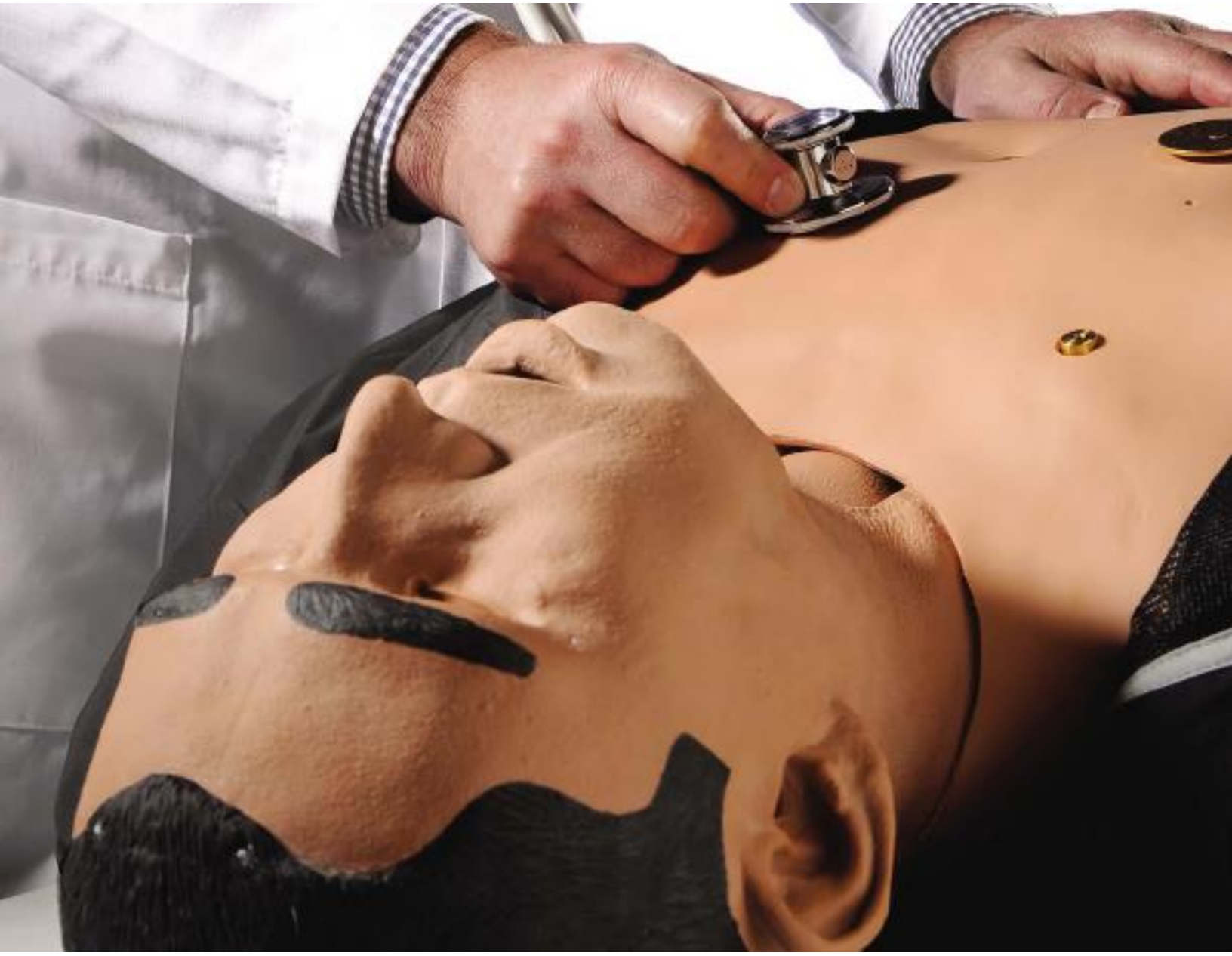
CAE**iStan**
User Guide



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165K296200 v2.8

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DECLARATION OF CONFORMITY

CAE Healthcare

DECLARATION OF CONFORMITY

CE

Application of Council Directive(s):	**Low Voltage Directive 73/23/EEC, EMC Directive 90/336/EEC**
Standard(s) to which Conformity is declared:	EN61010, EN55011, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN61000-4-3, EN61000-4-4, EN61000-4-5, EN61000-4-6, EN61000-4-8, EN61000-4-11
Manufacturer's Name:	**CAE Healthcare, Inc.**
Manufacturer's Address:	6300 Edgelake Drive Sarasota, Florida 34240 U.S.A.
Type of Equipment:	Patient Care Simulator – iStan™
Model No.:	**iStan-100**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s)

Place:	Sarasota, FL 34240 USA
Date:	June 8, 2012

Everett S. Tucker

Signature

Name: Everett Tucker
Title: Vice President of Engineering and Operations

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.

iSTAN SPECIFICATIONS

Size

Manikin/Simulator	72” H x 22” W x 12” D (183cm x 56cm x 30cm)
Instructor Workstation	1” H x 14.1” W x 9.6” D (2.5cm x 36cm x 24cm)

Weight

Manikin/Simulator	124lbs (56kg)
Instructor Workstation	5.4lbs (2.5kg)

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 90 – 240VAC, 50/60Hz
Consumption:	Maximum 150W (Charging), 100W nominal
Internal Batteries:	16.8V 100-watt-hour lithium-ion, rechargeable
Run Time:	7 to 8 hours (Typical)

Instructor Workstation

AC Input:	AC 100 – 240VAC, 50/60Hz
Run Time:	2 to 4 hours (Typical)

TouchPro Computer

Please see your product’s user guide for power specifications

Replacement Fuse

F1, DC Power In – 8A, 32VDC (250VAC), 5 x 20mm, IEC 60127-2/2 (Fast Acting)

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 : 20ma to 180ma

Air Supply

When using the optional external compressed air kit in conjunction with the facility supply source and facility wall adapter.

Maximum pressure: 50 psi to 120 psi

Cautions and Warnings

Please read and understand these cautions and warnings before you begin using the iStan 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 Fidelis 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.
- 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 of fuses
- Always remove the power cable and have simulator turned off when replacing fuses
- Replace F1 with a 32VDC (250VAC), 5 x 20mm, IEC 60127-2/2 fast acting fuse/rated for 8 amperes
- 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

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 iStan 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

CO_2 Production System

- Care must always be taken when using high-pressure equipment
- Do not disassemble or alter regulator
- Store CO_2 canisters in dry location between 32° and 104° F. (0 to 40°C). Do not expose CO_2 canister to heat above 140° F as rupture may occur.
- Never point CO_2 canister towards your face or someone nearby
- Use only CAE specified CO_2 canisters
- Wear protective gloves and eye protection when removing canister from regulator assembly

Bleeding and Secretion System

- DO NOT modify the tank or any assembly component
- ALWAYS protect eyes, skin and clothing against accidental exposure
- NEVER exceed 35 strokes while pressurizing the tank
- ALWAYS read and follow instructions for creating trauma fluids (e.g. blood). NEVER fill the tank with more than 6 liters (1.6 gallons) of fluid.
- After use, ALWAYS release pressure and clean the tank. DO NOT store liquids in the tank.
- ALWAYS release tank pressure before servicing. NEVER transport or ship in a pressurized and/or full state or leave a pressurized tank unattended.

Manikin

- Do not disassemble factory-assembled parts of the manikin
- Do not clean the manikin with chemical solvents. Use water and a light soap solution only.
- Make sure that manikin is set up on a stable, sturdy work surface to avoid collapsing and causing injury to users
- iStan should be operated in ambient temperatures below 104 degrees Fahrenheit (40 degrees Celsius). Prolonged operation (>4hrs) in ambient temperatures greater than 104 degrees Fahrenheit (40 degrees Celsius) may result in anomalous behavior and out of specification performance.
- Do not introduce foreign substances into the airway - with the exception of small amounts of approved lubricant. Only perform invasive procedures supported by the system as described in the applicable sections of the User Guide.
- Do not pick the manikin up by the limbs — support head and leverage weight with torso. It may be necessary to have the help of a second person to lift and move iStan.

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.

TABLE OF CONTENTS

INTRODUCTION

Welcome to the CAE iStan® Wireless Patient Simulator user guide. This guide provides complete instructions on how to use and maintain your iStan simulator.

With CAE's proprietary human physiology model at its core, iStan is designed to answer the need for a product that delivers more realism, more clinical features, and more flexibility than other simulators. Simply put, iStan is like no other simulator before it.

iStan

iStan allows for the physical assessment of various clinical signs (e.g. heart/breath/bowel sounds, palpable pulses, chest excursion, airway patency, etc.) that are dynamically modeled using mathematical algorithms of human physiology and pharmacology.

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

iStan

In addition, iStan has assessment, airway, cardiovascular, genitourinary, ACLS and trauma features that are familiar to CAE customers plus many new specially designed features such as cyanosis and capillary refill, trismus, SpO_2 finger probe, fluids on board, bilateral autoinjection, intraosseous sites, flail chest and programmable speech.

Wireless and tetherless, iStan takes simulation education to a new and exciting level of realism.

Weight Distribution

iStan is uniquely designed to emulate human weight distribution. This means that when iStan is lifted, certain components (e.g., head) respond in similar fashion to the way human muscles react to support themselves when lifted. This design allows learners to gain an understanding of how to lift and move a real person.

Skin

Modeled from a cast of a real person, the skin of iStan truly acts, looks and feels like real human skin, right down to the goose bumps (*cutis anserina*). Small "pores" on iStan's forehead have the ability to secrete clear fluid, simulating diaphoresis.

Skeletal Structure

Designed from the inside out, CAE has created the first patient simulator truly based around a human-like skeletal structure, a revolutionary development in itself. But iStan also closely mimics the anatomical workings of the human body at a level of realism not possible with other simulators. Spine, neck, arms and hips all mimic the degrees of movement of a real person.

Wireless

iStan is fully wireless and battery operated for amazing portability and versatility.

Contained in this User Guide

This User Guide has been designed for quick access to information on how to use and maintain your iStan system. Please make sure that you read and follow the **Cautions/Warnings** on the pages preceding the **Table of Contents**. This is for your safety and your learner's safety, as well as for the protection of your simulator.

Each subsequent section has been designed to keep valuable information at your fingertips. Before using the system, follow the step-by-step instructions included in the **iStan Setup** section.

The **Using the Software** section provides instructions on the use of the various software features as well as how to create and save a new SCEs.

Using iStan includes information on how the simulator and software components work and the functionality that each supports. Various clinical interventions are explained in this section along with how these interventions isolate critically important learning objectives. In addition, a description is provided of the CAE preconfigured patients, as well as detailed instructions on how to develop and save your own patients.

We encourage you to follow the iStan care and maintenance guidelines found in the **iStan Care and Maintenance** section, as this will ensure that your system is functioning optimally. Warranty details, as well as clean up and care information, are included in this section, making it a very important part of keeping your system in good working condition.

Equipment Overview

iStan has been designed to be used in any learning environment. iStan's standard features are easily integrated into a laboratory setting or remote locations.

Standard Components Inventory

iStan comes with all the necessary equipment for establishing an educational simulation center.

Standard Equipment
iStan Simulator
Laptop Instructor Workstation
Power Cord (Recharger)
CO_2 Canisters (4)
Inventory Kit
Wireless Microphone or Wireless Voice Link
Trauma Fill Tanks (2)

Detailed descriptions of this equipment can be found in the section iStan Standard Equipment

As you would with any shipment, cross-check this inventory with your CAE packing invoice to verify that all components have been received.

Optional Components Inventory

Optional equipment is available to accommodate special customer requirements. For example, options like an air compressor and the Trauma/Disaster Casualty Kit (TDCK) enable instructors to create real-life scenarios at authentic locations.

Optional Equipment
Tablet Instructor Workstation
Trauma/Disaster Casualty Kit (TDCK)
Moulage Kit
iStan Replacement Lithium Battery Pack (4)
Tool Kit
iStan Learning Applications
External Compressed Air Kit
Air Compressor
Hands-Free Training Cables

Detailed descriptions of this equipment can be found in the *Optional Equipment* section for iStan.

Contact CAE Customer Service at 866-462-7920 if there are any questions or if optional equipment is needed.

iStan Standard Equipment

The design of the iStan system allows students to focus on the patient simulator while giving instructors the ability to create an endless number of possible clinical situations.

Full-Body Wireless Simulator

All patient assessments and clinical interventions are played out on the iStan manikin, which represents a human patient. At 5 feet 10 inches (177.5 cm) in height and weighing 124 pounds (56 kg), iStan is fully operational in the supine, lateral, prone and seated positions. The simulator offers features like arm pronation and supination, breath, heart and bowel sounds, palpable pulses, patient voice, genitourinary features and airway management features.

The simulator is rechargeable using the **Power Cord** provided.

Laptop Instructor Workstation

The Laptop Instructor Workstation is a computer that utilizes Müse Software to operate as the main simulation control center.

Instructors control the simulation session from the Workstation by using SCEs that meet their learning objectives.

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

CO_2 Canisters

Four CO_2 canisters are included with iStan for use with a disposable $ETCO_2$ detector.

Scan or click the QR code to access the Using a CO_2 Canister with iStan video tutorial on caehealthcare.com.

Inventory Kit

iStan comes with a number of accessories and replacement components.

Included in the Inventory Kit are:

- iStan Start-Up Kit (Quick Start Chart and Setup Map)
- Priming syringe
- Roll (4 ft) of VHB tape and roll of 2 inch wide red tape (for cricothyrotomy)
- Cricothyrotomy replacement skin
- BP adapter kit
- Silicone lubricant
- iStan priming tube
- iStan ECG posts
- Pacing/Defibrillation disks
- Condensation drain
- Wound umbilical assembly
- NIBP Adapter
- Chest Tube prime tubing
- Female genitalia
- CO_2 Cartridge Kit

Wireless Microphone

The wireless receiver enables the user to communicate through the simulator using a microphone. The clip-on microphone is attached to a transmitter that may be attached to a belt or waistband.

Wireless Microphone

The microphone is battery-operated and has a power switch on the top to turn it on and off

Trauma Fill Tanks

Fluids are supplied to the simulator using a trauma fill tank. Two tanks are supplied so that one tank may be used for distilled water and red food coloring (for simulated blood) and the other tank used for distilled water (for clear fluids).

Trauma Fill Tanks

These tanks should be cleaned after use, but even with cleaning, it is best to dedicate one tank to simulated blood.

Scan or click the QR code to access the Cleaning the Trauma Fill Tank video tutorial on caehealthcare.com.

Optional Equipment for iStan

Additional components enable the iStan system to be customized to fit the specific needs of a wide variety of education environments.

Tablet Instructor Workstation

The Tablet Instructor Workstation is an optional, ruggedized tablet computer that can be used instead of the Laptop Instructor Workstation to run the Müse software (with proper configuration). An additional Müse license is provided with this option.

Note: The Tablet Instructor Workstation cannot perform calibration utilities; the Laptop Instructor Workstation is needed to perform these functions. Additionally, the Tablet Instructor Workstation and the Laptop Instructor Workstation cannot be used to run Müse at the same time, and Müse content is not shared between the Tablet and Laptop Instructor Workstation.

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

Scan or click the QR code to access the Getting Started with iStan and a Tablet Instructor Workstation video tutorial on caehealthcare.com.

Trauma Disaster Casualty Kit (TDCK)

The TDCK adds to the fidelity of a training session by providing the means to add a continuous flow of blood from the simulator while using the Moulage Kit to give a realistic look to the injury or condition (product #TF-005).

Trauma Disaster Casualty Kit (TDCK)

Moulage Kit

The Moulage Kit may also be ordered separately.

Moulage Kit

The kit provides the materials needed to create wounds on iStan (product #MODS-999).

iStan Replacement Lithium Battery Pack

Under normal usage, a battery pack should last up to two years.

Tool Kit

To simplify common adjustments and periodic repairs, CAE has put together a kit containing tools selected for use with the simulator (product #TOL-001).

Tool Kit

External Compressed Air Kit

The External Compressed Air Kit gives the user the ability to connect iStan to a CAE compressor, tank, or wall air using the kit's hose and fittings. When connecting to wall air, the kit attaches to the customer's wall adapter.

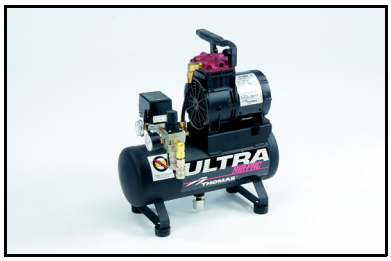
External Compressed Air Kit

The internal pump turns off automatically when external compressed air is sensed.

The External Compressed Air Kit includes a flexible 30ft (9m) hose attached to a preset air regulator, a fitting for air compressors and adapters for wall or tank air (product #AIR-006).

Air Compressor

An air compressor (product #AIR-003) designed for quiet operation is available for same-room use, and an alternative air compressor (product #AIR-002) is available for situations where the compressor resides in a location, such as a storage room, set apart from the simulator.



Out-of-Room Air Compressor
Product #AIR-002

Quiet In-Room Air Compressor
Product #AIR-003

Both Air Compressors are AC powered and include a regulator and an air hose with the appropriate connector fitting.

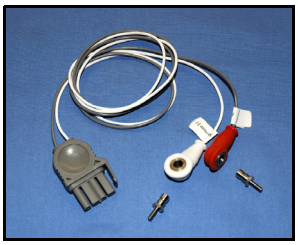
A 220VAC/50 Hz version of the Quiet In-Room Air Compressor (product #AIR-004) is also available.

Hands-Free Training Cables

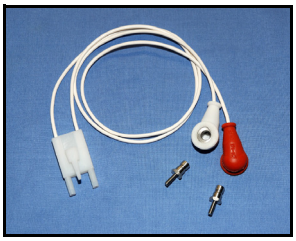
Hands-Free Training Cables connect to most popular defibrillators and cardiac pacing units and take the place of non-reusable electrode pads.

Hands-Free Training Cables

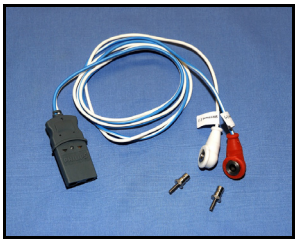
Three different cable designs are available to support the most popular defibrillation and pacing equipment. Each cable kit includes posts that attach to the defibrillator or pace locations on iStan.



Physio-Control (Medtronic, Inc.) product #ACC-005



Zoll (Zoll Medical Corporation) product #ACC-006



Philips (Koninklijke Philips Electronics, N.V.) product #ACC-007

Scan or click the QR code to access the Preparing METIman or iStan for Standard Defibrillation, Cardioversion, and Pacing video tutorial on caehealthcare.com.

iStan Educational Development

IStan Patient Simulator Essentials and Programming with Physiology courses offer learners at all levels in-depth instruction in the setup, operation, development of scenarios and maintenance related to the use of iStan.

The iStan Patient Simulator Essentials course provides learners with an overview of the system and its components, as well as an introduction to patient creation and scenario design.

- iStan Patient Simulator Essentials - two days at CAE facility
- iStan Patient Simulator Essentials On-Site - two days at learner-defined facility
- iStan Patient Simulator Essentials On-Site Physician Instructor - two days at learner defined facility with physician-led instruction

The iStan Programming with Physiology course builds upon the concepts introduced in the prerequisite Patient Simulator Essentials course. After a quick review of the Patient Simulator Essentials course, Programming with Physiology instruction spends the majority of the day providing learners with the ability to design patients and scenarios that can be used immediately upon completion of the course.

- iStan Programming with Physiology - one day at CAE facility
- iStan Programming with Physiology On-Site - one day at learner-defined facility
- iStan Programming with Physiology On-Site Physician Instructor - one day at learner defined facility with physician-led instruction

iStan Learning Modules

CAE Learning Modules enhance the use of the simulator by providing preprogrammed scenarios and corresponding support documentation (i.e. Learning Objectives, Facilitator Notes) that can be readily integrated into a lesson plan, a specific curriculum or an educational program.

- Adult Nursing
- Advanced Cardiac Life Support (ACLS)
- Airway Management Module I
- Airway Management Module II
- Cardiopulmonary Critical Situations (CCS)
- Disaster Medical Readiness (DMR)
- Emergency Medical Services (EMS Modules 1, 2, 3, 4 & 6)
- Foundations of Nursing Practice
- Patient-Centered Acute Care Training (PACT)
- Perioperative Management
- Rapid Assessment and Intervention (RAI)
- Respiratory Education Simulation Program (RESP I, II & III)
- Tactical Medical Care - Military (TMC)

The Program for Nursing Curriculum Integration (PNCI)

PNCI is a full learning package that integrates pre-licensure nursing curriculum with high-fidelity patient simulation. With 100 evidence based Simulated Clinical Experiences (SCEs), PNCI can be used with both CAE patient simulators and other brands. Includes the Joint Commission's National Patient Safety Goals, and the Quality and Safety Education for Nurses (QSEN) competencies.

iSTAN SETUP

The following pages will guide you through assembling and configuring iStan. Below is a list of the steps required to prepare iStan for operation.

Setting Up iStan
Place iStan in the Work Area
Open the Secretions Valve
Ensure the Cervical Clip is Detached
Power on iStan
Power on the Instructor Workstation
Connect to the Wireless Network
Connect a TouchPro™ Computer to the Wireless Network (Optional)
Insert the CO_2 Canister (Optional)
Connect the SpO_2 Probe (Optional)
Fill the Fluid Reservoirs (Optional)

Before Beginning Setup

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

Understand the Cautions/Warnings information located in the **Introduction** section of this User Guide.

- Follow the sequence of steps carefully
- Complete all steps in order
- Do not power on any components until instructed in the text

KEEP all original shipping materials, including the BOXES - warranty and repair items must be return shipped to CAE in their original packaging.

Because shipping materials should be stored and retained, be sure that all protective packing materials and unused ancillary computer parts are secured as well.

If unpacking iStan for the first time, careful use of a box cutter protects both the packaging and the product.

Scan or click the QR code to access the Unpacking iStan and Finding the Serial Number video tutorial on caehealthcare.com.

Step 1: Place iStan 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 meter x 4 meter) work area is recommended for movement of learners and positioning of components around the simulator.

iStan

iStan 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.

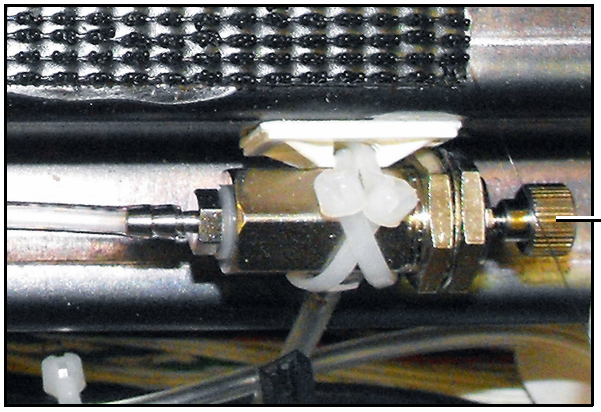
Before placing the simulator on a surface, be certain that surface can easily support 200 pounds.

