the best sound quality from the WVL, please note the following recommendations:

- Do not separate the WVL pair with more than two walls
- Use channels 0 through 11 for the best sound quality
- Use channels 12 through 31 if more than 12 simulators are present in one area

Wireless Voice Link Devices

There are two unique devices that make up a WVL pair: the handset device and the base station device. The base station device is located inside the simulator, while the handset device is battery powered and carried by the user. The handset transmits voice input through a microphone to the base station receiver, where it is transmitted to the speakers in the simulator's head. The two different devices can be identified by their cases.

The handset device has a cover that extends over the length of the antenna.

WVL Handset

The base station device antenna is almost fully exposed.

WVL Base Station

Physical Features

The following features are located on the top of the WVL devices:

- **Headphone jack:** Used to plug in headphones or an iPhone compatible headphone/microphone combination
- **Microphone jack:** Used to plug in a standalone microphone
- **Red power light:** Indicates when the unit is powered on by blinking. Also indicates when the Mute button is activated by solidly staying on.
- **Green connection light:** Indicates an RF link connection between the handset and base station by blinking
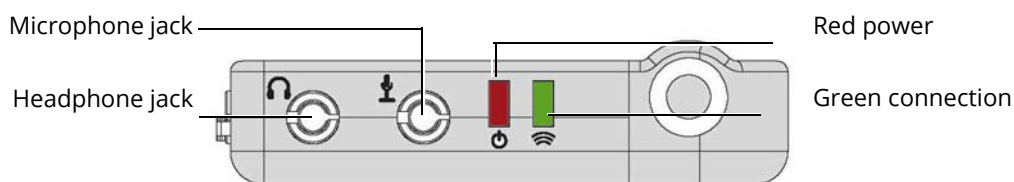
WVL Front View

The following features are located on the side of the WVL devices:

- **Battery compartment:** Houses two AAA batteries and the DIP switch
- **DC power jack:** Accommodates a 5VDC/0.2A power source
- **ON/OFF switch:** Turns WVL handset power on or off
- **Line out jack:** Connects the WVL to the simulator's audio amplifier
- **Volume/mute dial:** Controls microphone gain and microphone mute on the handset
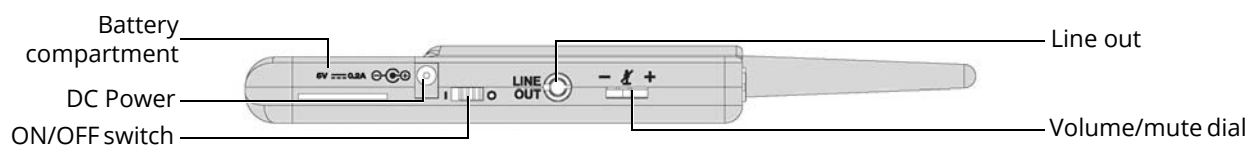
WVL Side View

On the WVL handset, the volume/mute dial controls the microphone volume or mutes the microphone.

On the WVL base station, the dial serves as the volume control for the speakers inside the simulator. Moving the dial toward the plus sign increases the volume. Moving the dial toward the minus sign decreases the volume and setting. On the handset, pressing straight down on the volume dial in the center mutes the microphone.

Preparing the Base Station in the Simulator

When using the base station in the simulator, ensure the batteries are removed and the following items are attached:

- Power cable
- Line out cable

The DIP switch is located in the battery compartment of the base station.

DIP switch settings
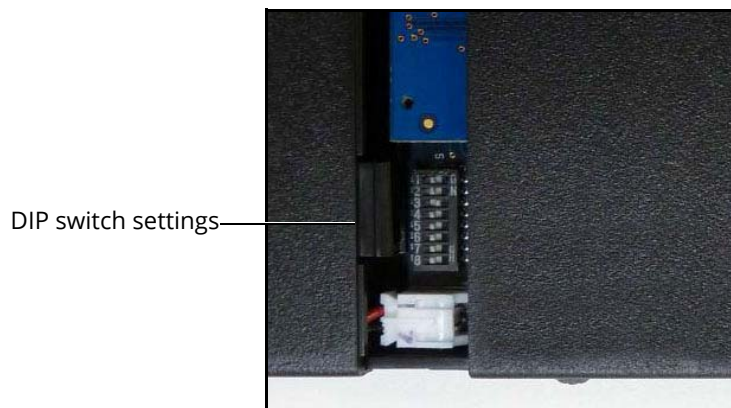
Dip Switch Settings

The base station should come already connected and installed inside the simulator.