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: Open the Secretions Valve

With the enhancements of iStan, a secretions valve was added to the internal operations of iStan. This valve can be found inside the left chest area and it is attached to the black router cover, adjacent to the circuit breaker. When iStan is shipped the valve is in the fully closed position. Therefore, the valve needs to be opened in order to achieve secretions. The valve is very sensitive and only needs to be opened slightly. If the secretions are too forceful, adjust the valve accordingly.



The Secretions Valve

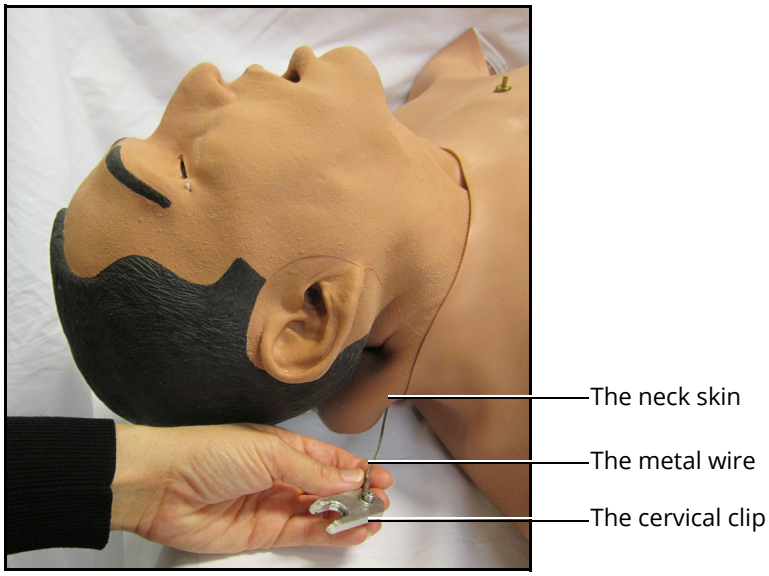
Scan or click the QR code to access the Using iStan's On-Board Clear Fluid System video tutorial on caehealthcare.com.

Step 3: Ensure the Cervical Clip is Detached

iStan includes a cervical clip that can be clipped to the inside of the neck to prevent the neck from turning or moving. This feature is useful in certain specialized clinical scenarios. However, for normal use, the clip should be removed. To check whether the clip is in place, turn iStan's head from side to side. If the neck moves freely, the clip is detached and no further action is needed.

If the neck does not move freely:

a. Pull back the neck skin at the back of iStan's head
b. Feel behind the skin at the back of the neck for the metal clip. The clip is permanently tethered to iStan by a metal wire.
c. Once the clip has been located, pull down until it detaches



The Cervical Clip

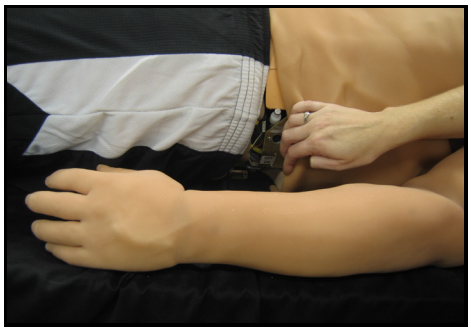
d. Place the clip and the metal wire under the neck skin
e. Return the neck skin to its original position

The clip can be replaced as needed by feeling for the groove in the neck and placing the clip in the groove.

Step 4: Power on iStan

a. Carefully pull back the skin on iStan's left hip and move the protective foam aside

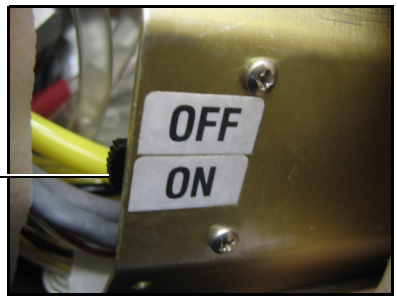
b. Locate the power (toggle) switch on the edge of the side plate



Locate iStan Power Switch

c. Flip the power switch to the ON position

Flip the Power Switch from OFF to ON.



iStan Power Switch

d. Carefully return the skin and foam to its position covering the switch

IMPORTANT: You must wait three (3) minutes before proceeding to Step 5 while the simulator establishes a wireless network.

iStan can be operated continuously for seven to eight hours without recharging or running from a power source.

Step 5: Power on the Instructor Workstation

a. Place the Laptop or Tablet Instructor Workstation near iStan 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. Power on the Instructor Workstation

Step 6: Connect to the Wireless Network

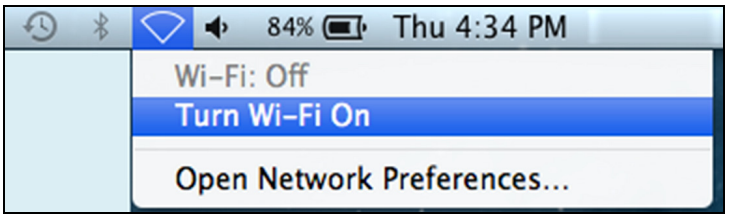
A) Mac Laptop Instructor Workstation Option

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

   TIP: Some previous versions of Mac refer to WiFi as Airport.



The WiFi Icon

2. Select your simulator's wireless network (for example, ISTANXXX, where XXX is the serial number for the unit) and enter password

The Simulator WiFi Connection

- The case-sensitive network password is *istanxxx*
- The wireless connection is established
- The Müse software can now be launched

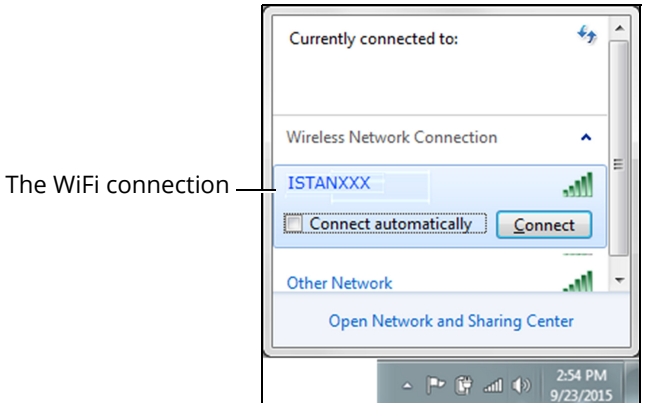
For more information on starting the application, see the *Using Müse* section of the User Guide.

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, ISTANXXX, where XXX is the serial number for the unit)
3. Click **Connect** and enter password



The Simulator WiFi Connection

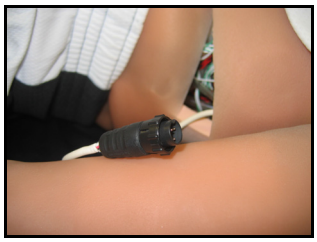
- The case-sensitive network password is *istanxxx*
- The wireless connection is established
- The Müse software can now be launched

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

Optional: Connect the SpO_2 Probe

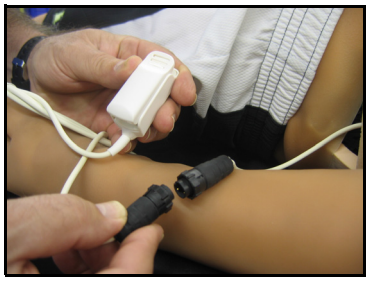
To connect and attach the SpO_2 probe:

1. Lift the skin on iStan's left side and locate the SpO_2 jack in the simulator



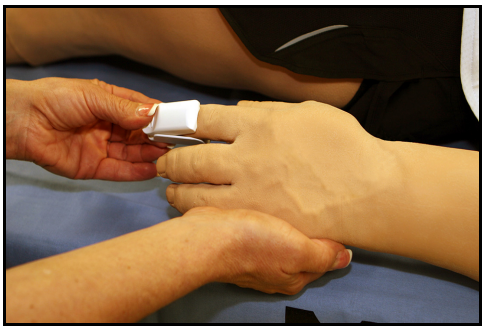
The SpO_2 Jack

2. Connect the SpO_2 probe to the SpO_2 jack in the simulator



The SpO_2 Probe Connection

3. Place the SpO_2 probe on iStan



The SpO_2 Probe

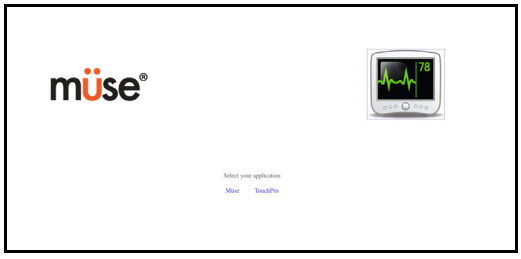
Connect a TouchPro™ Computer to the Wireless Network (Optional)

The CAE TouchPro computer comes pre-configured for use with iStan. If you wish to supply your own computer to run the TouchPro software, the additional computer must meet the system requirements on page 24 and must join the iStan network prior to use.

The iStan 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 iStan network. The help of your system administrator or CAE Customer Service may be needed to configure the network properties.

The steps below outline how to obtain the IP address that accesses the TouchPro software on the TouchPro computer. The Instructor Workstation MUST be connected to the iStan network prior to performing the steps below

1. Power on the computer to be used for the TouchPro software
2. Using this computer, join the iStan network
3. From the Laptop Instructor Workstation that is connected to the iStan Network, from the **Apple** menu, click **System Preferences**
4. From the System Preferences screen, click **Network**
5. Click **Advanced**
6. Click **TCP/IP**. Next to the **IPv4 Address** header, an IP Address is listed
7. Write down the IP Address and click **Cancel** to close the Advanced screen
8. Close the Network screen
9. From the web browser on the TouchPro computer, enter the IP obtained in **Step 6** into the browser's address field



The Müse Start Screen

Optional: Insert the CO_2 Canister

Some SCEs rely on the simulation of exhalation of CO_2. The following instructions will show you how to safely install the CO_2 canister in the simulator.

WARNING: Careful handling, including the use of hand and eye protection, is required in the use of CO2 canisters.

Please read and understand all the important **cautions and warnings** on **removing canisters** as well as safety steps that must be used when **handling CO_2** canisters.

Use of CO_2 Canisters

- Store the CO_2 canisters in a dry location between 32° and 104° F. (0 to 40°C)
- Do not expose the CO_2 canister to heat above 140° F as rupture may occur
- Never point the CO_2 canister towards your face or someone nearby
- Use only CAE specified CO_2 canisters
- Do not remove cannister from regulator base until empty. Canister end becomes punctured when screwed into regulator base.
- Never ship the CO_2 canister attached to the regulator assembly

Assembly of the CO_2 Regulator

- Care must always be taken when using high-pressure equipment
- Do not disassemble or alter regulator
- Dry completely if the regulator becomes wet
- Discontinue use of this equipment if leakage or visible damage is evident

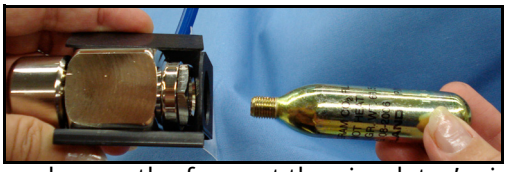
Insertion of the CO_2 Canister

To insert the CO_2 canister:

1. Locate the regulator (shipped in the inventory bag)
2. While holding the regulator firmly, carefully screw the CO_2 canister into the regulator as far as it will go. The final turns will puncture the CO_2 canister, which is necessary for correct operation.

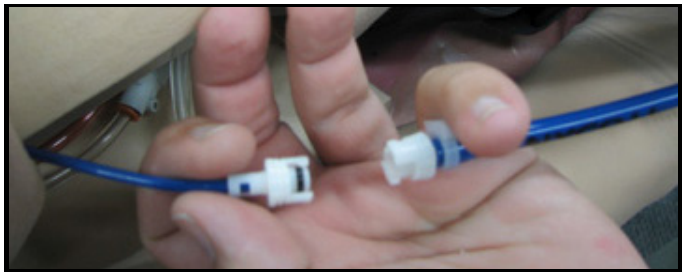
CAUTION: Do not loosen the canister once it has been screwed into the regulator assembly until the contents are exhausted and pressure relieved.

CAUTION: Unscrewing the canister before it is empty results in the sudden release of all high-pressure gas with a possibility of liquid CO2 spray. Unprotected skin could receive freezing burns.



a. Lift the skin and move the foam at the simulator's right midsection and locate the CO_2 pneumatic umbilical hose inside the side tray

b. Attach the blue CO_2 pneumatic umbilical hose to the connection on the regulator



c. Place the CO_2 canister, regulator and hoses inside the simulator. Use the Velcro mounting surface to secure this assembly to the tray. A properly installed assembly will have the CO_2 canister sloping down toward the rear of the manikin.

d. Carefully reposition the foam and pull the skin back over the simulator to its original location

Once the canister and regulator assembly is in place, CO_2 is measurable with a disposable ET CO_2 detector during patient exhalations.

Based on the training environment, a CO_2 canister may last from 10 minutes (rapid breathing) to 25 minutes.

Optional: Prepare the Secretion System

Secretions from the ears, nose, mouth, tearing, and urine share the same fluid, so it is recommended to ONLY use clear distilled water with the secretion system. For example, red food coloring for simulated blood secretions will also produce red urine secretion.

Using the Trauma Fill Tank

The Trauma Fill Tank provides the means by which the simulated blood is transported to the on-board blood reservoir.

CAUTIONS and WARNINGS

Carefully follow all instructions for using the Trauma Fill Tank. Pay particular attention to the following cautions and warnings:

- ALWAYS read and follow instructions for creating trauma fluids (e.g. blood)
- ALWAYS protect eyes, skin and clothing against accidental exposure
- After use, ALWAYS release pressure and clean the tank
- ALWAYS release tank pressure before servicing
- DO NOT modify the tank or any assemble component
- DO NOT store liquids in the tank
- NEVER transport or ship in a pressurized and/or full state

Assembling the Trauma Fill Tank

Careful assembly of the Trauma Fill Tank helps to ensure proper operation.

Step 1: Connect the Trauma Fill Tank Umbilical to the Tank Assembly

To connect the umbilical to the Trauma Fill Tank:

a. Insert the pink siphon tube approximately 1/2 inch into the pink hose insert (Otherwise, the tank will pump only air)
b. Lubricate (with silicone or water) the black o-ring on the pink hose insert
c. Push into the threaded tank nipple until fully sealed
d. Screw the hose nut onto the threaded tank nipple and firmly hand tighten

Step 2: Attach the Overflow Bottle to the Tank Assembly

To attach the Overflow Bottle to the Trauma Fill Tank:

a. Connect the umbilical male connector to the female bottle lid fitting
b. Clip the bottle to the tank using the attached carabiner mechanism

Operating the Trauma Fill Tank

Be careful to complete the following steps correctly to ensure proper use and maintenance of the iStan and its peripherals.

Step 1: Pour the Fluid into the Trauma Fill Tank

Pour the desired amount of fluid into the Trauma Fill Tank, being careful NOT to exceed 6 liters (1.6 gallons) of fluid.

Note: The left thigh tank is smaller (0.8 liters) and used for clear fluids (urine, diaphoresis, tears and ear, nose and mouth secretions). The right thigh tank is larger (1.8 liters) and used for blood (chest tube drainage).

Four (4) liters of simulated blood provides enough fluid to fill the right thigh reservoir twice. The amount of blood used in a training session will vary with the patient, the wounds simulated and the learner's experience.

Step 2: Connect the Trauma Fill Tank Umbilical to the Simulator

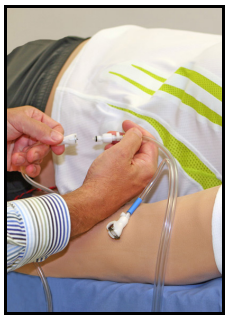
Attach the tank's umbilical to the simulator by matching and connecting the fittings labeled in blue and yellow.

a. For clear fluids, separate the skin on the left side of the simulator at the hip to reveal a bundle of hoses

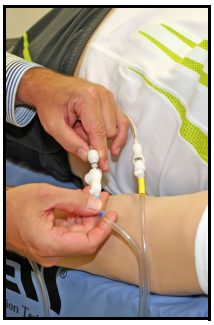
For blood, the hoses can be located by separating the skin on the right side of the simulator at the hip.

b. Locate the blue FILL hose and yellow VENT hose

c. Connect the FILL (with the blue label) and VENT (with the yellow label) hoses to the CAE tank. Connections are male to female.



Connect the Vent Hose



Connect the Fill Hose

Note: Both connections must be made for correct operation.

Step 3: Pressurize the Trauma Fill Tank and Fill the Reservoir

An integrated hand pump is used to create the pressure for the Trauma Fill Tank.

> **WARNING**: To prevent ejected pump assembly and/or solution from striking and injuring you, NEVER stand with your face or body directly over the top of the tank when pumping or loosening the pump.

To operate the pump and fill the reservoir:

a. Ensure the yellow relief valve on the front of the tank is closed
b. Unlock the pump handle by turning counter-clockwise

   Note: Be careful not to loosen the pump from the tank.

c. Stroke the pump handle up and down from 25 to 35 times to transport approximately 1 liter of fluid to the reservoir

   Note: NEVER exceed 35 strokes while pressurizing the tank.

d. Lock the pump handle back into the pump assembly by turning clockwise
e. Watch the Overflow Bottle located on the tank assembly. When liquid begins to appear in this bottle, the reservoir is full. (Filling the 1.8 liter blood reservoir takes approximately 3 to 5 minutes while filling the 0.8 liter clear reservoir takes 1 to 3 minutes.)

Step 4: Release Pressure from the Trauma Fill Tank

Immediately release pressure from the tank by turning and holding the yellow pressure relief knob clockwise until all air pressure is gone.

If pressure will not release using the relief knob:

a. Place a rag over the top of the tank and pump handle
b. While firmly pushing down on the pump handle, slowly turn the handle counter-clockwise

   WARNING: NEVER leave a pressurized tank unattended.

Step 5: Disconnect the Trauma Fill Tank Umbilical from the Simulator

Step 6: Clean the Simulator and Fluid System

When the simulation is completed and the Trauma Fill Tank has been disconnected, remove the fluids and clean the simulator

Step 7: Clean the Trauma Fill Tank

Before storing the Trauma Fill Tank, make sure the equipment is clean

Step 8: Store the Trauma Fill Tank

After cleaning, the Trauma Fill Tank assembly should be stored securely for future use.

a. Allow the interior of the tank to dry by loosening the pump assembly

   Note: Do NOT leave the pump assembly out of bottle, however, because dust will contaminate the system.

b. Loosely wrap the Trauma Tank Umbilical around the neck of the tank to protect it

c. Store all components in a clean, dry area

Using Muse

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.

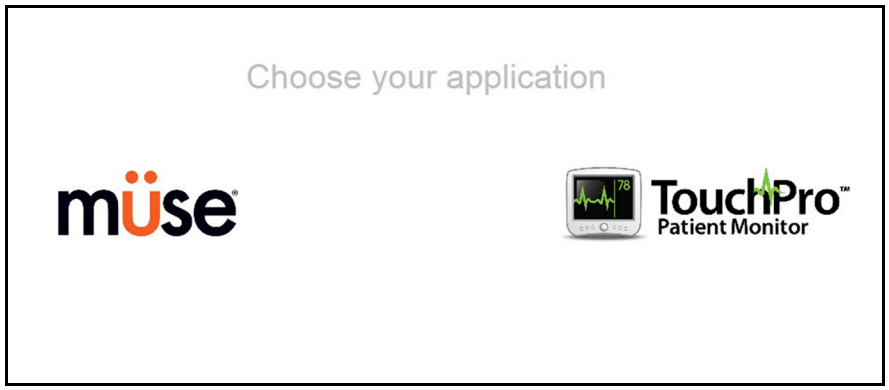
IMPORTANT: Do NOT use any of the browser's navigational tools (i.e., back and forward buttons) while operating Müse.

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

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 View

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

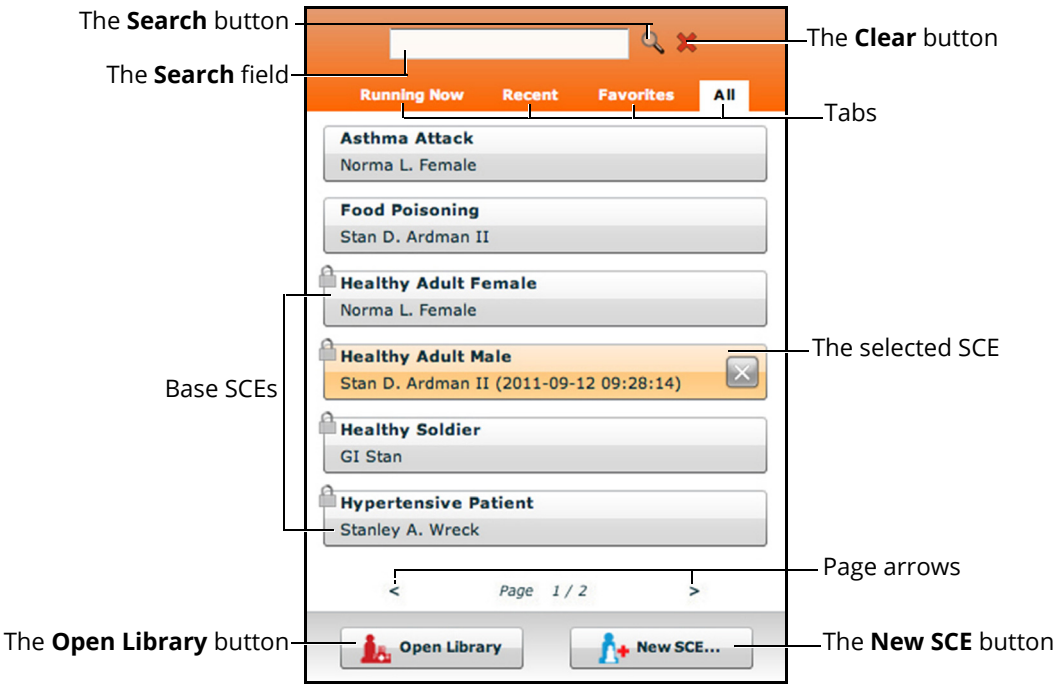
The Home page can be accessed by clicking the **Home** button in the upper right corner of the Müse software or, on any screen without a **Home** button, by clicking the **Return** button in the upper left or right corner of the screen.

The Home Page

The SCE Selection Panel

SCEs are process tools that enable the facilitator to execute a learning strategy using simulation. Preconfigured CAE SCEs provide an extensive overview and outline of the learning exercise and require minimal additional faculty development time for use. Each SCE is comprised of a patient and up to four scenarios.

Available SCEs appear in the SCE Selection panel on the Home page.



The SCE Selection Panel

The SCE Selection panel has four tabs that access SCEs: Running Now, Recent, Favorites and All.

- **Running Now** tab: Lists the SCE that is currently running and is only available when an SCE is running

  Note: Only one SCE is allowed to run at a time.
- **Recent** tab: Lists all the recently run or edited SCEs
- **Favorites** tab: Lists all SCEs that have been selected as favorites and is only displayed after favorites have been selected. To add a favorite SCE to your profile, click the **Add to Favorites** button at the top of any SCE on the Home page. Managing favorites is achieved in the Account Profile portion of the software.
- **All** tab: Lists all SCEs, including user-created SCEs and all SCEs from available learning modules

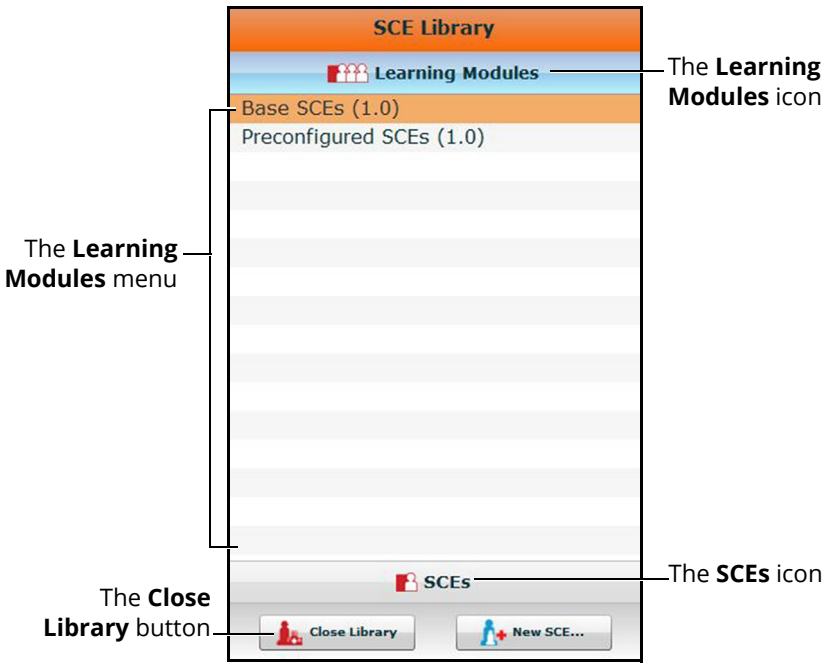
The **Lock** icon indicates a locked SCE. Locked SCEs are installed by CAE and cannot be edited or deleted.

A Locked SCE

- To search for an installed SCE, enter part of the name of an SCE in the **Search** field and click the **Search** button
- Click the page arrows to view additional pages of installed SCEs
- Click any SCE to select it. Once an SCE is selected, it appears in the SCE Summary panel
- To run an SCE, click **Run** in the SCE Summary panel to execute the SCE
- To open the SCE Library, click the **Open Library** button
- To create a new SCE, click the **New SCE** button

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.

There are six base SCEs included with HPS with Müse:

- Healthy Adult Male
- Healthy Adult Female
- Healthy Soldier
- Hypertensive Patient
- Chronic Obstructive Pulmonary Disease (COPD) Patient
- Pregnant Female

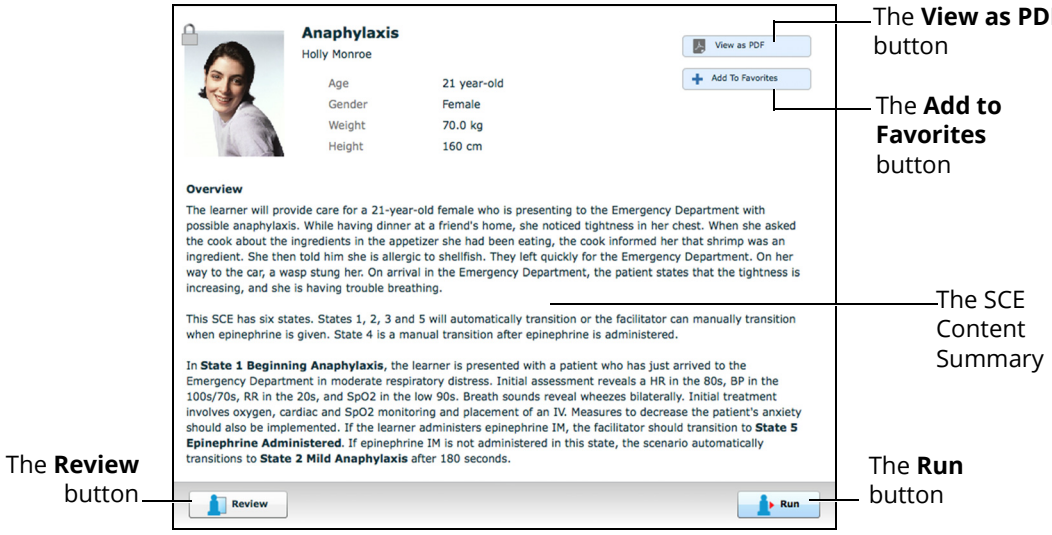
Preconfigured SCEs

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

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.

The SCE Summary Panel

- The SCE Summary Panel provides information about the selected SCE



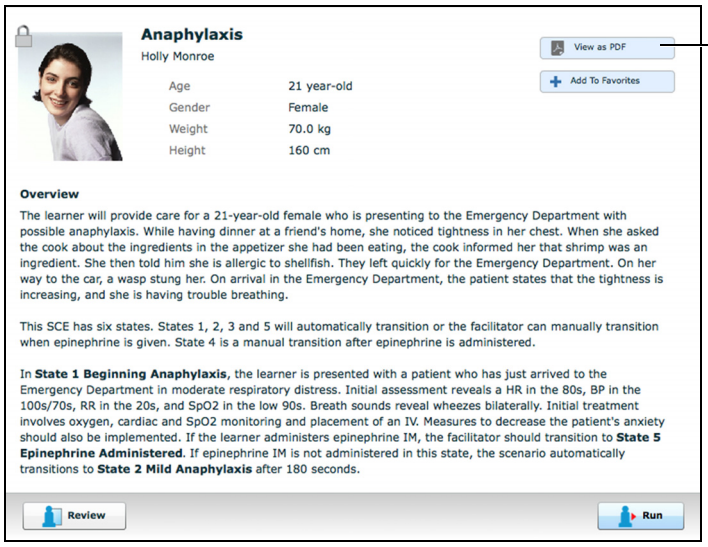
The SCE Summary Panel

- 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

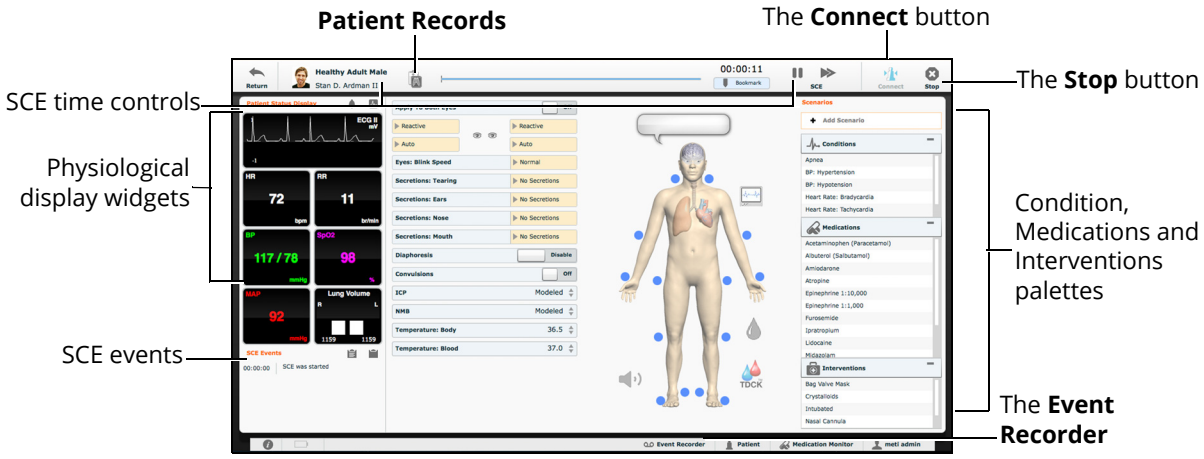
2. From the SCE summary panel, click the **View as PDF** button
3. Save the PDF to an external storage device to print from another computer

   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

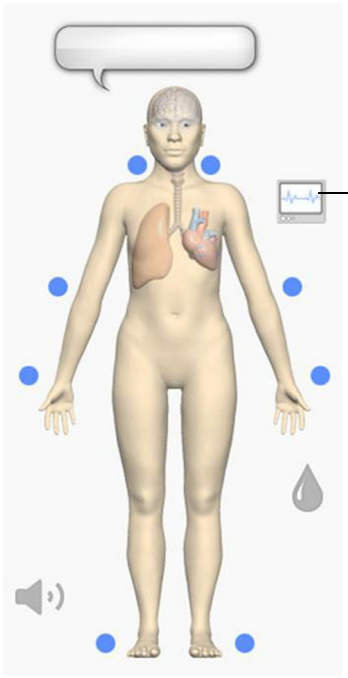


The Run Screen

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:

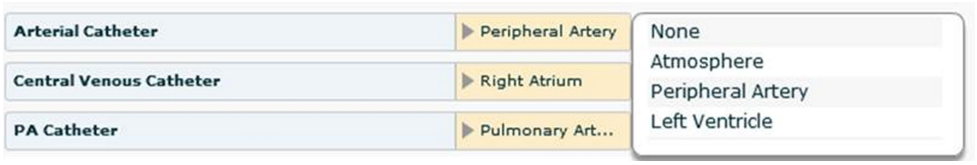
- ECG Leads OFF:
  - The ECG waveform is not displayed
- Pulse Oximeter OFF:
  - The PLETH waveform is not displayed
- Capnograph turned OFF:
  - The CO2 waveform is not displayed

The listed probes also impact the numerical values as follows:

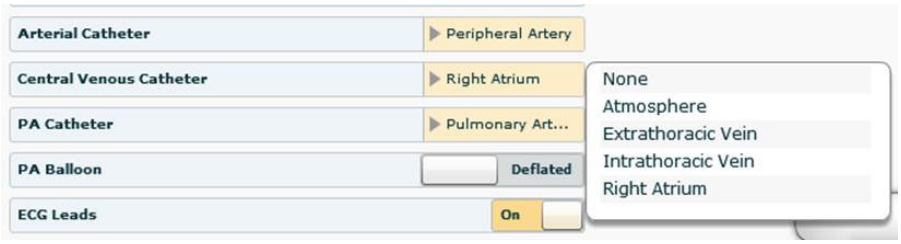
- ECG Lead OFF and Pulse Oximeter OFF:
  - The HR (Heart rate) is not displayed
- Pulse Oximeter OFF:
  - SpO2 is not displayed
- Capnograph OFF:
  - EtCO2 not displayed
- Pulse Oximeter OFF and Capnograph OFF:
  - RR (Respiratory rate) not displayed
- Blood Temperature Probe OFF:
  - TBlood and TRectal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

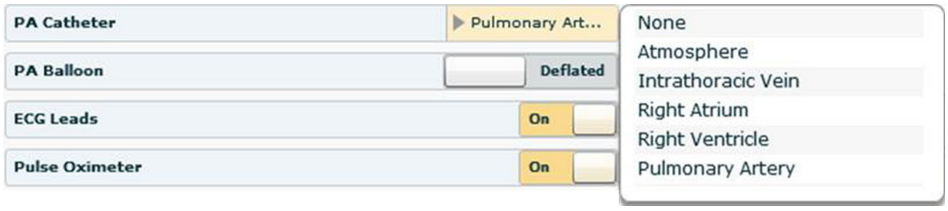
Setting the catheter placement to Atmosphere causes a flat line to be displayed even when an override is used.



Arterial Catheter Placement

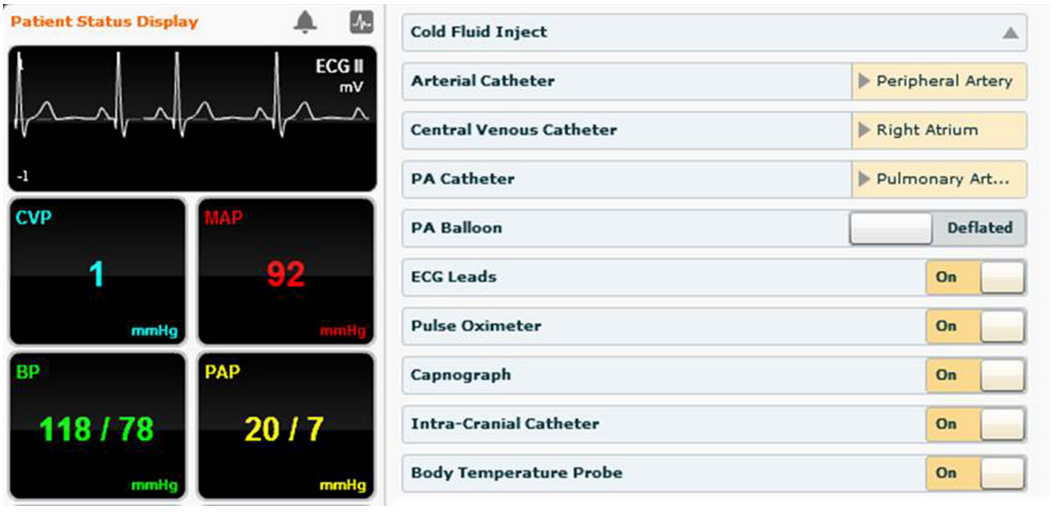


Central Venous Placement

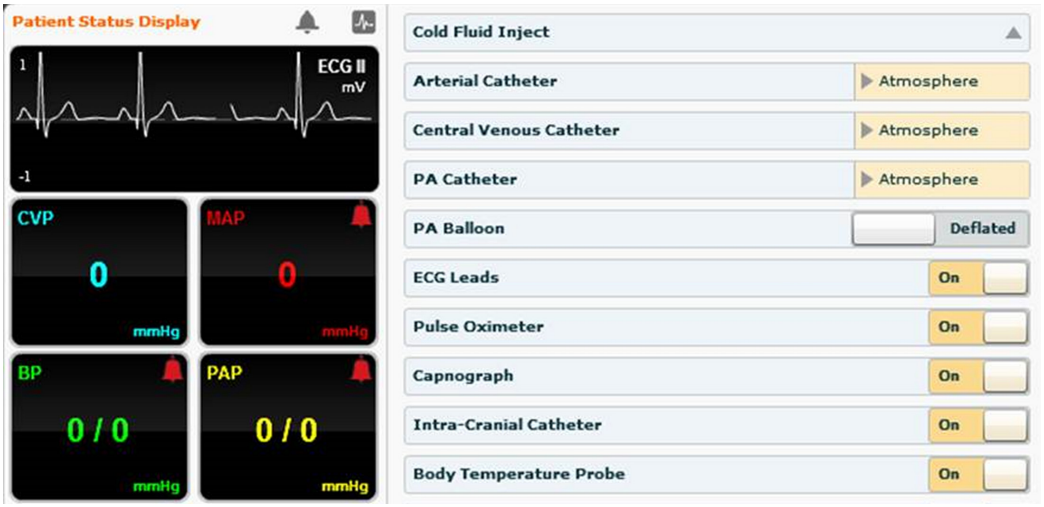


PA Catheter Placement

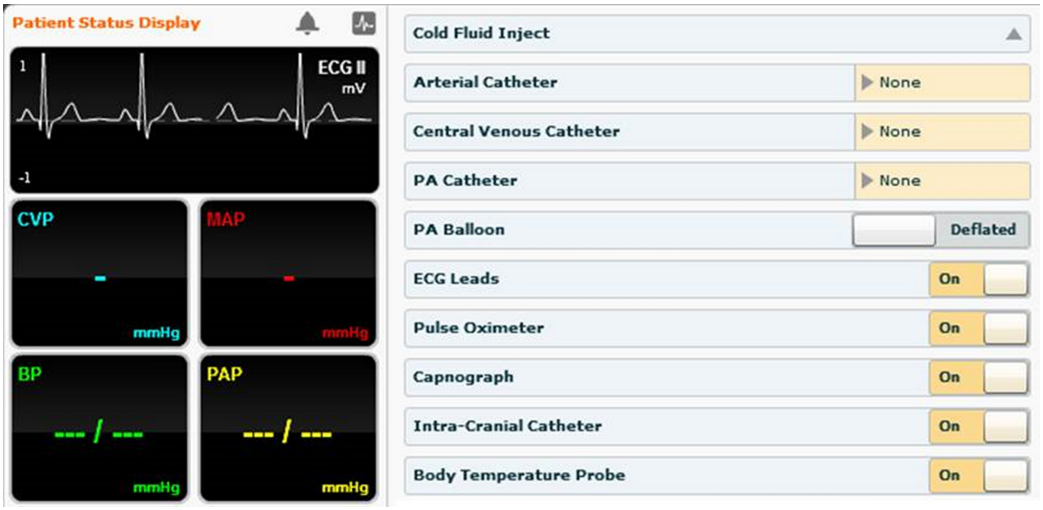
If the catheter placement is none, no graph is displayed vs a flat line when Atmosphere is selected. The associated widget is displayed and no alarm is generated.



Catheters in Proper Locations



Catheters set at Atmosphere



Catheters set at None

Connecting to the Simulator

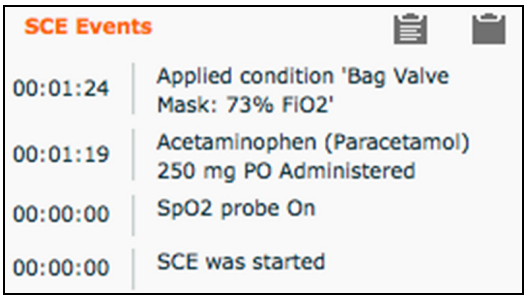
After starting an SCE by clicking the **Run** button, click **Connect** to connect to the simulator. The **Connect** button is located in the upper right corner of the Run screen.

The Connect Button

An SCE must be running before you can connect to the simulator.

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

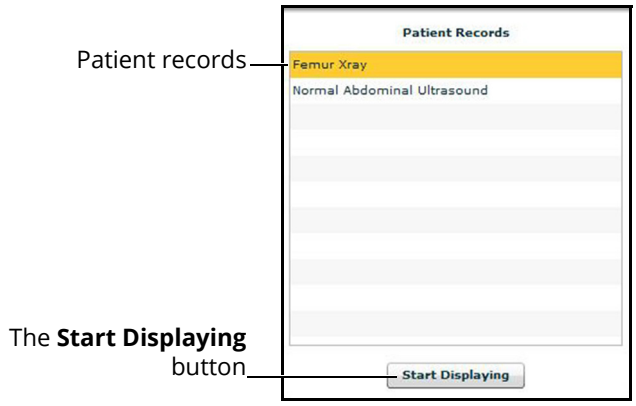
Displaying Patient Records

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



The Patient Records List

2. Select a patient record from the list
3. Click **Start Displaying**

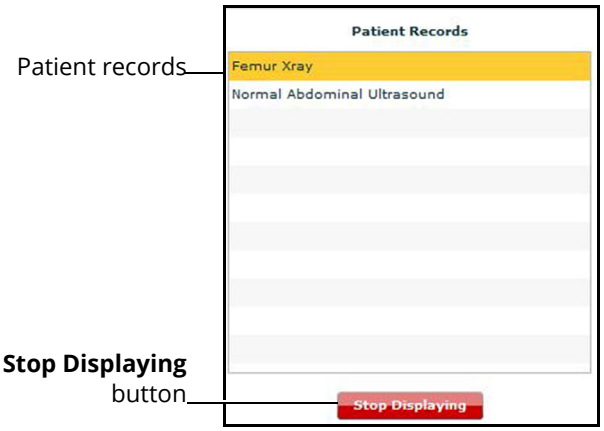
   IMPORTANT: Ensure pop-up blocking is turned OFF in the web browser of the Instructor Workstation and any TouchPro workstations. Consult the web browser's help menu for assistance.

   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.



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*.

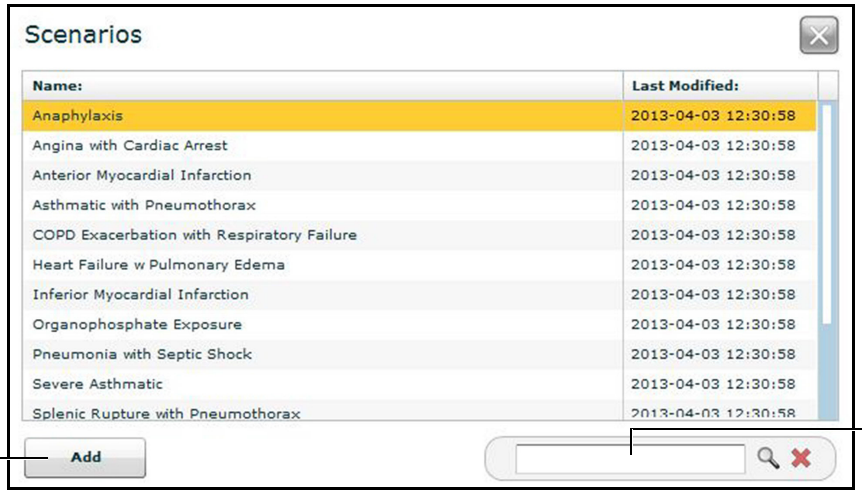
Adding a Scenario to a Running SCE

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

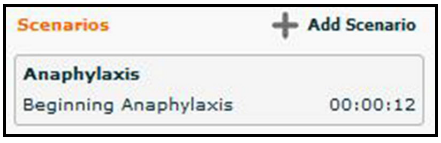
The Add Scenario Button



The 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 six different views representative of various body systems and features:

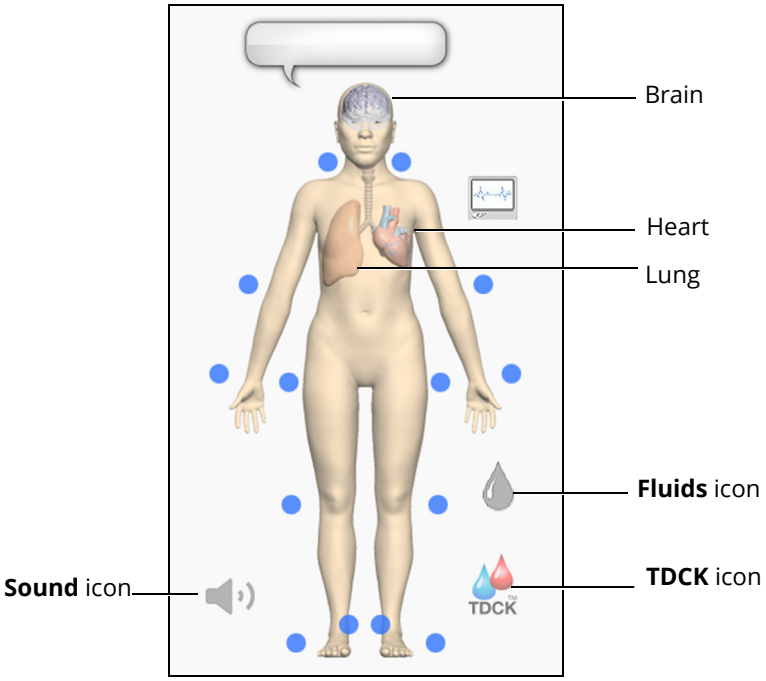
From the Run screen, users can select from different views representative of various body systems and features:

- Neurological
- Respiratory
- Cardiovascular
- Fluids
- TDCK
- 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 TDCK, click the **TDCK** icon
- For Sounds, click the **Sound** icon

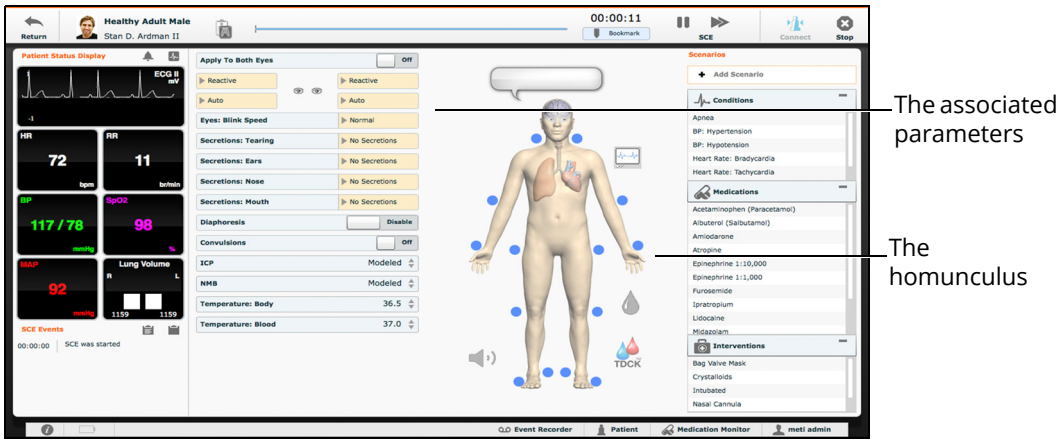
From each view, various parameters can be viewed and adjusted.