To prepare the base station:

1. Set the base station DIP switch positions 6 and 7 to OFF, and 8 to ON
2. Turn the power off and on using the power switch on the outside of the base station to ensure the DIP switch changes take effect
3. Leave the power switch on the outside of the base station in the on position
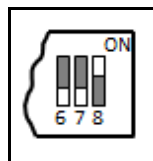
DIP Switch Settings for the Base Station

Note: Since the base station receives power from the simulator, the power switch on the outside of the base station must remain in the ON position. Use this power switch to refresh DIP switch settings. Do not turn the simulator off and on to refresh the DIP switch settings.

Preparing the Handset for Use

To prepare the handset for use:

1. Insert two AAA batteries into the battery compartment
2. Set the handset DIP switch positions 6 and 7 to OFF and position 8 to ON
3. Turn the power switch off and back on to ensure the DIP switch changes take effect
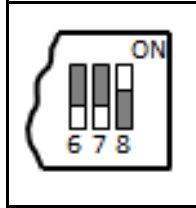
DIP Switch Settings for the Handset

While DIP switch positions 6 through 8 affect the handset and base station settings, DIP switch positions 1 through 5 are used to set the radio frequency channel used for communication between the handset and the base station.

Selecting the Radio Frequency Channel

There are two ways to configure the radio frequency (RF) channel spacing. The first method reduces channel-to-channel interference, but allows only 12 channels to operate simultaneously. The second method increases the number of channels that can be used simultaneously to 20 channels. However, this method diminishes the channel-to-channel noise immunity.

All of the WVL pairs in the same vicinity must use channels from either RF Channel Group 1 or 2. The channels used must belong to the same group. The DIP switch determines the initial communication frequencies that the WVL pair use to communicate when the power of the base station and handset is first turned on. If there is too much interference at the initial channel, the WVL pair changes frequency automatically and continues operating. The WVL pair will repeat this process automatically as needed.

Multiple WVL pairs can be set to the same initial frequency. However, setting different initial frequencies helps the WVL pairs quickly find a stable operating frequency.

For example, if there are 12 or fewer simulators in the same vicinity, set all of the WVL pairs to use channel 0 of RF Channel Group 1. To give unique initial RF frequencies, assign each WVL pair to its own RF channel with the settings found in CH 0 through CH 11.

If you have 13 to 20 simulators in the same vicinity, set all of the WVL pairs to use channel 12 of RF Channel Group 2. To give unique initial RF frequencies, assign each WVL pair to its own RF channel with the settings found in CH 12 through CH 31.
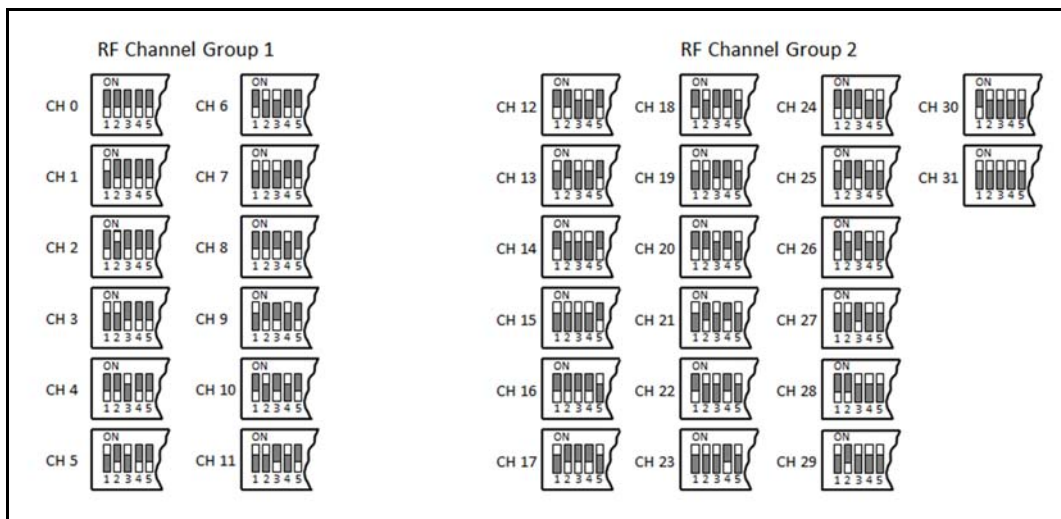
RF Channel Selection Methods