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



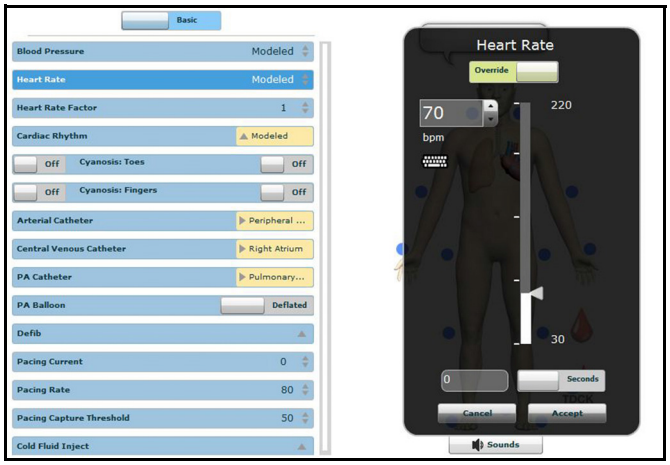
The Run Screen

2. Locate the desired parameter

   Note: Some views include a Basic/Additional switch that can be used to toggle between basic and advanced parameters. Basic parameters are shown by default.

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 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 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

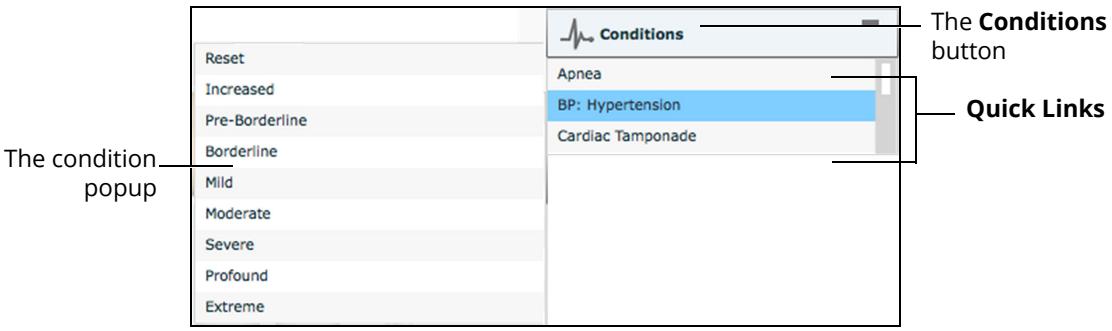
The Conditions, Medications and Interventions palettes on the Run screen enable the application of conditions, medications and interventions during simulation. Once applied, conditions are reflected in the patient's physiology and logged. All medications and interventions are also logged, and most affect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



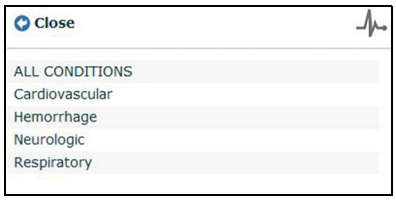
The Medications Palette

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.



The Conditions Menu

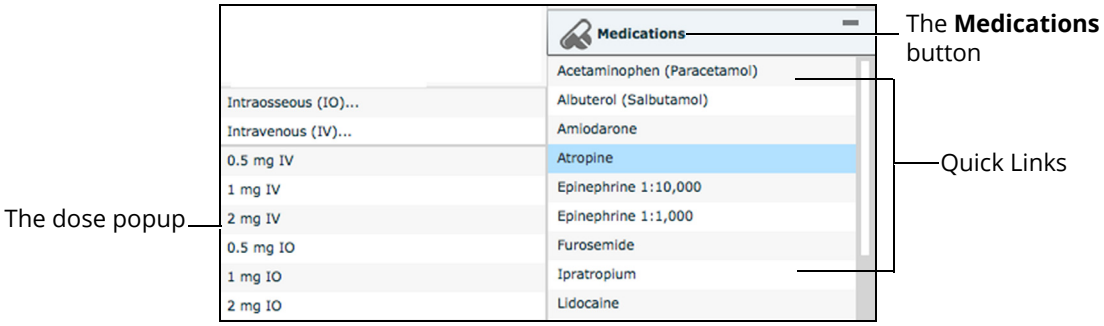
2. Navigate the menus to find the desired condition

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.

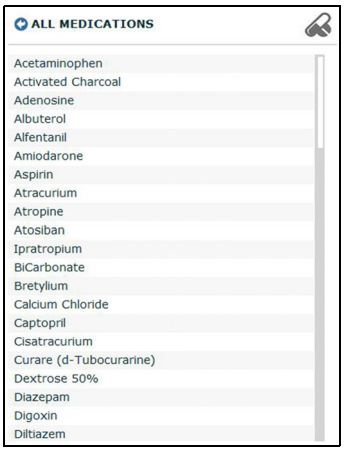


The Medications Palette

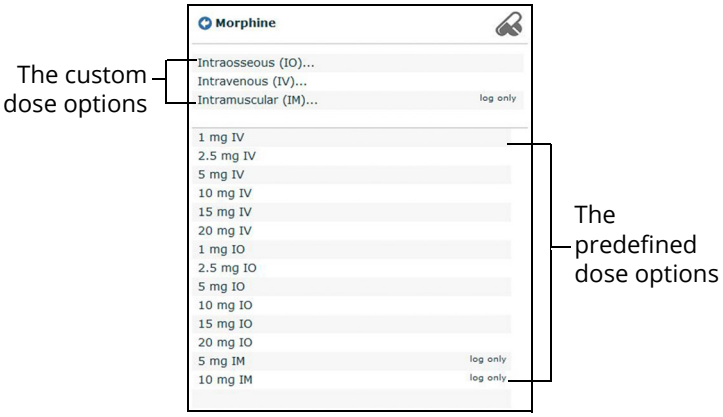
Note: Quick Links can only be added while creating or editing an SCE.

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

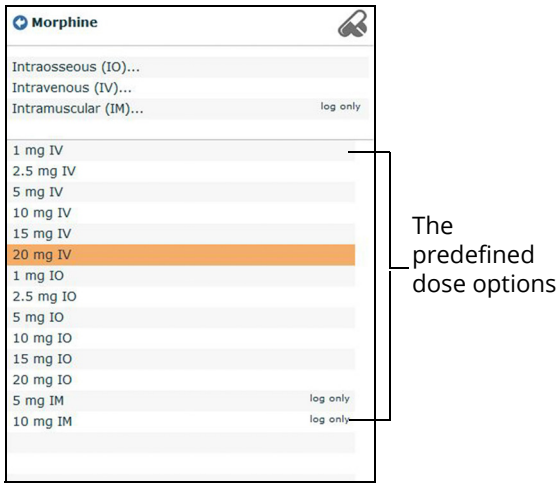


The Medication Dose Menu

4. Select a dose option

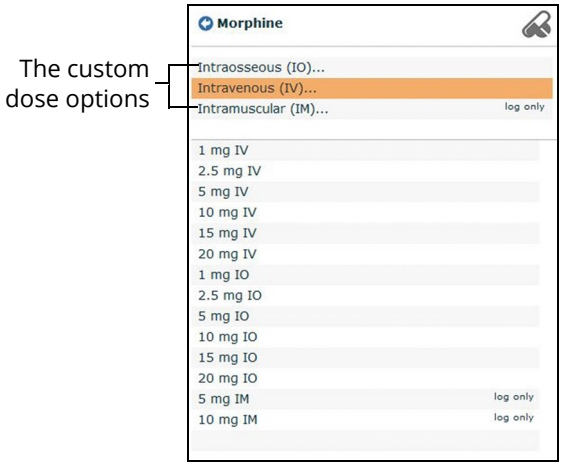
   This can be done one of two ways:

   a. Choose a pre-defined dose

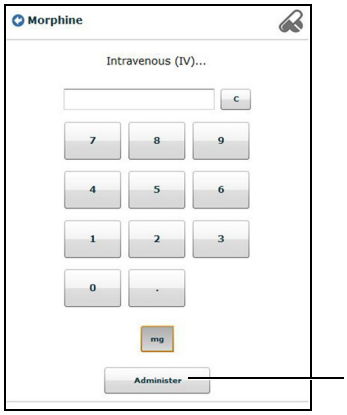


The Medication Dose Menu

   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

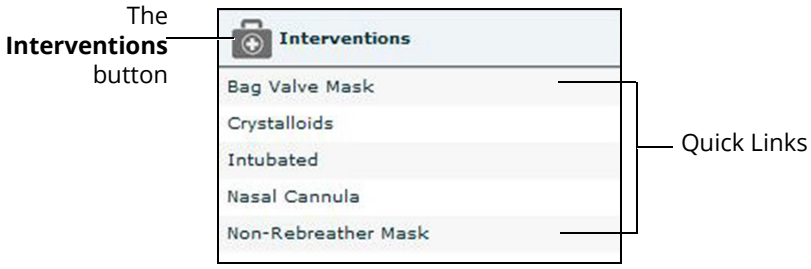
   Note: Not all medications affect the patient's physiology, but all are logged.

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.

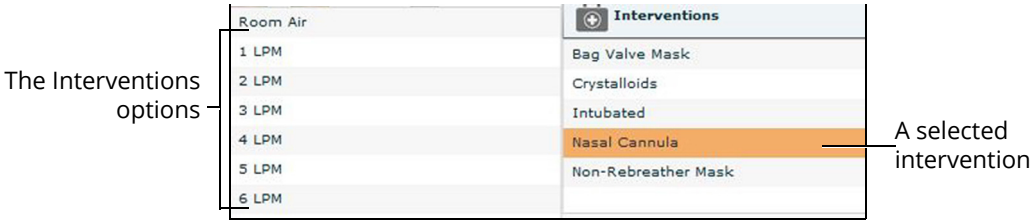
To apply an intervention using the Quick Links in the **Intervention** palette, click an Intervention Quick Link.

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.

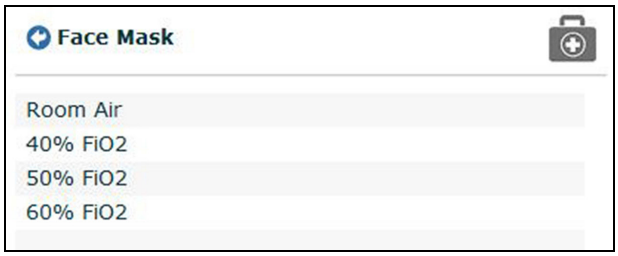
To apply an intervention that has not been set up as a Quick Link in the **Interventions** palette:

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. Once the desired intervention has been located, click the intervention's name from the list



The Intervention Options Menu

4. Click the desired option

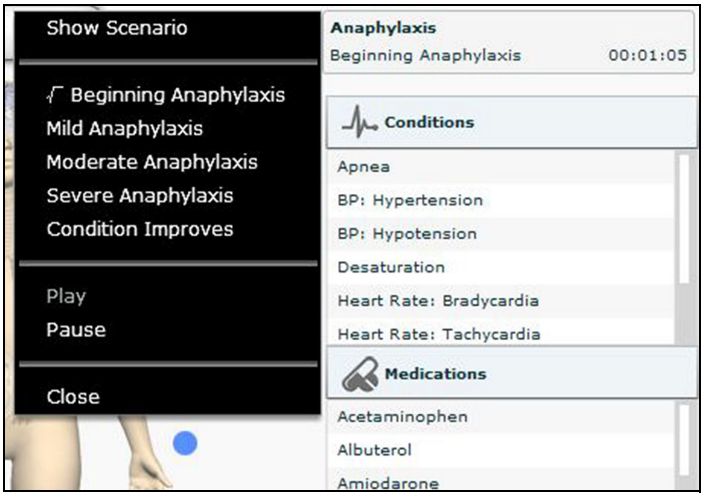
   The intervention is applied and appears in the patient's physiology.

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

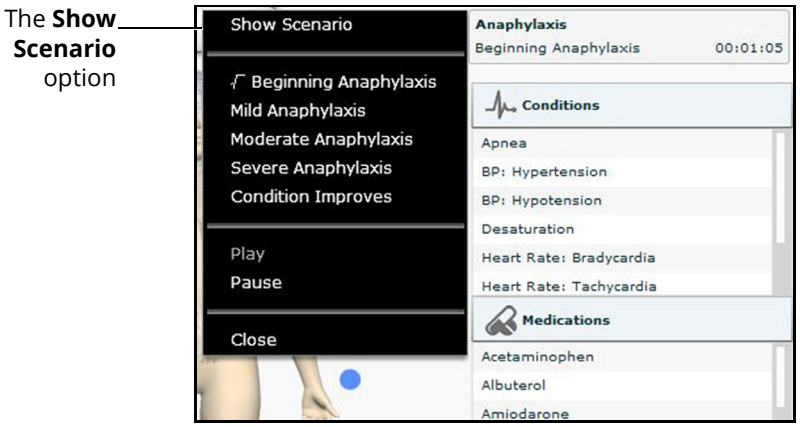
2. Select the desired state. The scenario proceeds to the selected state

   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

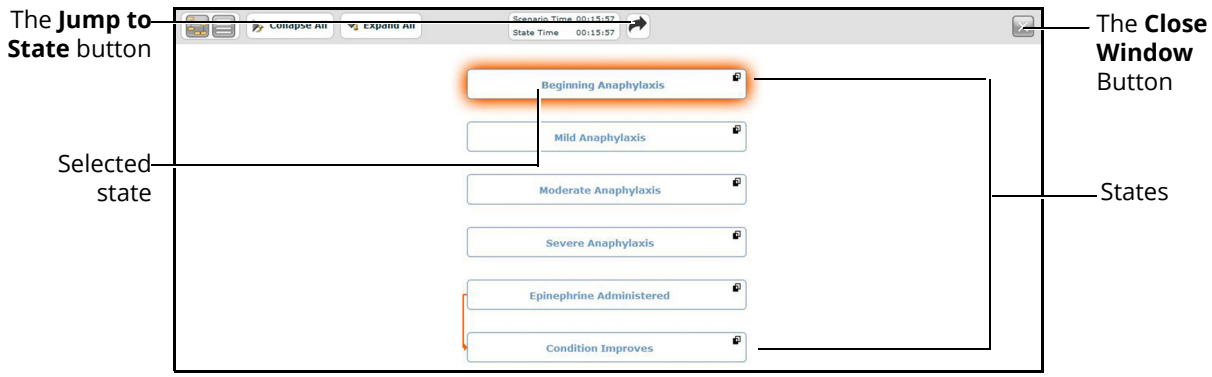
To move between scenario states from the Scenario Screen:

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



The Scenario Management Pop-Up Menu

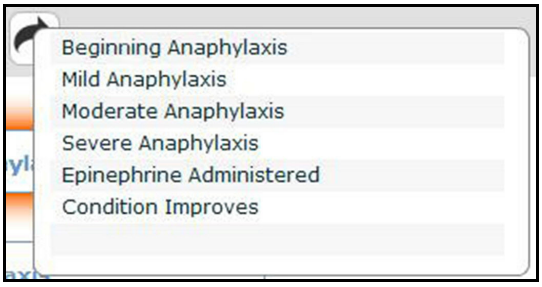
2. From the menu, select **Show Scenario**



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



The Jump to State Menu

4. Select the desired state

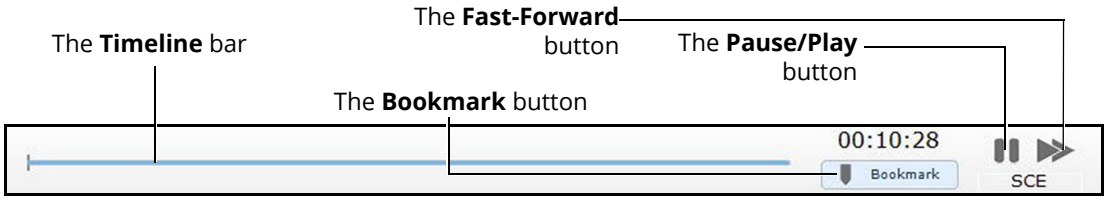
   The scenario transitions to the selected state and the state is highlighted on the Scenario screen.

   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.

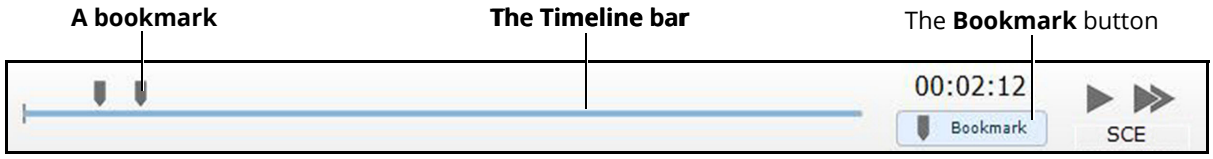


The SCE Time Controls

- 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

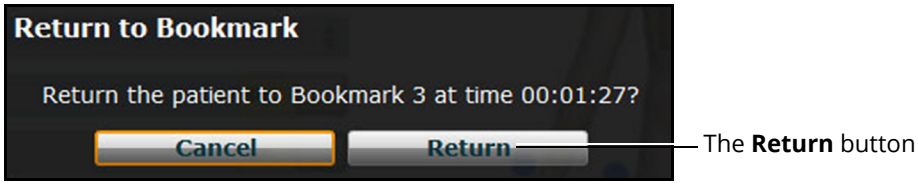
To create a bookmark, click the **Bookmark** button. A bookmark appears on the **Timeline** bar.



The SCE Time Controls

To return to a bookmarked time in the SCE:

1. Click the bookmark on the timeline



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.

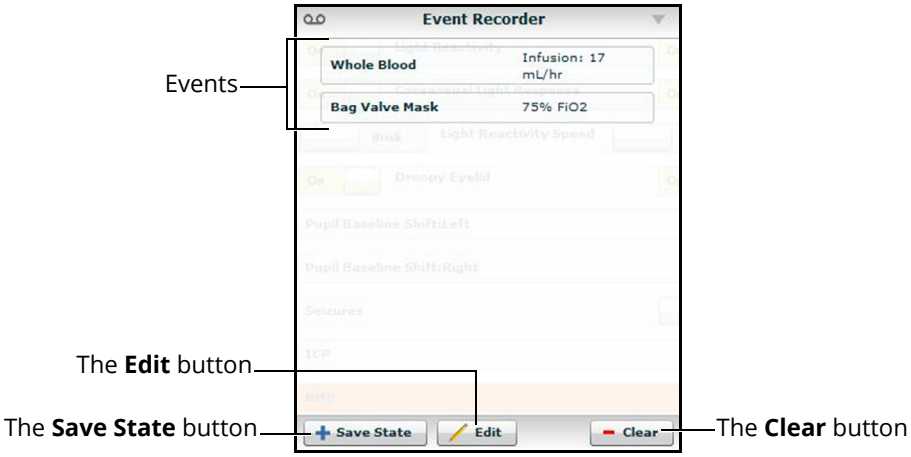
Using the Event Recorder to Save States

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

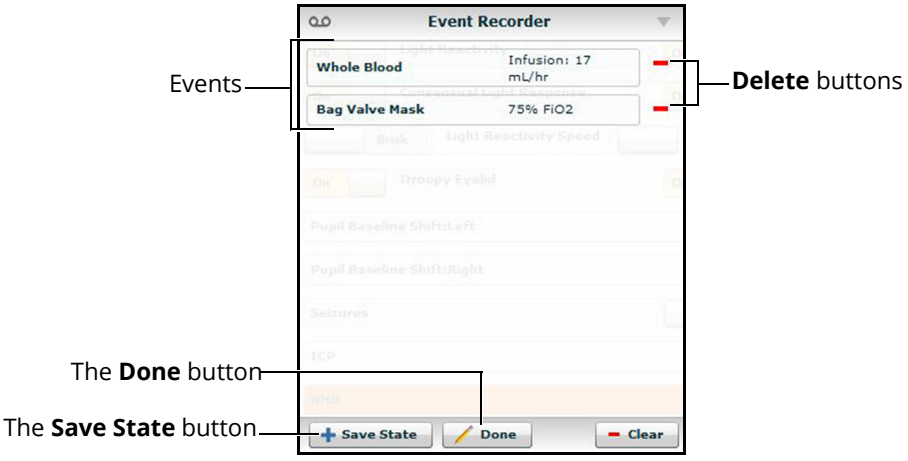
WARNING: The Clear button deletes all recorded events. This action cannot be undone.