For a complete list of the initial frequencies associated with the RF Channels, see *RF Channel Initial Operating Frequencies.*

Powering Up the WVL Pair

To power up the WVL pair:

- Power on the base station by turning on the simulator

  The base station power switch is in the on position by default.

- Power on the handset by setting the power switch to the on position

  The red power light on each unit blinks when the unit is on. Once both units are powered on and communicating with each other, the green connection light flashes once every second.

  If the green connection light fails to blink, ensure both units are set to the same RF channel.

  If you make changes to the DIP switch settings, toggle the power switches of the handset and base station off and back on to ensure the changes takes effect.

Using the iPhone/Standalone Microphone

DIP switch position 6 on the handset determines if the iPhone microphone input or the standalone microphone input is enabled. When DIP switch position 6 is set to the OFF position, the standalone microphone jack is enabled for the standalone microphone, provided by CAE.


Handset and CAE -provided Microphone

To use a microphone compatible with an iPhone (three-pole jack), set DIP switch position 6 to ON. Please note that an iPhone-compatible microphone is not provided as part of the product package. Any microphone with a common 3.5 mm input jack can be used with the handset when DIP switch position 6 is set to ON.

Special Handset Settings

Advanced settings for the handset DIP switch are available.

iPhone microphone enable

Base station volume control enable

Noise reduction enable (default)

ON

6 7 8

Noise reduction disable

Microphone gain control enable (default)

Standalone microphone enable (default)
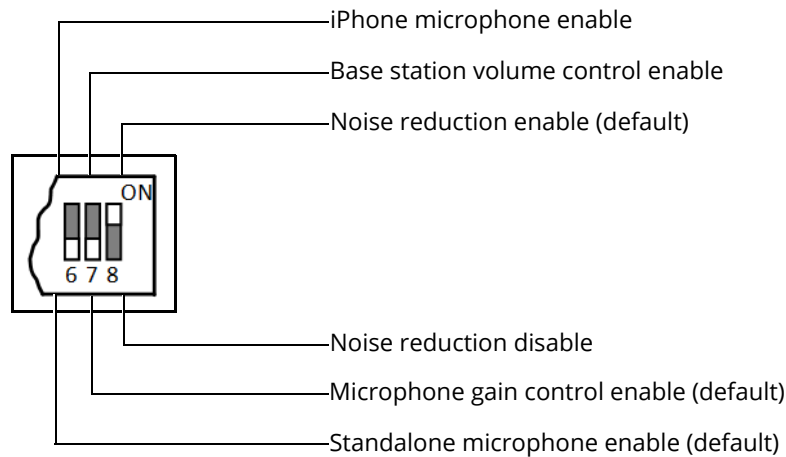
Advanced DIP Switch Settings

DIP switch settings are only refreshed when the handset is powered on. To ensure the DIP switch changes take effect, turn the power off and back on after making changes.

To enable noise reduction and minimize background noise in high ambient noise environments, place the position 8 DIP switch in the ON position.

Battery Capacity Indicator

The red power light flashes one time every second when the battery capacity is good. When the battery capacity is nearly depleted, the red power LED flashes twice in quick succession every second. This indicates the batteries need to be replaced.

To get the most battery life out of the handset, the handset should be powered down when it is not in use.

Troubleshooting

CAE Customer Service is available to help with issues, should they arise. However, sometimes you can speed up the customer service process by performing diagnostics before calling, and eliminating some problems on your own with the help of the following instructions.

Note: The loss of WiFI connection for approximately 60 seconds may also cause a loss of Voice over IP connection. To solve this, click **Disconnect** then click **Connect** once the WiFI connection has been reestablished.

Power Problems

The red power light on the handset does not flash when power switch is turned on.

- Check that the batteries are inserted correctly. Install a fresh set of batteries, if needed

The red power light on my base station is not flashing when the simulator is powered on.

- Check that the cables from the simulator are installed in the base station correctly

Audio Problems

The sound output from the simulator is low when using a microphone on my lapel.

    • Increase the microphone gain on the handset by moving the dial towards the plus sign

    Note: DIP switch 7 must be in the OFF position for this to work.

I'm hearing feedback from the microphone when I am close to the simulator.

    • Decrease the microphone gain on the handset by moving the dial towards the minus sign

    Note: DIP switch 7 must be in the OFF position for this to work.

The sound output from the simulator is too high or too low.

    • The volume level is configured at the factory for optimal performance. However, if you want to adjust the volume level of the base station (located inside the simulator), set the handset DIP switch 7 to ON. Remember to turn the handset power off and on after each DIP-switch change. After this step is complete, you will be able to adjust the volume level of the base station by adjusting the handset volume dial.

The sound output from the simulator is noisy when the speaker is not speaking.

    • You can use the noise reduction feature by setting the handset DIP switch position 8 to ON

The simulator voice output is cut off when the speaker is speaking quietly.

    • In this case, there are three possible options:
      1. Attempt to talk louder
      2. Increase the microphone gain
      3. Disable the noise reduction feature by setting the handset DIP switch 8 to OFF

RF Channel Initial Operating Frequencies

RF Channel	Frequency 1 (GHz)	Frequency 2 (GHz)
0	2.402	2.480
1	2.405	2.477
2	2.408	2.474
3	2.411	2.471
4	2.414	2.468
5	2.417	2.465
6	2.420	2.462
7	2.423	2.459
8	2.426	2.456
9	2.429	2.453
10	2.432	2.450
11	2.435	2.447
12	2.402	2.480
13	2.404	2.478
14	2.406	2.476
15	2.408	2.474
16	2.410	2.472
17	2.412	2.470
18	2.414	2.468
19	2.416	2.466
20	2.418	2.464
21	2.420	2.462
22	2.422	2.460
23	2.424	2.458
24	2.426	2.456
25	2.428	2.454
26	2.430	2.452
27	2.432	2.450
28	2.434	2.448
29	2.436	2.446
30	2.438	2.444
31	2.440	2.442

Recommended Clinical Supply Sizes

The following clinical supply sizes are recommended for use with the female simulator. Other sizes may cause damage to simulator and should not be used.

Recommended Clinical Supply Sizes	
Combitube	41 Fr
Endotracheal (ETT)	6.5 - 7.5 mm
i-gel Supraglottic Airway	#4
IV Cannula	14 - 20 g
King Airway	#4
Laryngeal Mask Airway (LMA)	#4, #5
Nasal-pharyngeal Airway	28 Fr
Oropharyngeal Airway	90 mm
Urinary Catheter	16 Fr

THE ISCHEMIC INDEX (DEATH SPIRAL)

The Ischemic Index is a measure of the myocardial ischemia modeled using classical determinants. When an unfavorable oxygen supply/demand ratio occurs, myocardial ischemia follows. The lower the Ischemic Index, the greater the myocardial ischemia. The Ischemic Index is derived through the underlying physiological models and cannot be measured clinically.

Favorable supply/demand ratios (slower heart rates, higher blood oxygenation levels) generally result in a higher Ischemic Index value, whereas unfavorable supply/demand ratios (faster heart rates, lower blood oxygenation levels) generally result in a lower Ischemic Index value.

The patient's Ischemic Index value can be viewed by selecting the Ischemic Index widget from the Patient Status Display.

The table below lists Ischemic Index values and their corresponding patient conditions.