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



The Event Recorder

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

c. Click Done

4. Click Save State

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. From the Run screen, 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

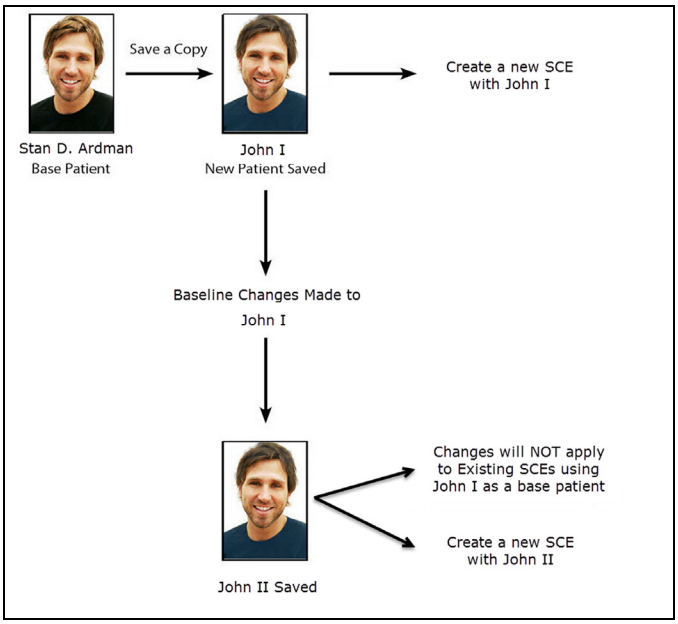
The Patient Pop-Up Menu

4. Click **Save**

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

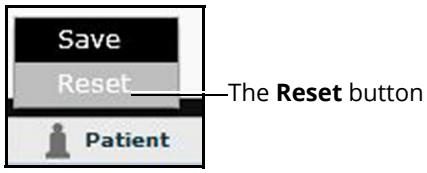
Resetting a Patient

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:

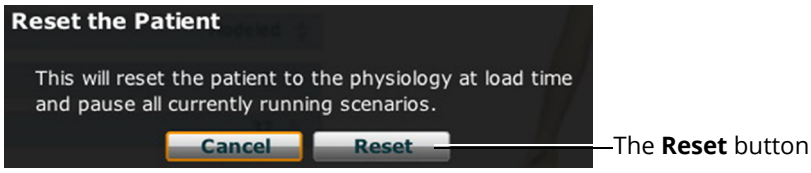
1. While running an SCE, click **Patient** at the bottom of the Run screen

The Patient Button



The Patient Pop-Up Menu

2. Click **Reset**



The Reset the Patient Dialog Box

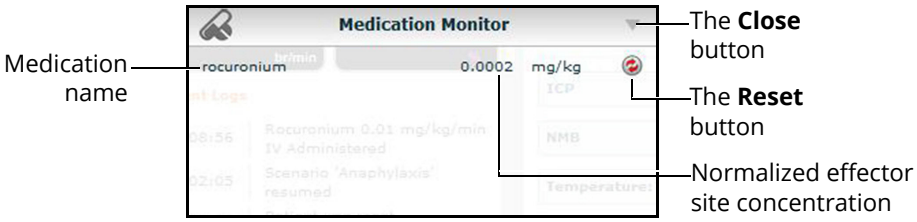
3. Click **Reset**

   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



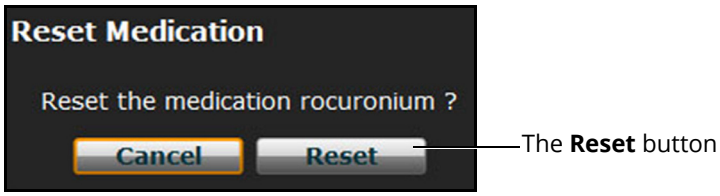
The Medication Monitor

- 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.



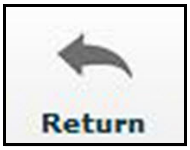
The Reset Medication Dialog Box

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

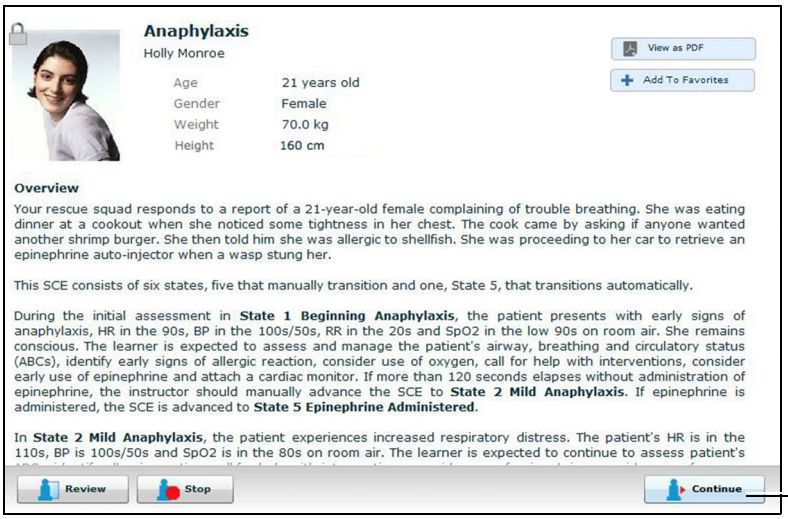
To exit the SCE and return to the Home page, click the **Return** button in the upper-left of the run screen.



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 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 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 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

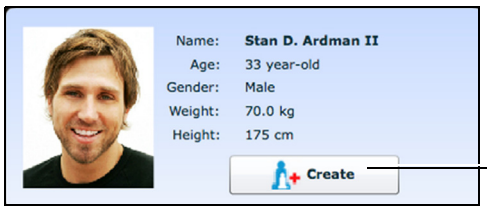
Creating a New SCE

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 on a patient to select that patient from the palette and click **Create**

The SCE Editor

3. 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 (' / \ : * ? < > % \| ") .*

4. 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 following pages provide an overview of using the SCE Editor functions to review a preconfigured or locked 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.

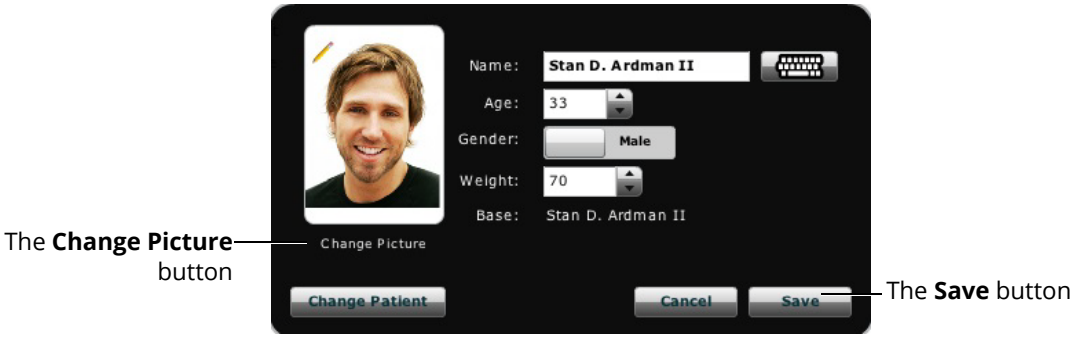
The **Content Management**, **Patient Management**, **SCE Configuration** and **Preloaded Scenarios** links in the left panel are used to review the SCE content and configuration, and to view scenarios applied to the SCE.

Editing a Patient's Profile

To edit the Patient Profile:

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

The SCE Editor Screen



The Profile Editor

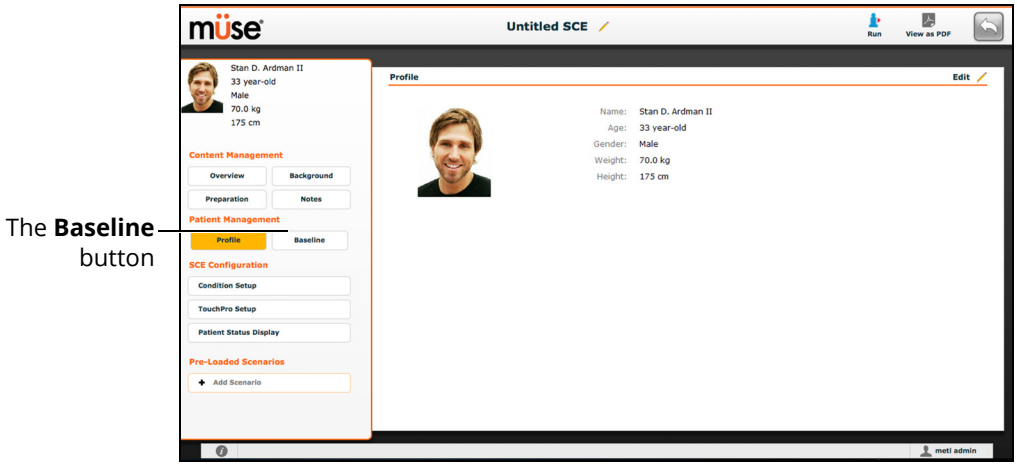
2. Set the Patient's name, age, gender and weight by filling in the appropriate fields
3. Click the **Change Picture** button to change the patient's picture (optional)
4. Click **Save**

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

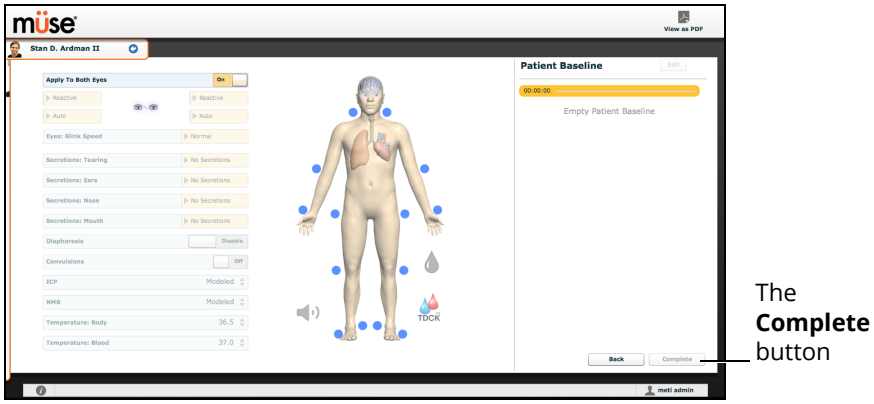
Setting a Patient's Baseline

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 SCE Editor Screen



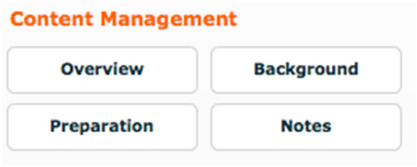
The Patient Baseline Screen

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

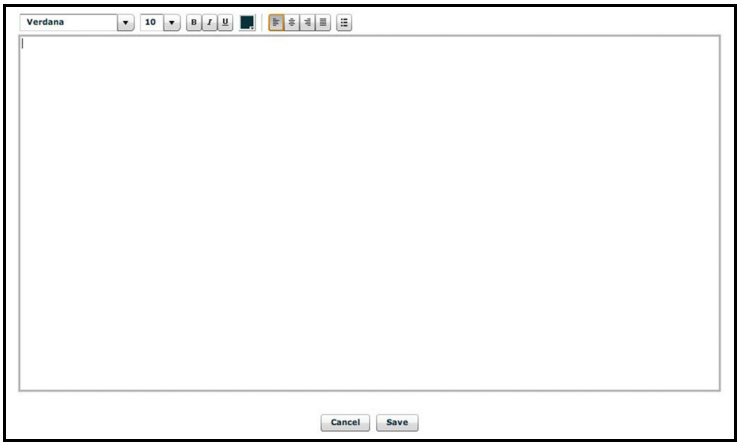
SCE Content is entered from the SCE Editor using the **Overview**, **Background**, **Preparation** and **Notes** buttons under the **Content Management** heading.



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.

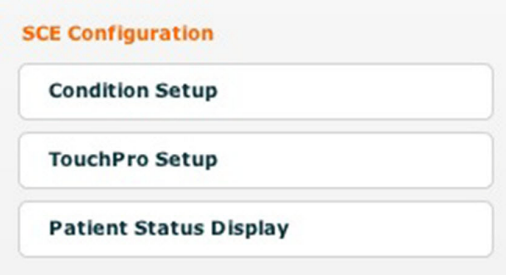


The Rich-Text Editor

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.

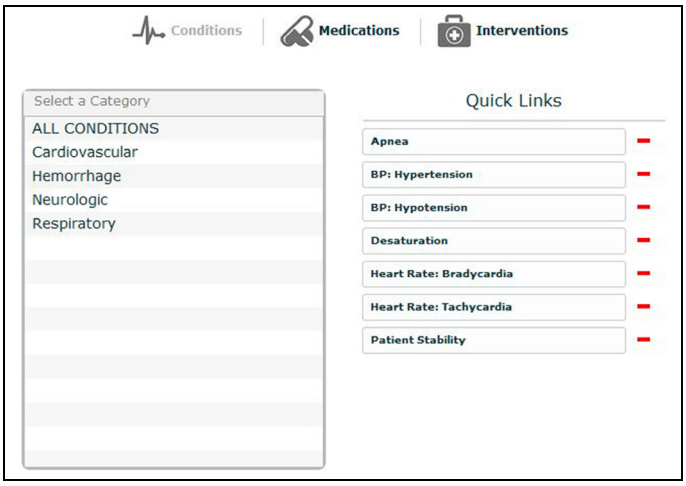


The SCE Configuration Buttons

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 Condition Setup Screen

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.

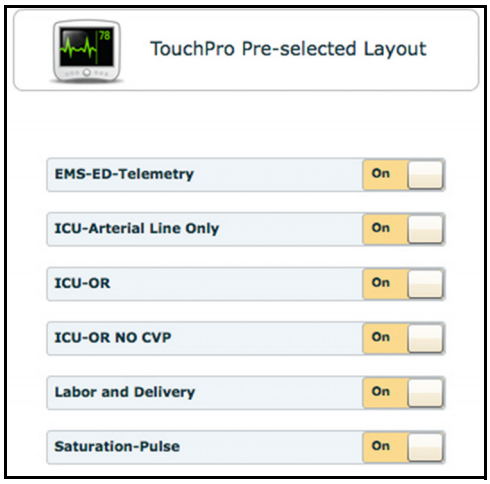
Modifying the TouchPro Setup

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.

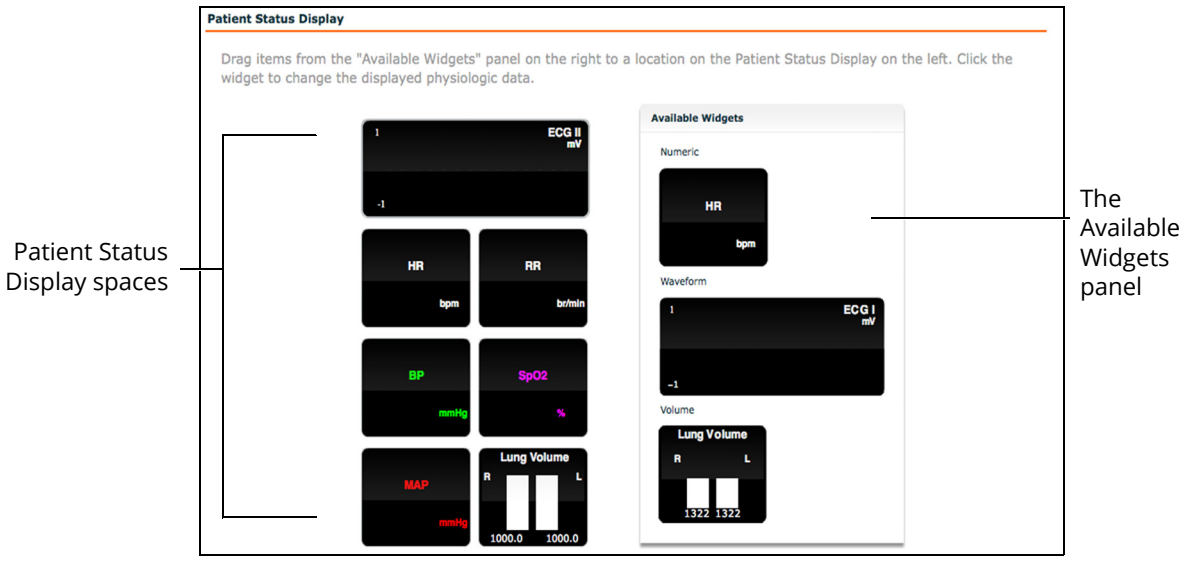
Click an **On/Off** switch next to a layout to enable or disable it.



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.



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.

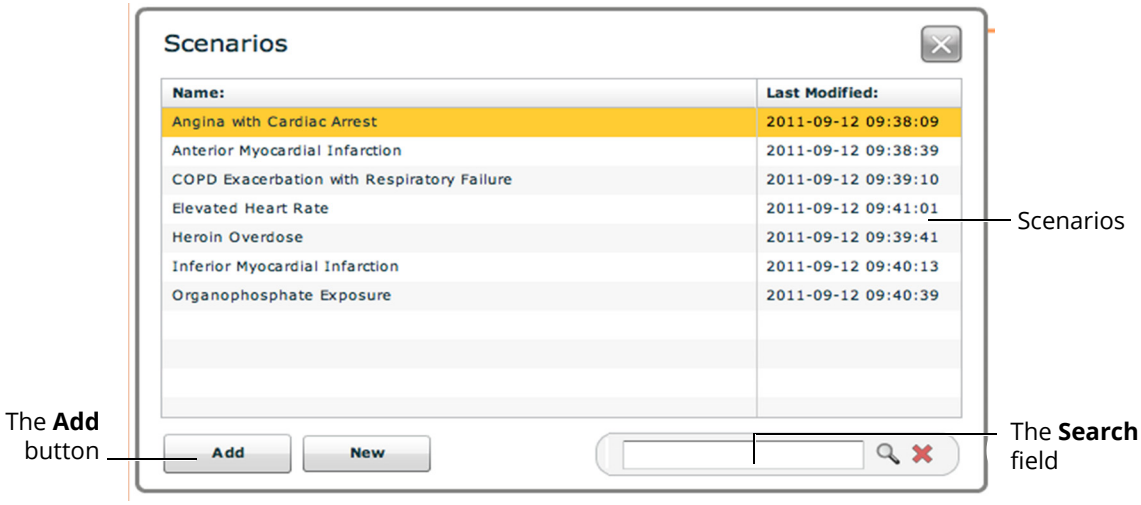
Adding a Scenario from the SCE Editor

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**

   The scenario is added to the SCE and is listed on the SCE Editor beneath the Pre-Loaded Scenarios heading.

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 Pre-Loaded Scenarios Heading

The Choose Scenario Dialog Box

2. Click **New**

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

The Scenario Designer

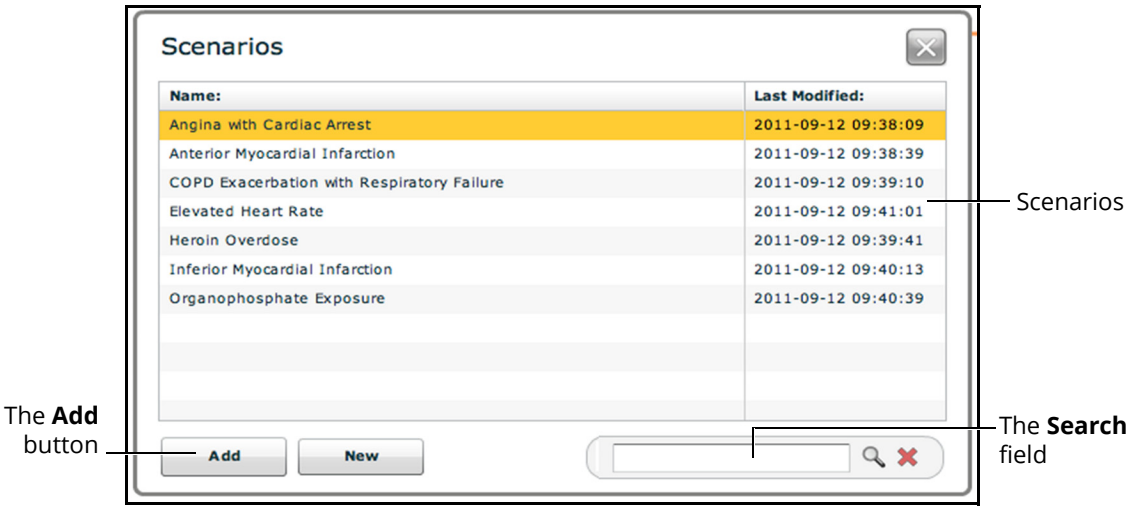
- The **Scenario** button is used to manage states and save the scenario
- The **View** buttons toggle between Scenario Designer views
- The **New State** button is used to add new states
- Once created, states are displayed on the Scenario Designer canvas

Editing a Scenario

To edit a scenario:

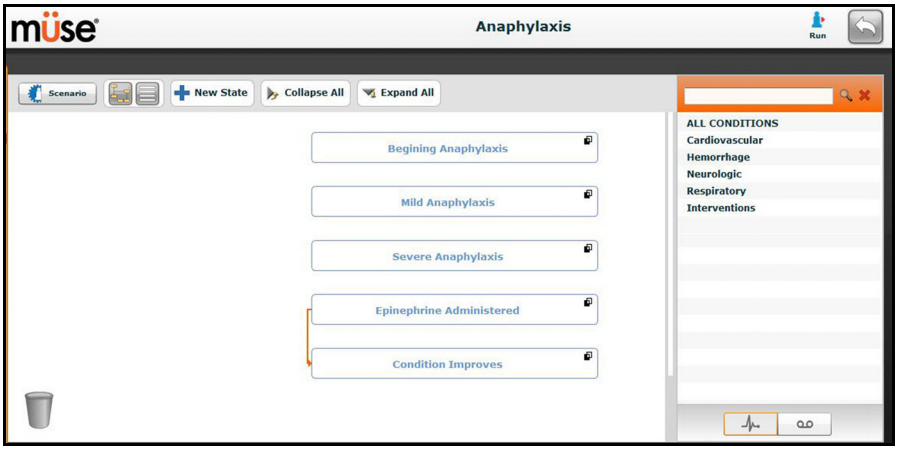
1. From the SCE Editor, under the Pre-Loaded Scenarios heading, click the **Add Scenario** button

The Pre-Loaded Scenarios Heading



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



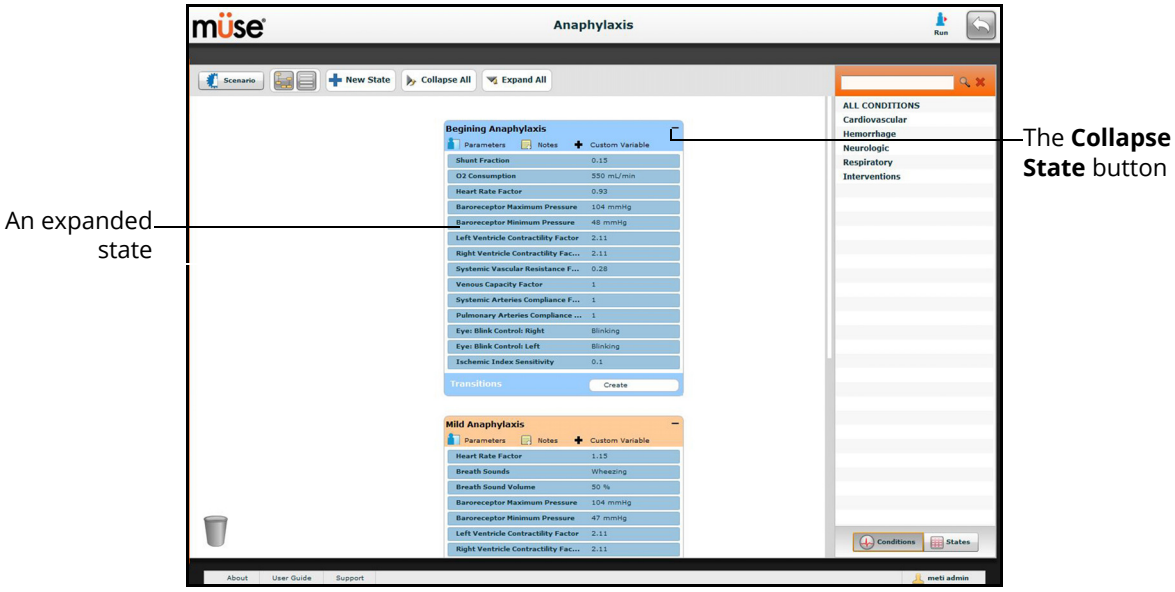
The Scenario Designer

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 Scenario Designer View Buttons

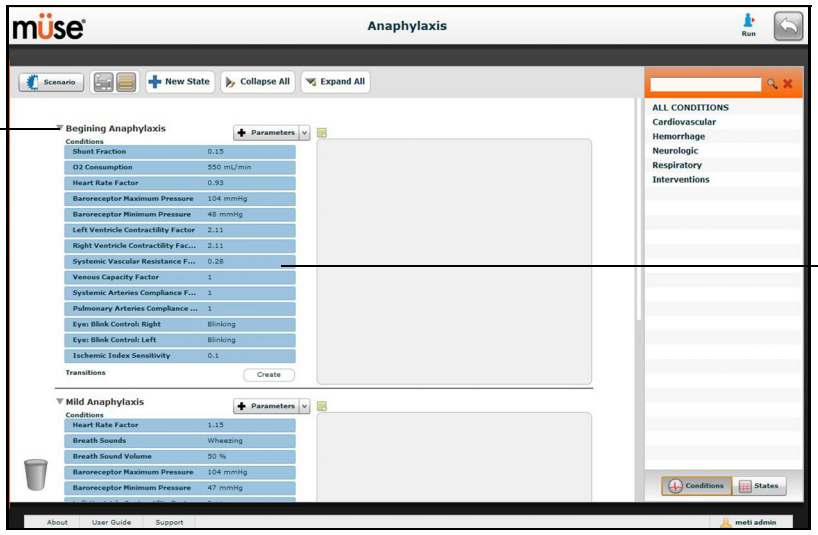
Click the **Graphical view** button to utilize the Graphical View.



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.

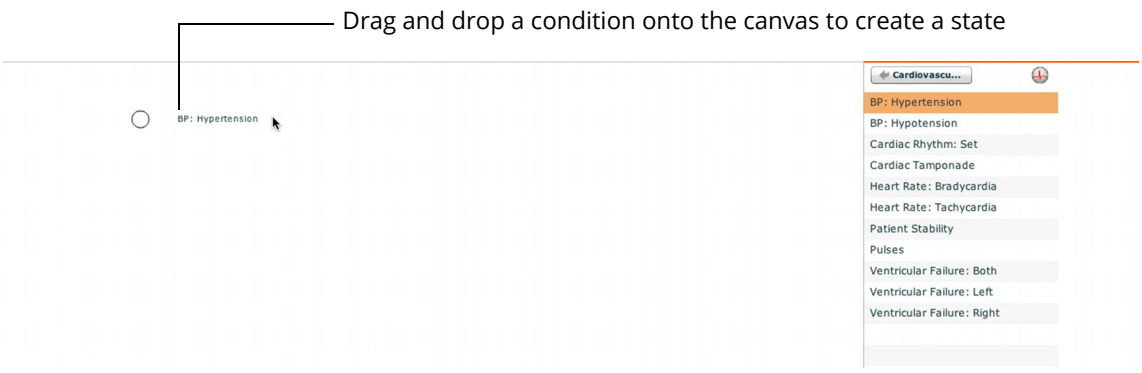


The List View

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.

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.

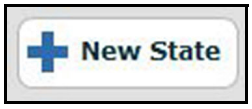


The Scenario Designer Canvas

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

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

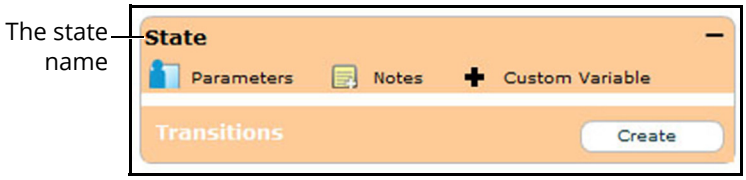
1. Click the **New State** button on the upper left side of the Scenario Designer



The New State Button

A New State

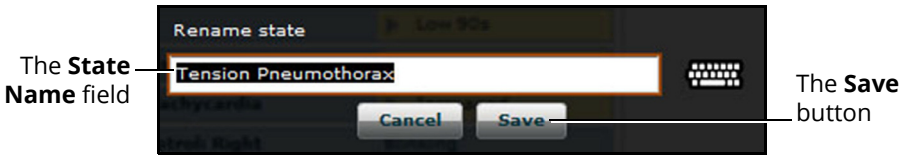
2. From the Graphical View, double-click the new state, or from the Line Item View, click the **Expand/Collapse** arrow to the left of the state to expand it



The Expanded State

3. Double-click the state name

   By default, new states are named “State.”



The Rename State Window

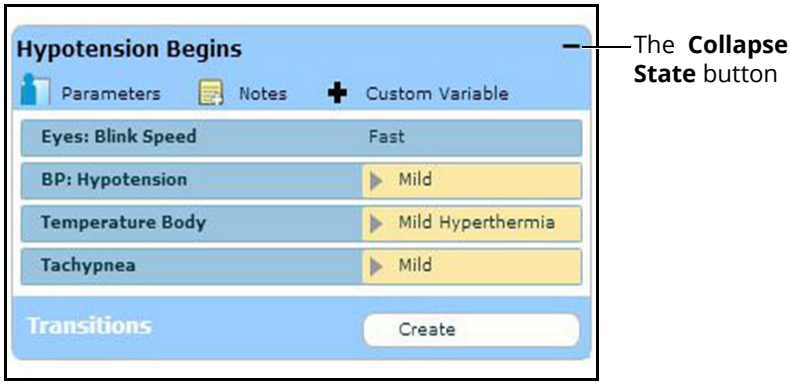
4. Enter a new state name

   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.



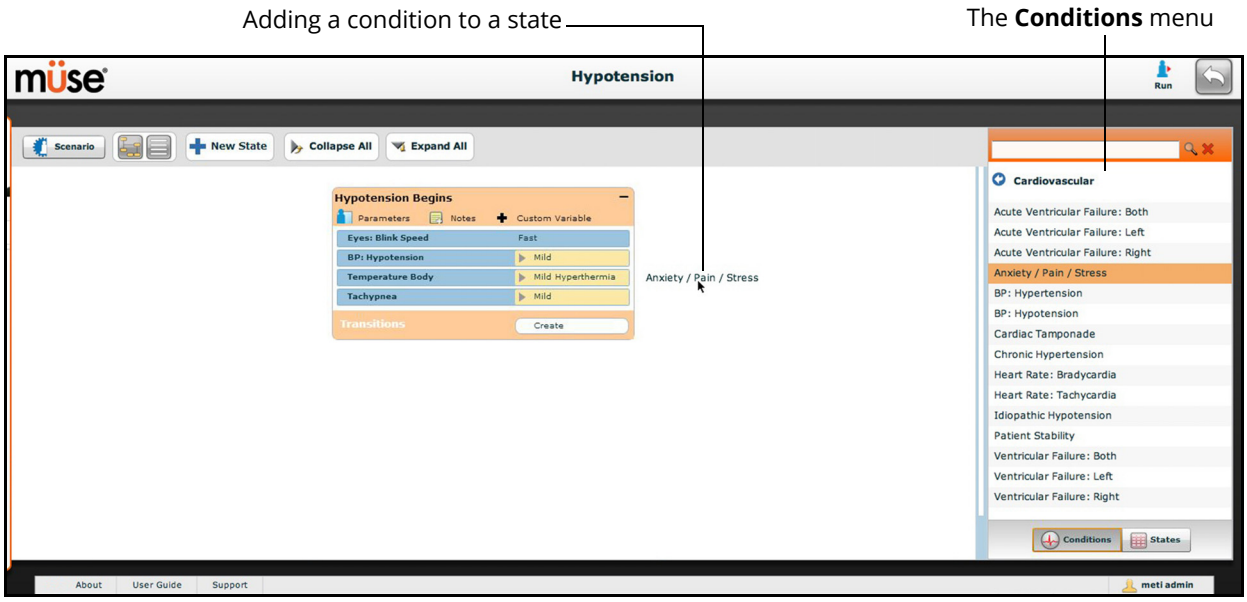
A State

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

Double-click the collapsed state to expand it.

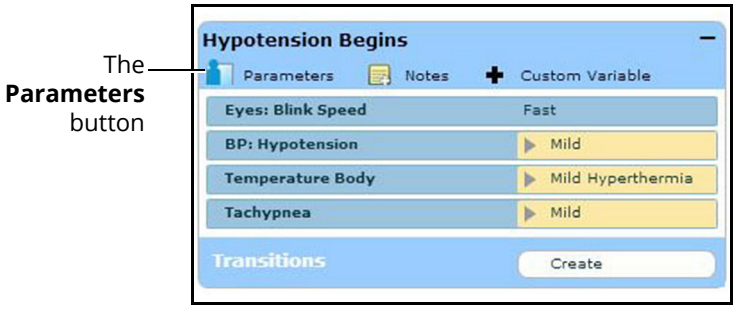
Adding Conditions, Interventions and Parameters

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

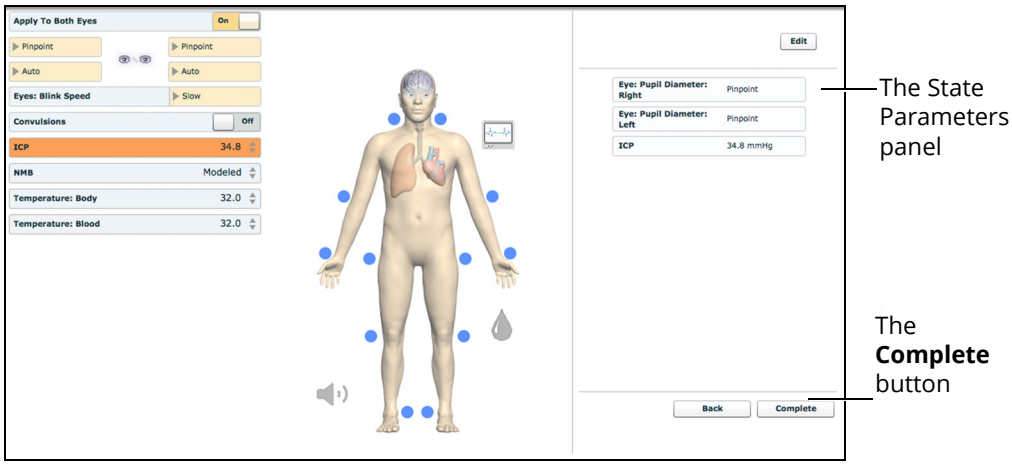


The Scenario Designer

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



A State



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.

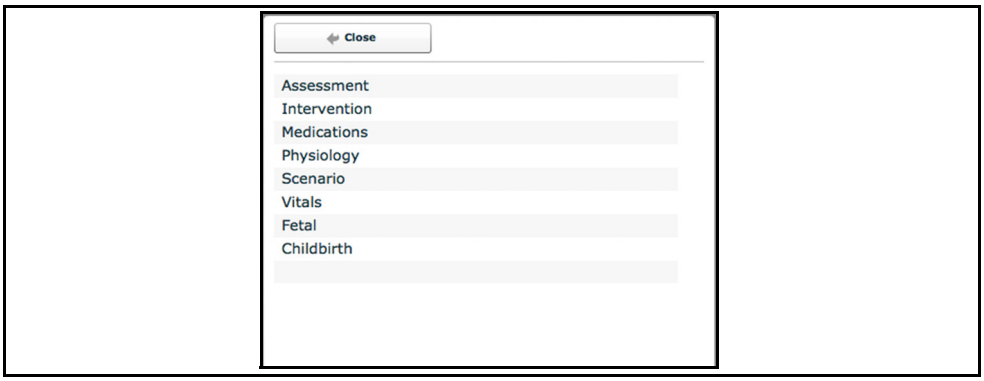
Adding Transitions

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



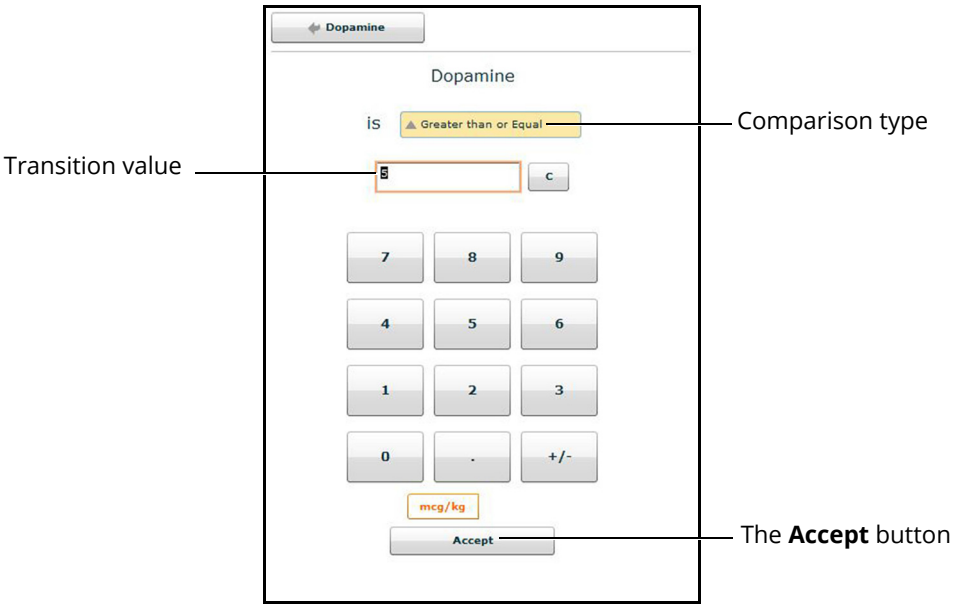
The Transitions Window

2. Select the desired variable type

   Example: if a transition based on the administration of medication is desired, select **Medications** and then select the desired medication from the list.

   Once a medication is selected, The Medication Transition window appears, asking for the comparison type and transition value.

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

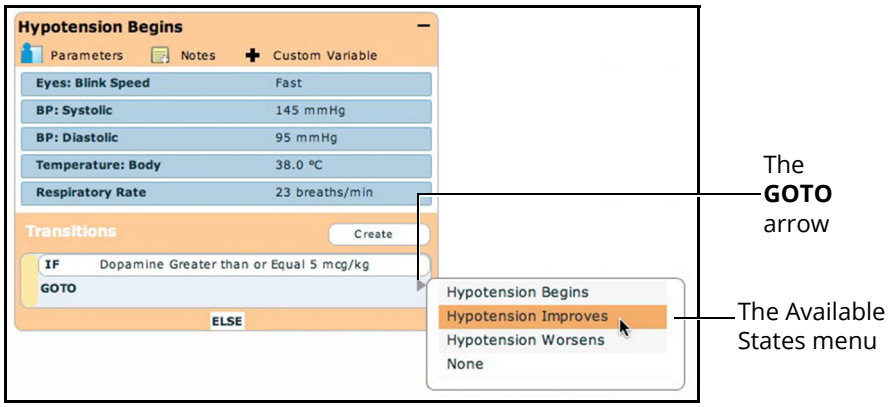


The Medication Transition Window

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.

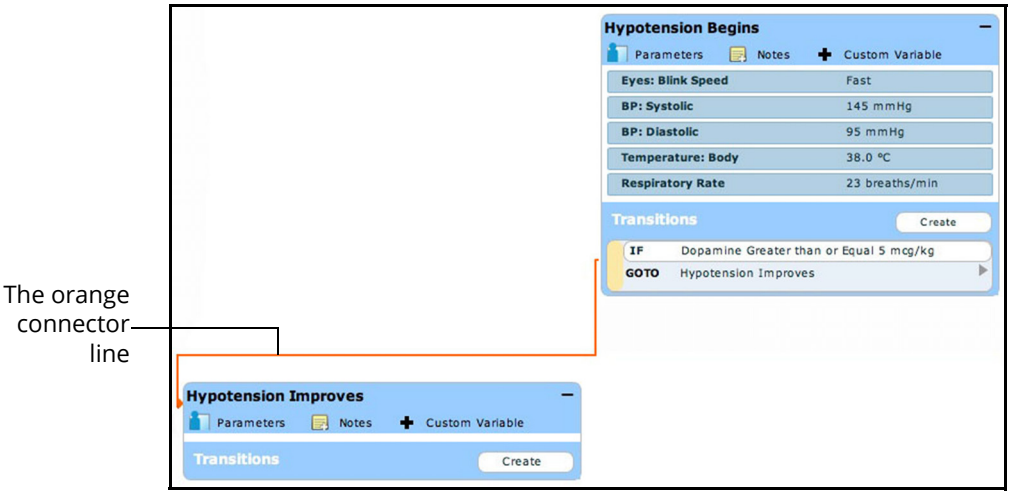
4. From the Scenario Designer, click the **GOTO** arrow beneath the new transition variable



The Scenario Designer

5. Select a state from the menu

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



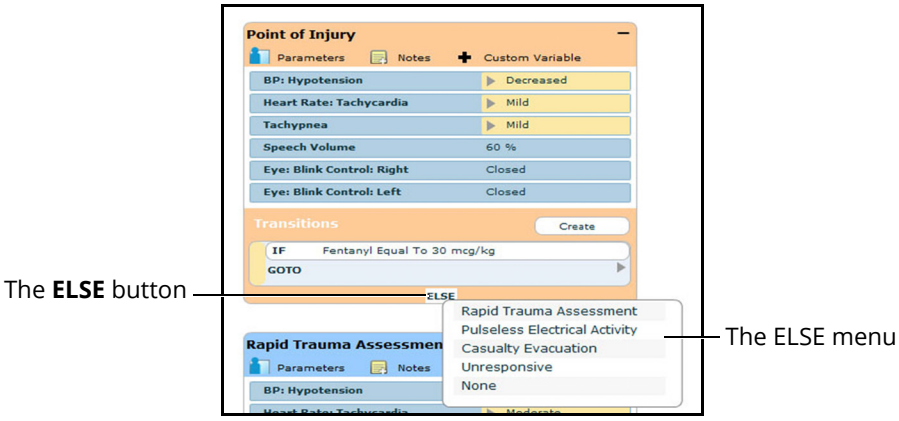
The Scenario Designer

ELSE Transitions

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

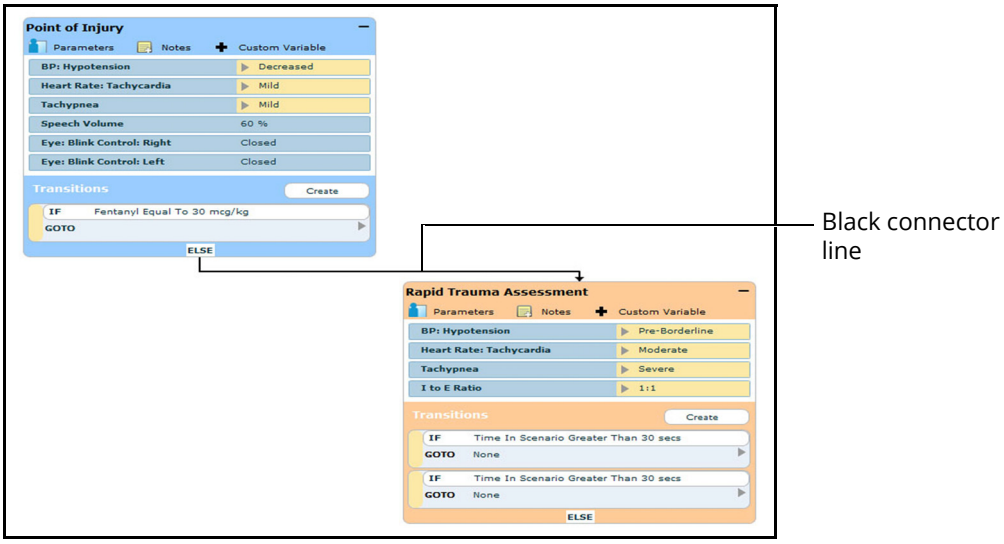
Before specifying an ELSE transition from a state, the state must first contain at least one other transition.

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



The Scenario Designer

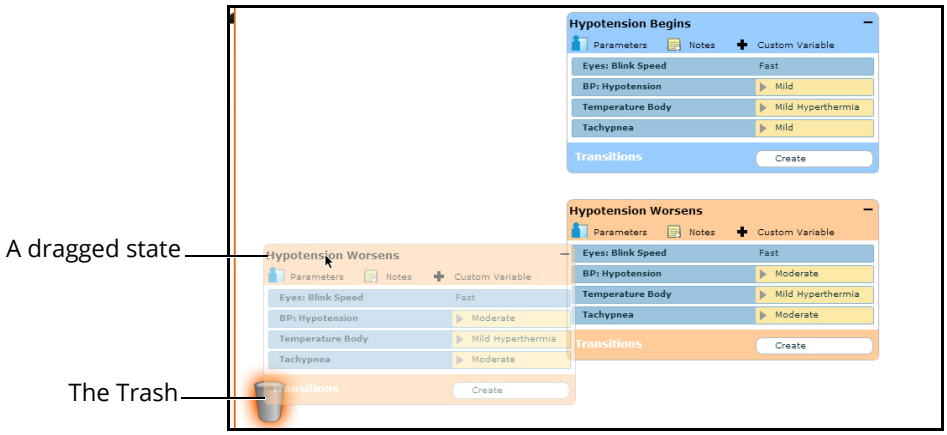
Select the desired state. A black connector line appears, indicating that the states are now linked by an ELSE transition.



The Scenario Designer

Deleting Scenario States

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



The Scenario Designer

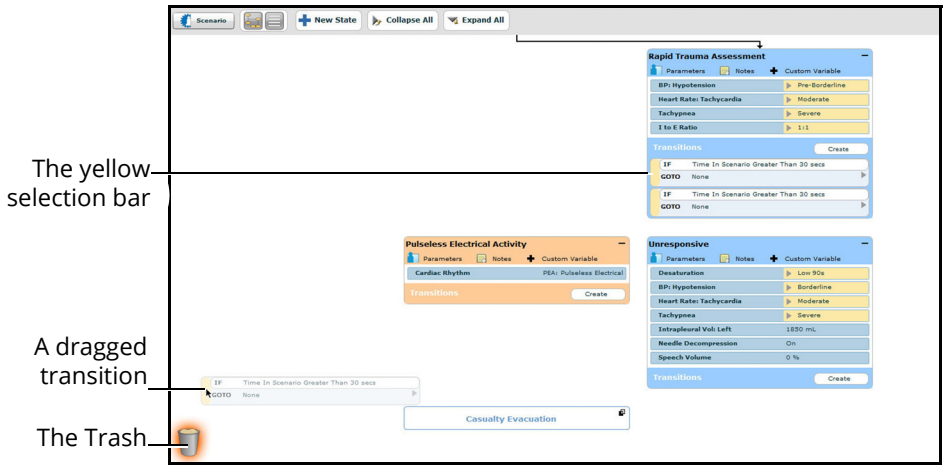
States can be dragged and dropped to the Trash from the Graphical view or the Line Item view.

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 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 (‘ / \ : * ? < > % ! | “).