Model-Driven ECG Rhythm	Ischemic Index (I.I.)
Normal Sinus Rhythm (NSR)	I.I. ≥ 0.90
Mild ST Segment Depression	0.90 > I.I. ≥ 0.70
Moderate ST Segment Depression	0.70 > I.I. ≥ 0.60
Premature Ventricular Contractions (PVCs)	0.60 > I.I. ≥ 0.40
Ventricular Tachycardia (VTach)	0.40 > I.I.
Ventricular Fibrillation (VFib)	1 minute after VTach
Asystole	1 minute after VFib

The patient's response to myocardial ischemia may be altered using the **Ischemic Index Sensitivity** parameter found in the **Cardiovascular** view (Additional Parameters). To make the patient less sensitive to ischemia, lower the value below the default setting. To make the patient more sensitive, increase the value above the default setting.

PARAMETER DISPLAY DEFINITIONS

The various patient displays and feedback windows in Müse and the TouchPro Patient Monitor use abbreviations to refer to the parameters displayed. The following is a list of parameters available for display and their abbreviations.

Müse Patient Status Display

The Müse Patient Status Display consists of waveform, numeric, and volume widgets, along with other special widgets for the simulator.

Waveform Widget Displays

Display	Physiological Variable
ABP	Arterial Blood Pressure
CO2	Capnogram
CVP	Central Venous Pressure
ECG aVF	ECG Lead aVF
ECG aVL	ECG Lead aVL
ECG aVR	ECG Lead aVR
ECG I	ECG Lead I
ECG II	ECG Lead II
ECG III	ECG Lead III
ECG V1	ECG Lead V1
ECG V2	ECG Lead V2
ECG V3	ECG Lead V3
ECG V4	ECG Lead V4
ECG V5	ECG Lead V5
ECG V6	ECG Lead V6
PAP	Pulmonary Artery Pressure
Pleth	Optoplethysmograph

Numeric Widget Displays

Display	Physiological Variable
Alveolar Enflurane	Alveolar Enflurane
Alveolar Halothane	Alveolar Halothane
Alveolar Isoflurane	Alveolar Isoflurane
Alveolar Nitrous Oxide	Alveolar Nitrous Oxide
Alveolar Sevoflurane	Alveolar Sevoflurane
BP	Blood Pressure
C.O.	Cardiac Output
Cervix Dilatation	Cervix Dilatation
CTG FHR	Cardiotocography Fetal Heart Rate
CVP	Central Venous Pressure

Display	Physiological Variable
EtCO2	End Tidal Carbon Dioxide
FHR/IUP	Fetal Heart Rate / Intrauterine Pressure
FHR/TUA	Fetal Heart Rate / Transabdominal Uterine Activity
Fluid Balance*	Fluid Balance
Hb	Hemoglobin
Hematocrit	Hematocrit
HR	Heart Rate
ICP	Intracranial Pressure
Ischemic Index	Ischemic Index
MAP	Mean Arterial Pressure
PACO2	Alveolar Partial Pressure Carbon Dioxide
PaCO2	Arterial Partial Pressure Carbon Dioxide
PAO2	Alveolar Partial Pressure Oxygen
PaO2	Arterial Partial Pressure Oxygen
PAP	Pulmonary Artery Pressure
PCWP	Pulmonary Capillary Wedge Pressure
pH	pH
PvCO2	Venous Partial Pressure Carbon Dioxide
PvO2	Venous Partial Pressure Oxygen
RR	Respiratory Rate
SpO2	Oxygen Saturation
TAxilla	Axillary Temperature
TBlood	Blood Temperature
TBody	Body Temperature
TRectal	Rectal Temperature

*Note: Rapid changes to the Baroreceptor Gain Factors (Overall, Cardiac, Peripheral) and Systemic Compliance Factor can have an impact on the volume reported by the Fluid Balance Widget.

Volume Widget Displays

Display	Physiological Variable
Intrapleural Vol	Intrapleural Volume
Lung Volume	Lung Volume

CPR Monitor

The following definitions apply to the parameters in the Müse CPR Monitor window.