Saving States to the State Library

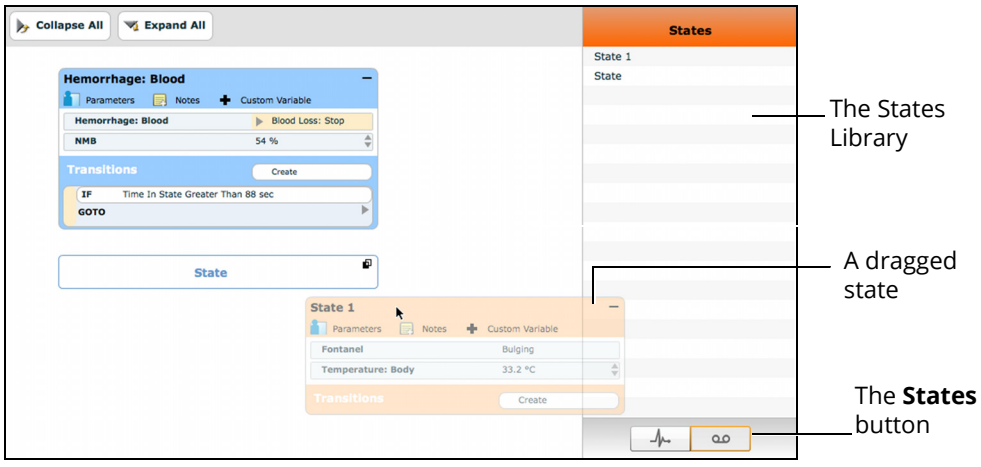
Users can save states to the State Library for later use.

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

The States Button

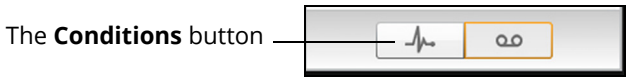
The State Library

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



The Scenario Designer

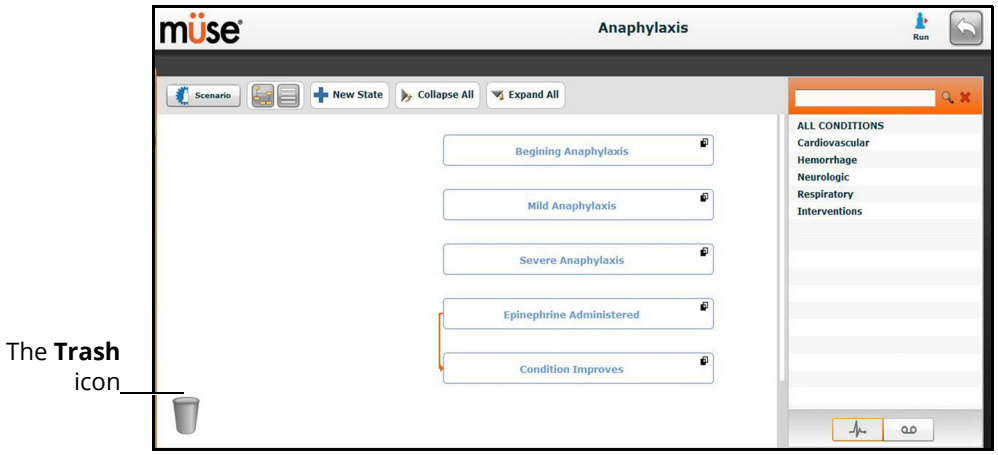
To exit the State Library, click **Conditions**.



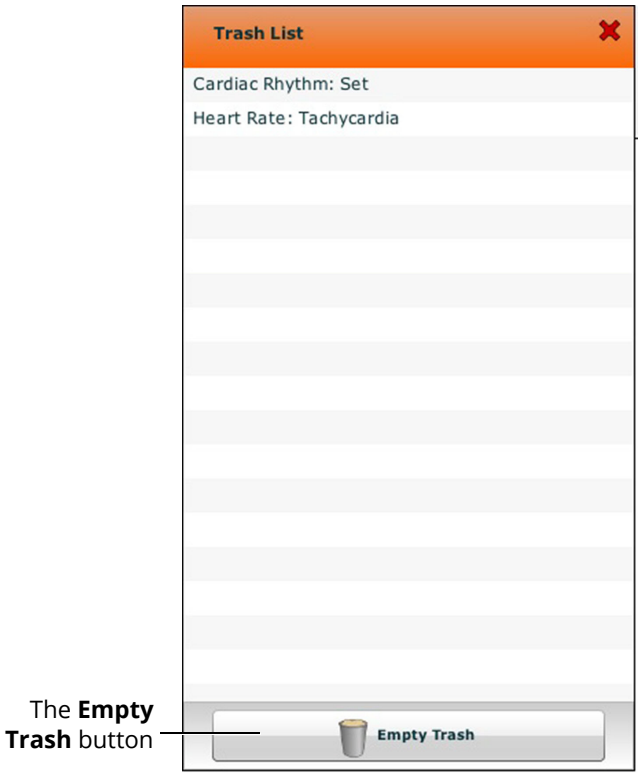
The Conditions Button

Emptying the Trash

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



The Scenario Designer



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.

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 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	Healthy Adult Male	Stan D. Ardman II			
2016-01-28 17:04:32	Healthy Adult Male	Stan D. Ardman II			

The History Screen

By clicking the **Simulation 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.

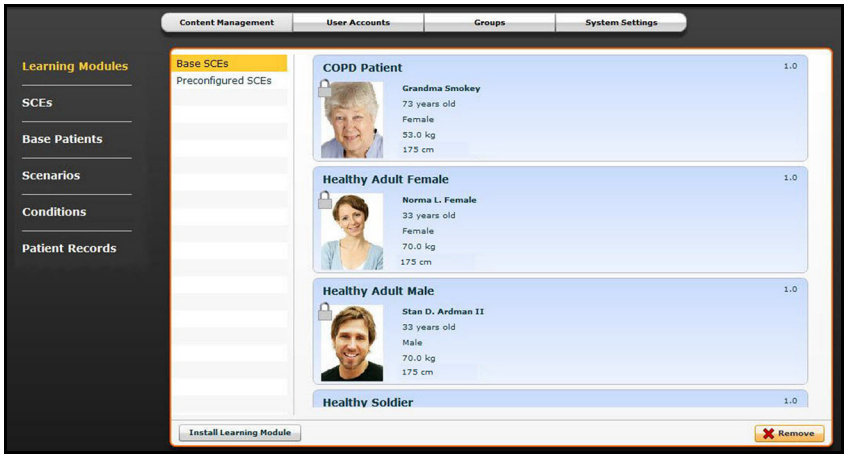
On the Simulation Events and Physiological Data screens, there is an **Export** button that, when clicked, exports the data to a CSV file that can be stored on an external device.

System Administration

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

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

The System Administration Button

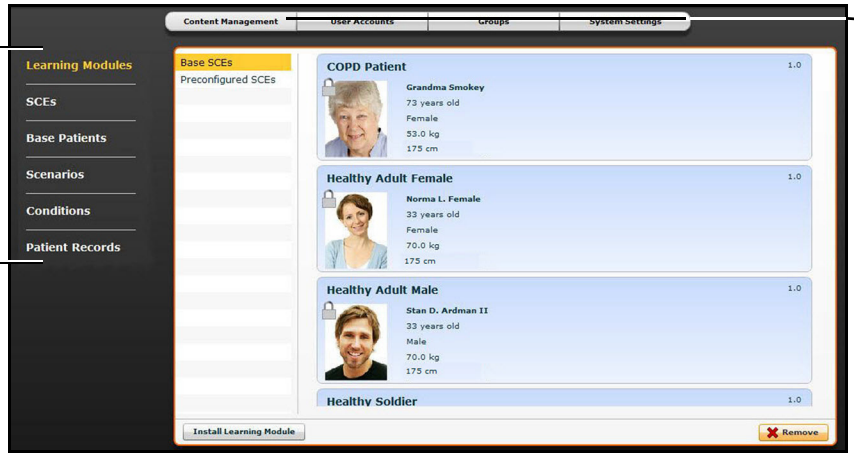


The System Administration Screen

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.

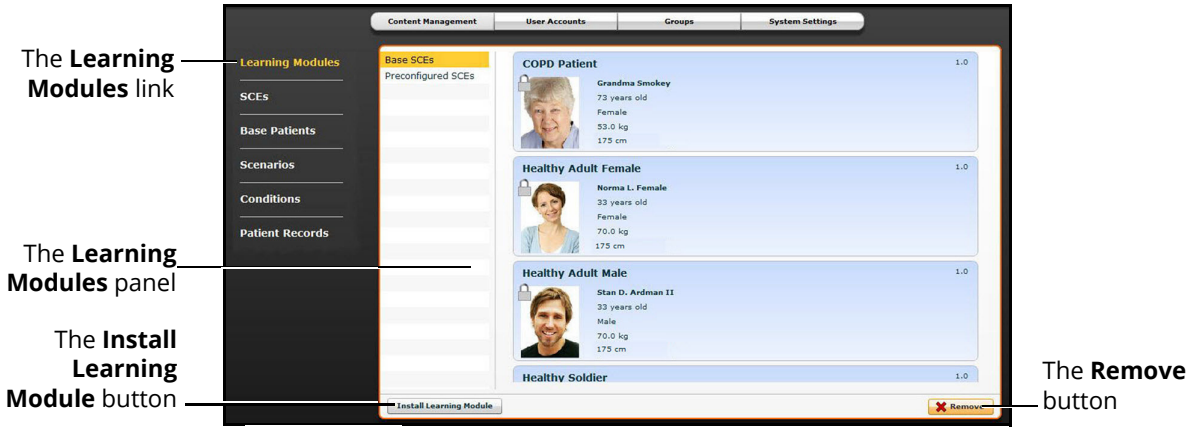


The System Administration Screen

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 Panel

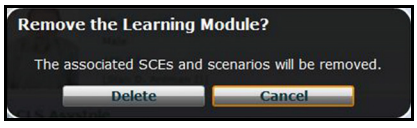
To install a learning module:

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



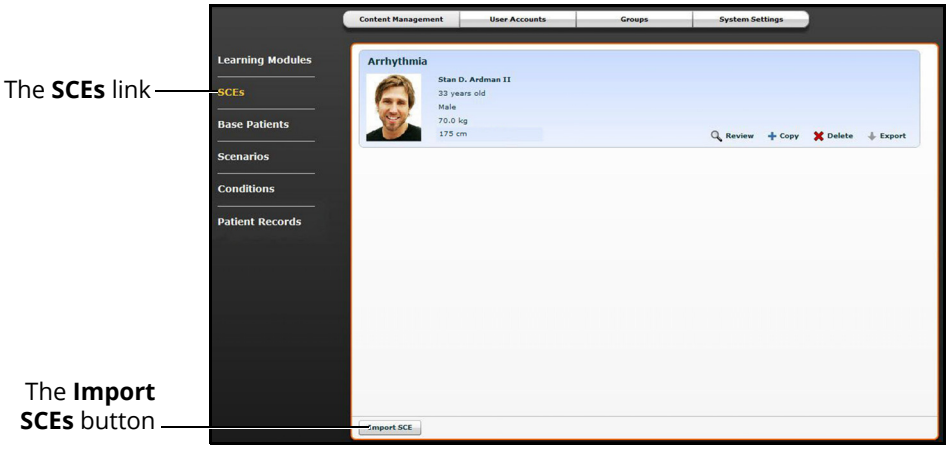
The Remove Learning Module Warning

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



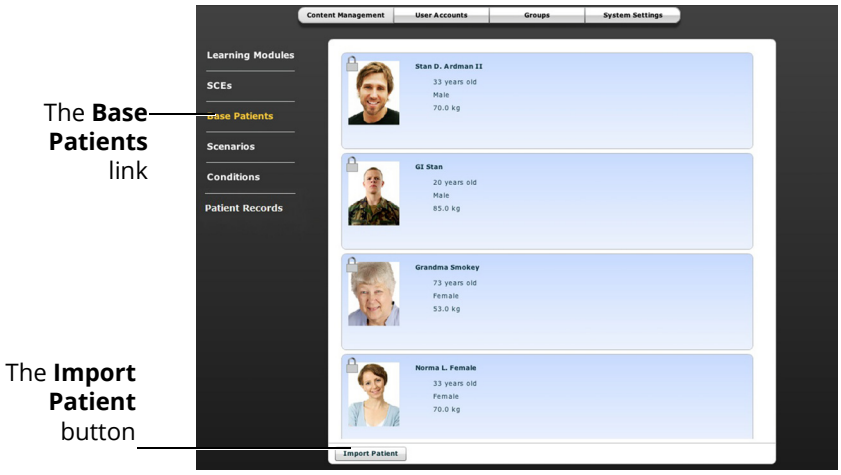
The SCEs Panel

- 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. The SCE file extension is ***sce***.

Base Patients

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



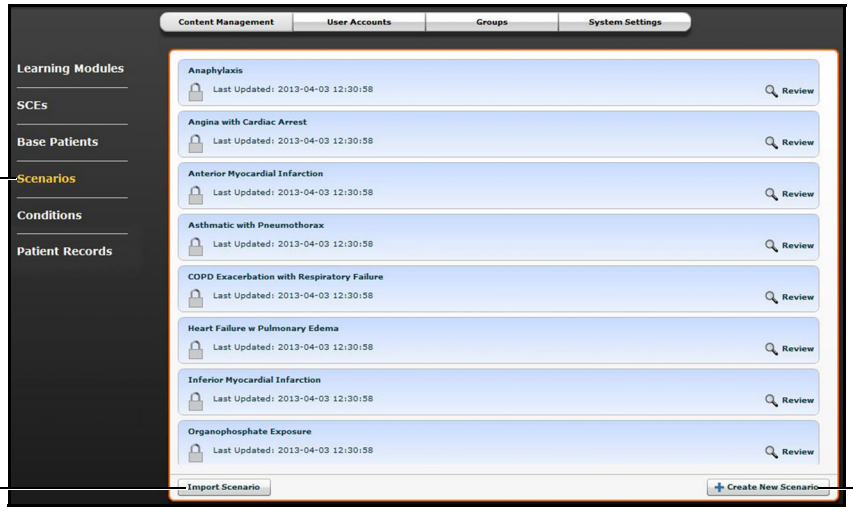
The Base Patients Panel

- 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. 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

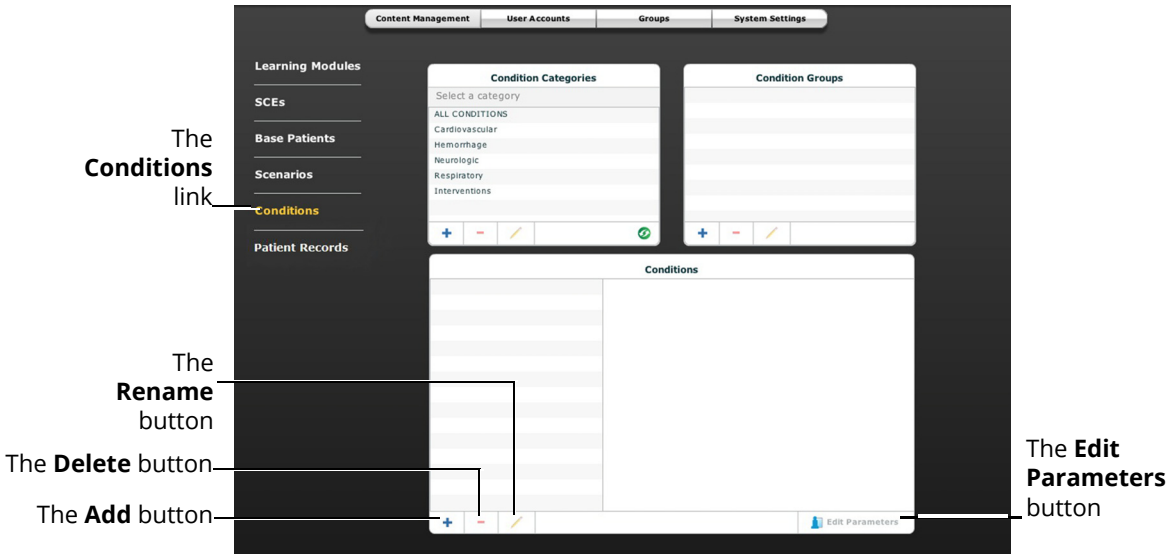
- From the Scenarios panel, users can rename, review, delete, import and export scenarios they have created by clicking the respective buttons within each scenario. Locked scenarios can only be reviewed
- Users can also create new scenarios from the Scenarios screen by clicking the **Create New Scenario** 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. 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 Editor appears.



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.

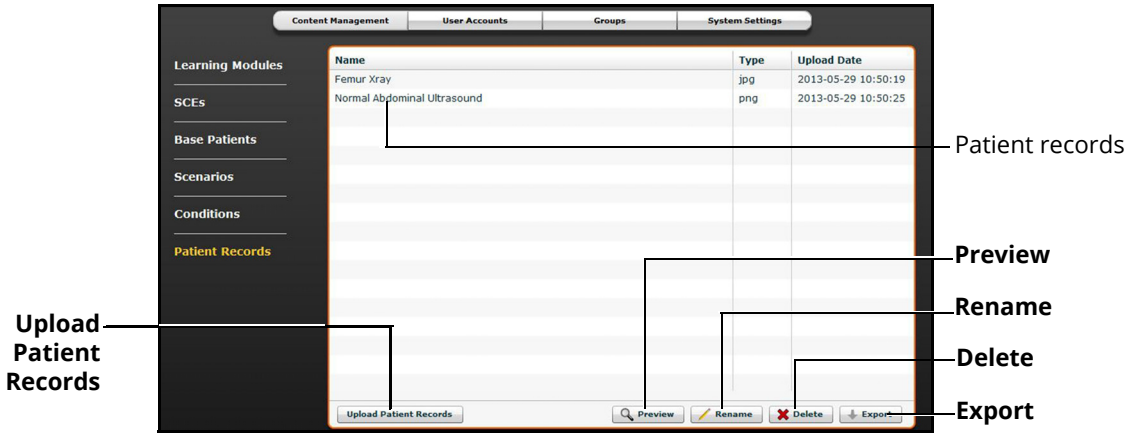
Use the **Delete** and **Rename** buttons in each panel to delete or rename a Condition, group or category.

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

Müse can store up to 100GB of patient record files. To ensure adequate space, please delete patient records when they are no longer needed.

To delete a patient record:

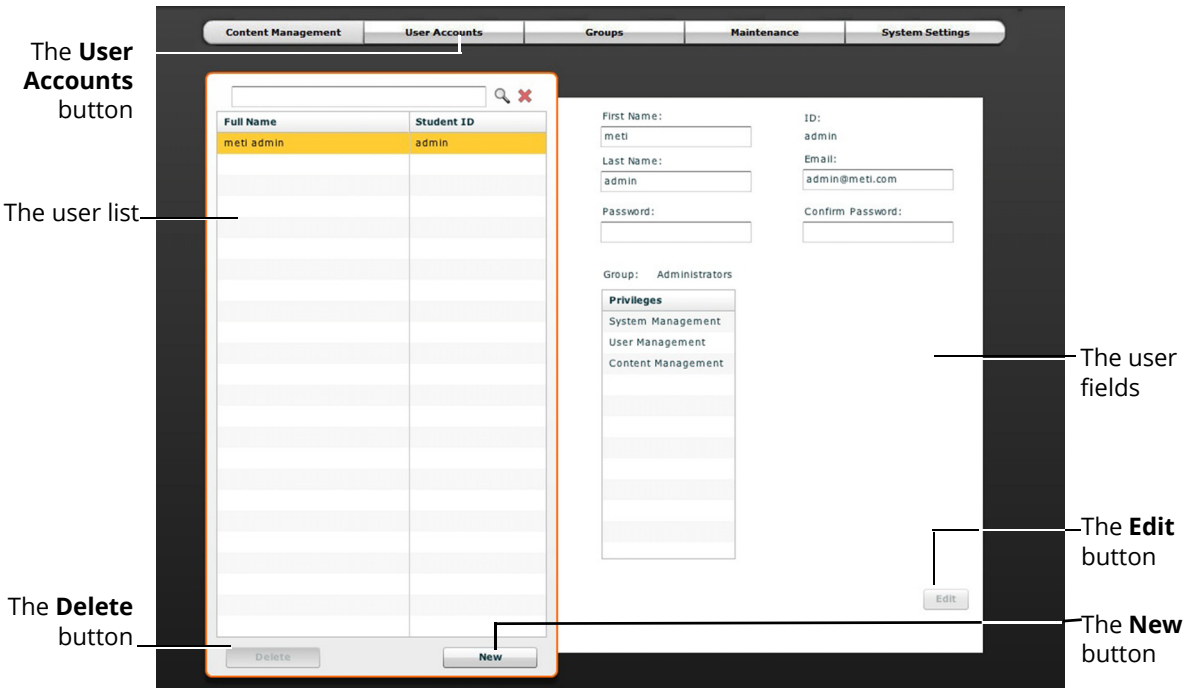
1. From the Patient Records panel, select the patient record to delete
2. Click **Delete**

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

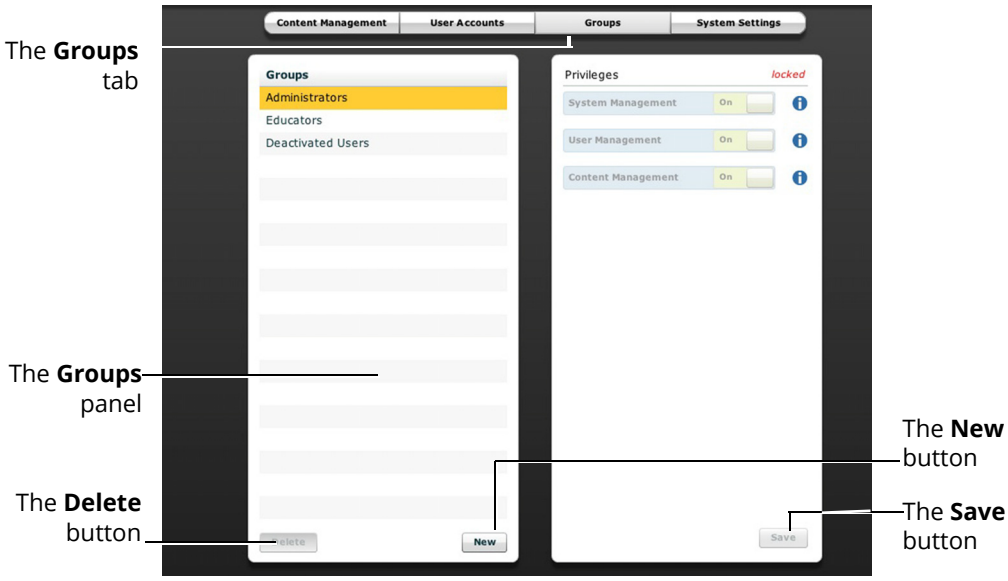
Deleting a User

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

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

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**
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:

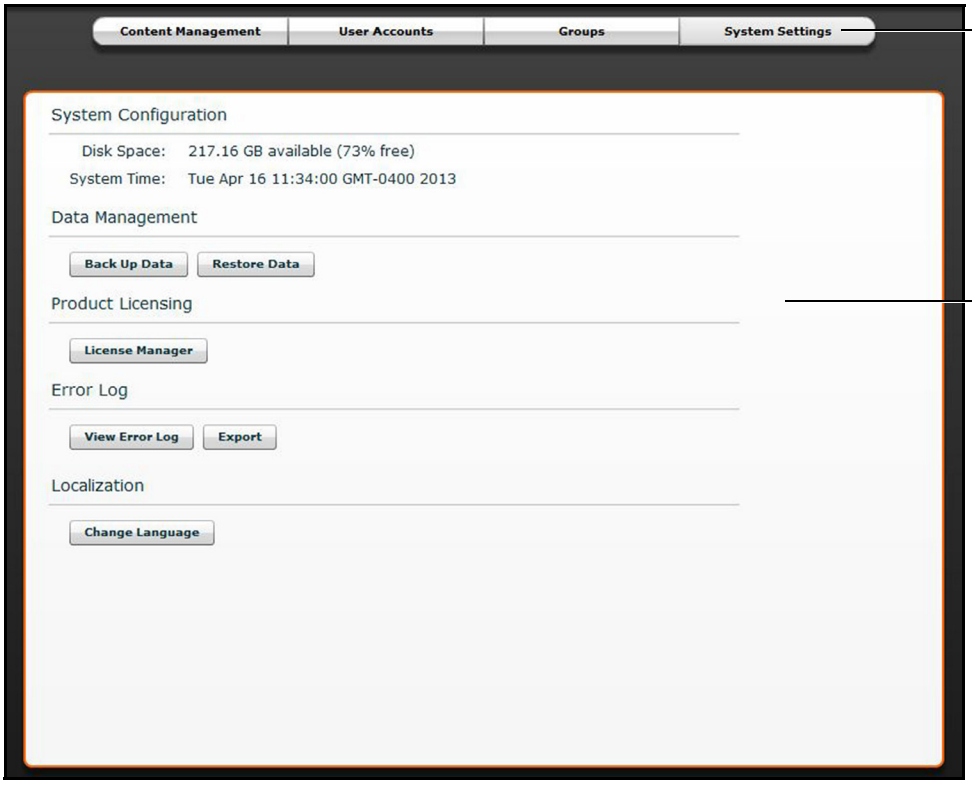
1. Create a new group called Content Only
2. Assign the group the Content Management privilege. Do NOT assign any other privileges to the group
3. On the **User Accounts** tab, create or edit the desired users, placing each user in the Content Only group

System Settings

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

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

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.*

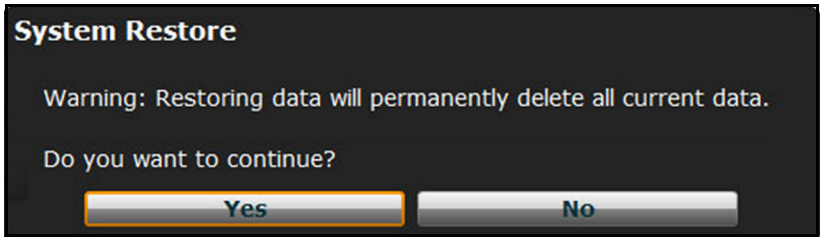
Users can restore data when the backed-up data needs to be replaced on the software. Restoring data only restores the last backup and does NOT merge the backup data with the current data.