Display	Definition
Hand Position	Hand position
Chest Compression	
Compression Depth	Compression Depth (%)
Compression Rate	Compression Rate (per minute)
Chest Recoil	Compression Release (%)
Compression Fraction	Proportion of time in which chest compressions are performed (%)
Depth Variability	Standard Deviation of Compression Depth (%)
Ventilation	
Ventilation Volume	Ventilation Volume (mL)
Ventilation Rate	Ventilation Rate (breaths/min)
I:E Ratio	Inspiratory/Expiratory Ratio
Minute Ventilation	Minute Ventilation (L/min)
Alveolar Ventilation	Alveolar Ventilation (L/min)
Patient Vitals	
Blood Pressure	Arterial Blood Pressure
CePP	Cerebral Perfusion Pressure
CoPP	Coronary Perfusion Pressure
SpO2	Oxygen Saturation
EtCO2	End Tidal Carbon Dioxide
CPR Live Data	
Compression Depth	Compression Depth (%)
Ventilation Volume	Ventilation Volume (mL)
CPR Summary	

Display	Definition
Chest Compression Rate	**Compression Rate (per minute)**
Chest Compression Depth Average	**Compression Depth Average (%)**
Chest Compression Depth Variability	**Standard Deviation of Compression Depth (%)**
Chest Compression Recoil	**Compression Release (%)**
Chest Compression Fraction	**Proportion of time in which chest compressions are performed (%)**
Ventilation Volume Average	**Ventilation Volume Average (L/min)**
Ventilation Rate	**Ventilation Rate (breaths/min)**
Ventilation I:E Average	**Inspiratory/Expiratory Ratio Average**

TouchPro Patient Monitor

The TouchPro Patient Monitor display consists of numeric and volume widgets. A 12-lead ECG report can also be generated from the TouchPro Patient Monitor software.

Waveform Widget Displays

Display	Physiological Variable
ECG I	ECG Lead I
ECG II	ECG Lead II
ECG III	ECG Lead III
ECG V1	ECG Lead V1
ECG V2	ECG Lead V2
ECG V3	ECG Lead V3
ECG V4	ECG Lead V4
ECG V5	ECG Lead V5
ECG V6	ECG Lead V6
ECG aVL	ECG Lead aVL
ECG aVR	ECG Lead aVR
ECG aVF	ECG Lead aVF
ABP	Arterial Blood Pressure
PAP	Pulmonary Artery Pressure
CVP	Central Venous Pressure
Pleth	Optoplethysmograph
Capnogram	Capnogram

Numeric Widget Displays

Display	Physiological Variable
ABP	Arterial Blood Pressure
TAxilla	Axillary Temperature
TBlood	Blood Temperature
TBody	Body Temperature
CVP	Central Venous Pressure
C.O.	Continuous Cardiac Output
EtCO2	End Tidal Carbon Dioxide
HR	Heart Rate
ICP	Intracranial Pressure
MAP	Mean Arterial Pressure
NIBP	Non Invasive Blood Pressure
PACO2	Alveolar Partial Pressure Carbon Dioxide
PaCO2	Arterial Partial Pressure Carbon Dioxide
PAO2	Alveolar Partial Pressure Oxygen
PaO2	Arterial Partial Pressure Oxygen
PCWP	Pulmonary Capillary Wedge Pressure
PAP	Pulmonary Artery Pressure
Pulse	Pulse
PvCO2	Venous Partial Pressure Carbon Dioxide
PvO2	Venous Partial Pressure Oxygen
TRectal	Rectal Temperature
RR	Respiratory Rate
SpO2	Oxygen Saturation
Therm C.O.	Thermodilution Cardiac Output

12-Lead ECG Report Parameters

Parameter	Physiological Variable
I	ECG Lead I
II	ECG Lead II
III	ECG Lead III
aVR	ECG Lead aVR
aVL	ECG Lead aVL
aVF	ECG Lead aVF
V1	ECG Lead V1
V2	ECG Lead V2
V3	ECG Lead V3
V4	ECG Lead V4
V5	ECG Lead V5
V6	ECG Lead V6

VIDEO TUTORIALS

The video tutorials section on *caehealthcare.com* provides answers to many frequently asked questions and demonstrate a number of useful procedures that will help get the most out of your CAE simulator.

Scan or Click For Access To Video Tutorials

CAE

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