To restore backup data:

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

The Restore Data Button

The System Restore warning box appears stating that restoring data erases all current data and asks if you want to continue.



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.

Error Log

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

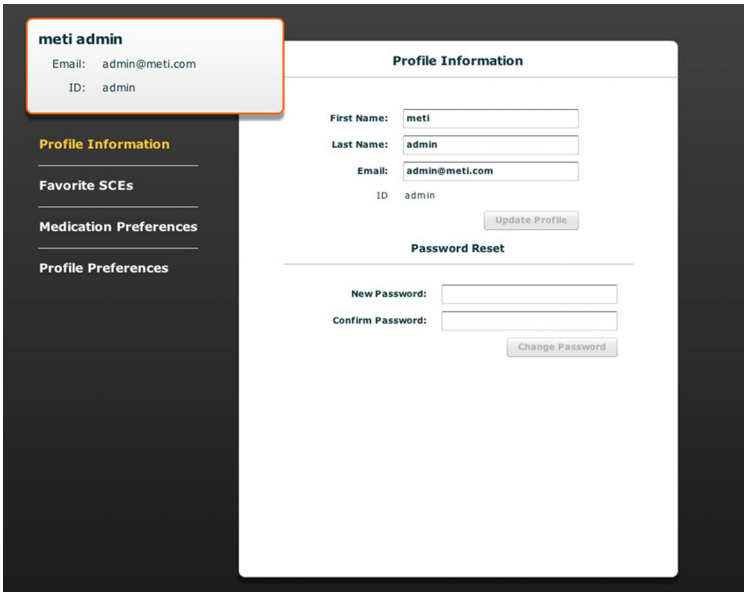
IMPORTANT: Do not clear the Error Log.

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

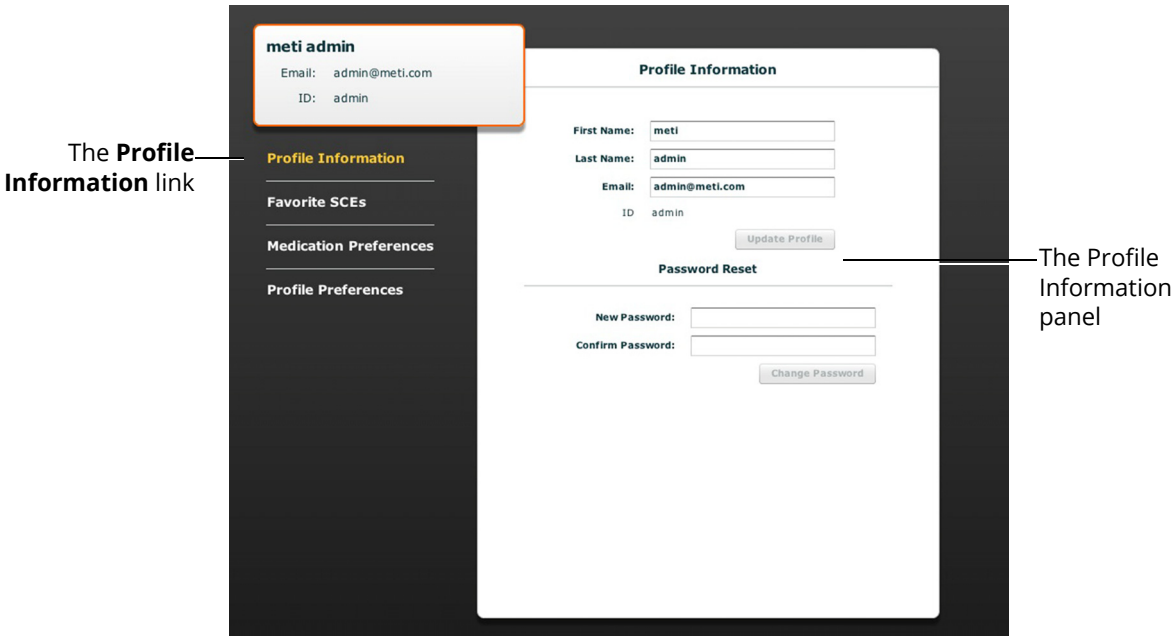


The Account Profile Screen

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 Account Profile Screen

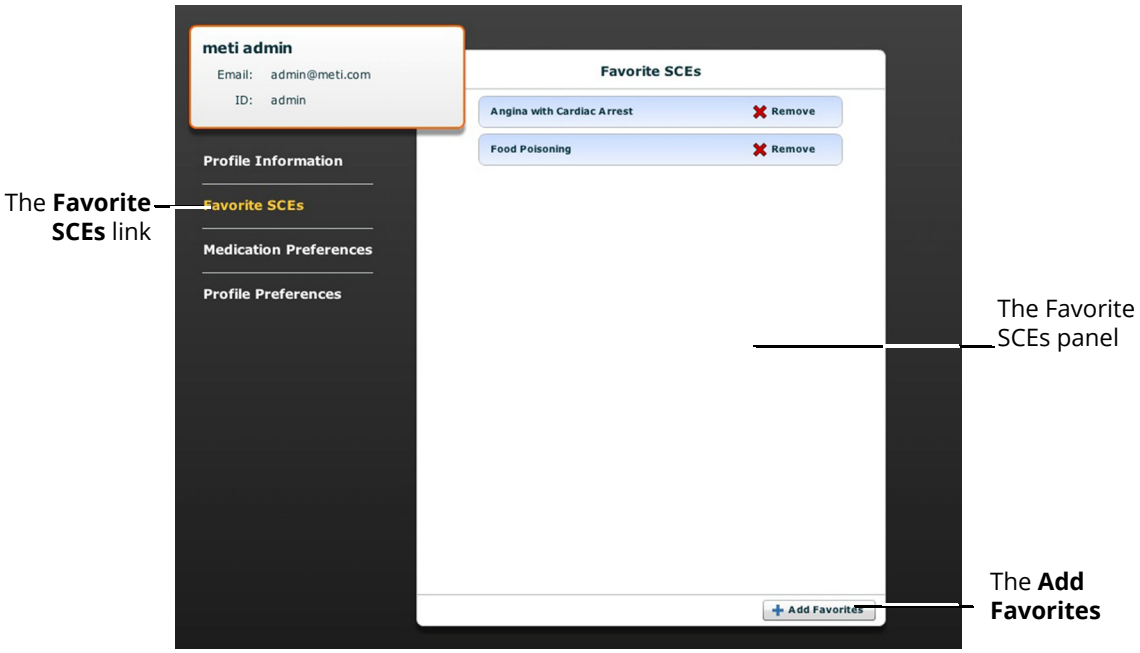
To change profile information, enter the new information in the appropriate fields and click **Update Profile** when finished.

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 Account Profile Screen

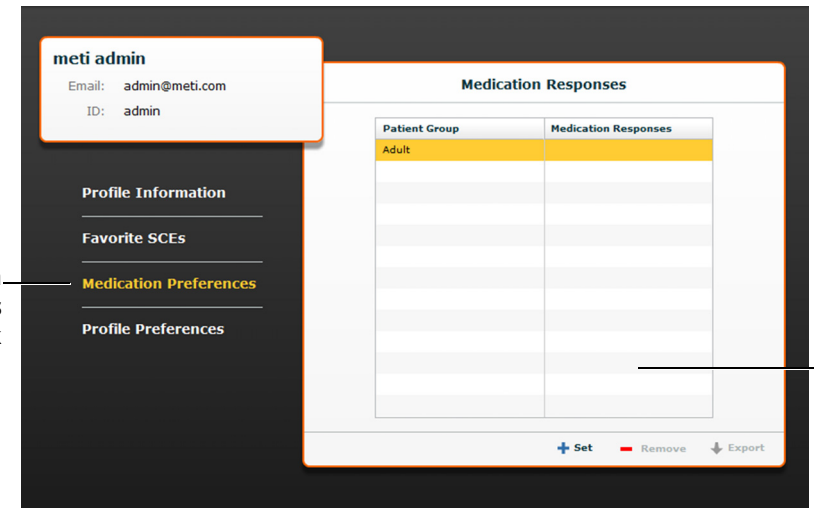
To add SCEs to the Favorite SCEs panel, click **Add Favorites**. The SCE Library appears. Select the desired SCE and it automatically appears in the Favorite SCEs panel.

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 Account Profile Screen

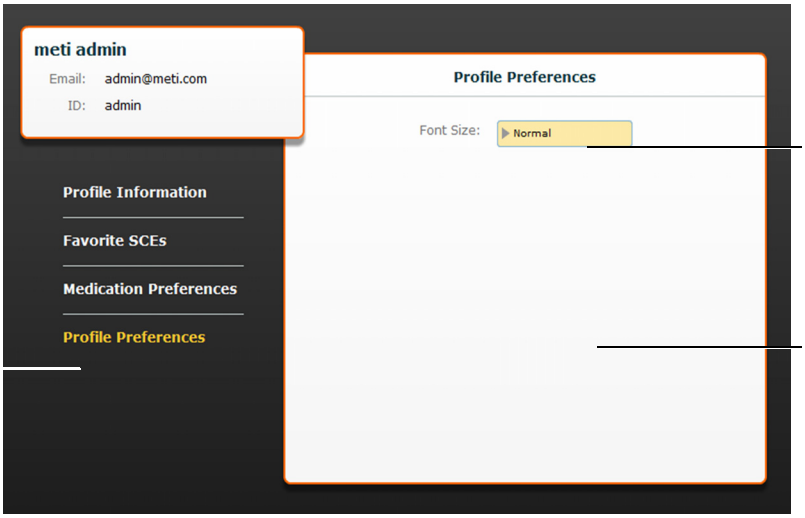
To import medication response files, click the **Set** button. The **Select File** dialog box appears. Select the medication response file to be added and click **Open** or **OK**.

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

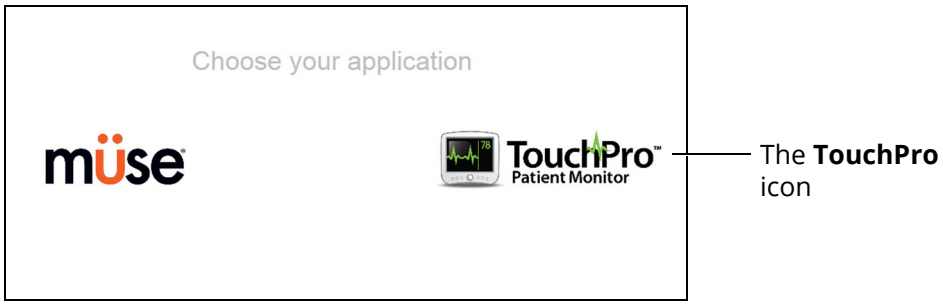
Like the Müse software, the TouchPro Patient Monitor software is compatible with computers that have touch-screen capabilities.

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 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

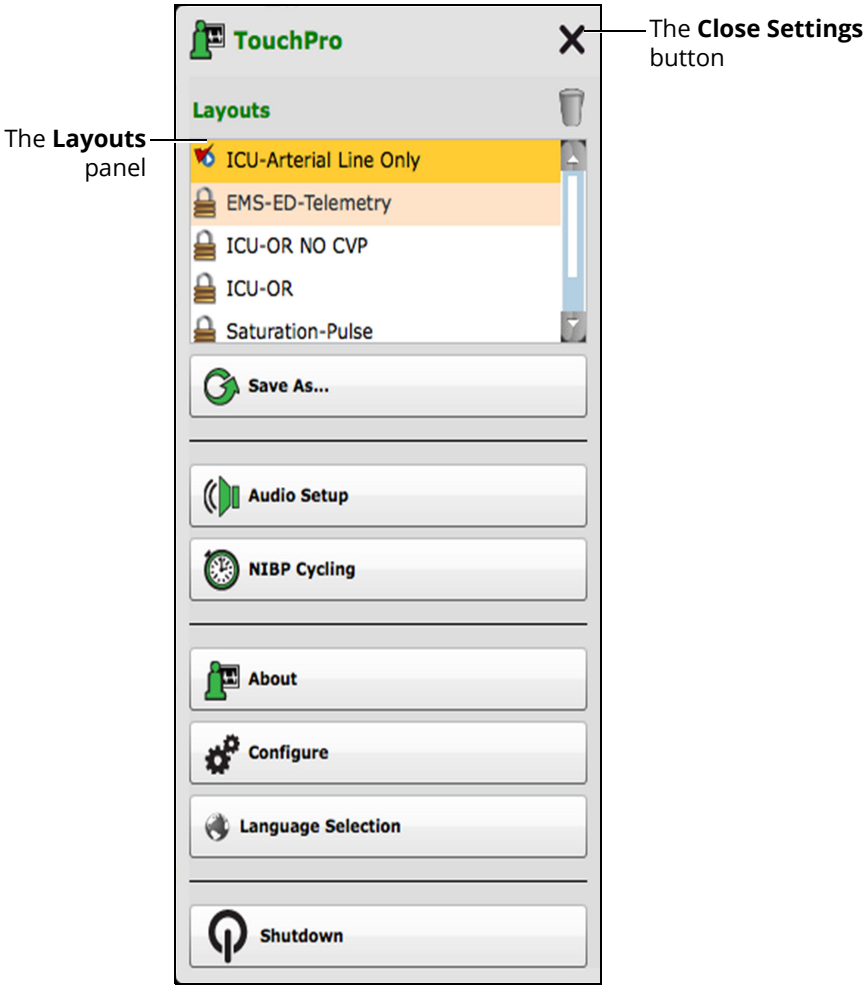
There are five preconfigured CAE Layouts:

- **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 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.

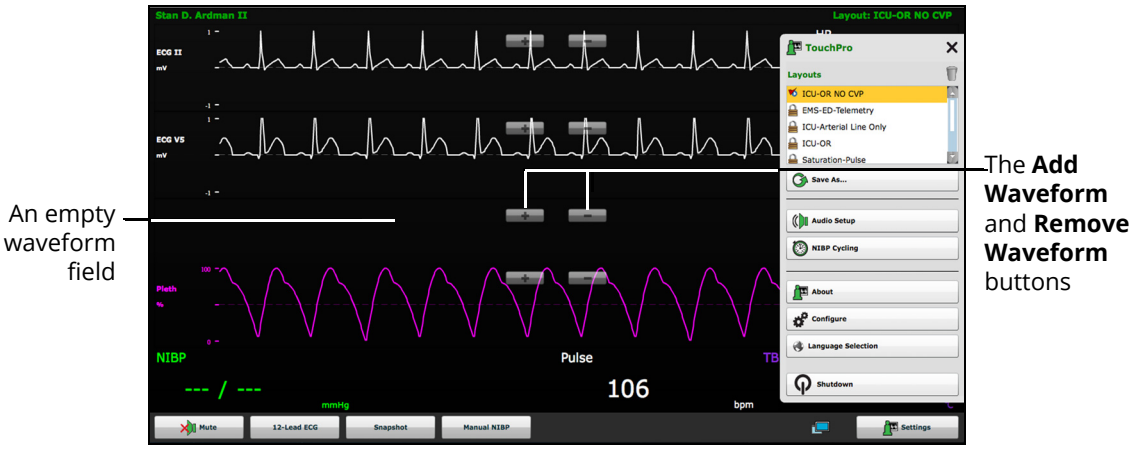
Adding a Waveform

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 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

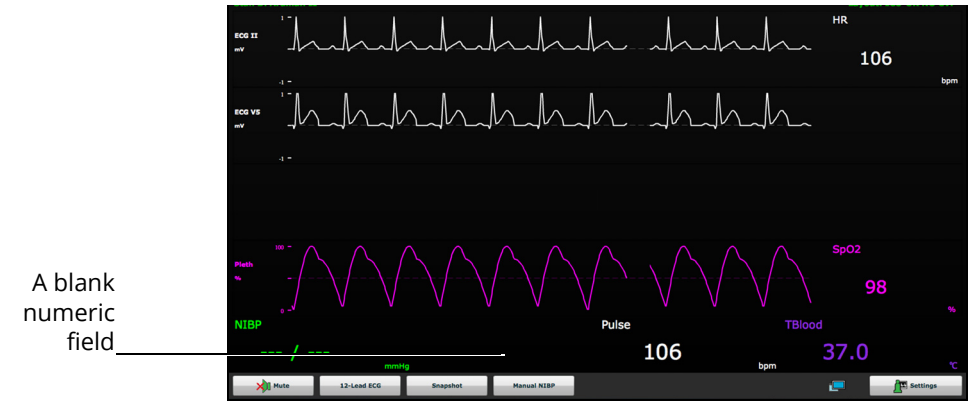
Adding a Numeric Display

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

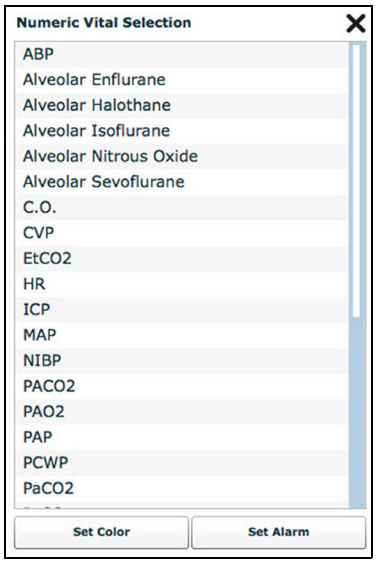
When fewer than four numeric readouts are being displayed, the remaining fields are blank.

To add or change a numeric display field:

1. Click an existing or a blank numeric display field



The TouchPro Display



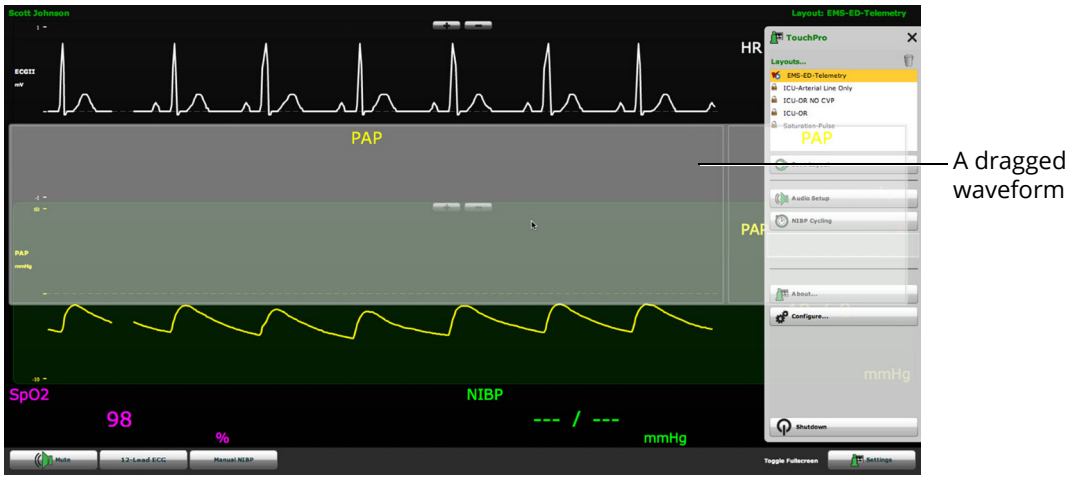
The Numeric Vital Selection Menu

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.



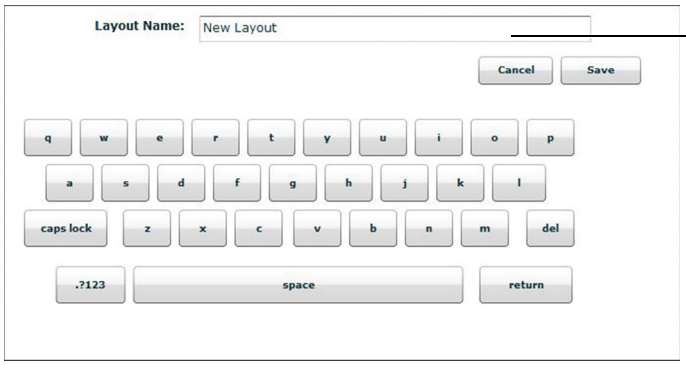
The TouchPro Display

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 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.

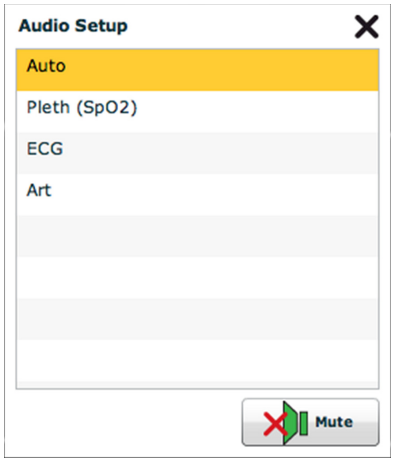
The Mute Button

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

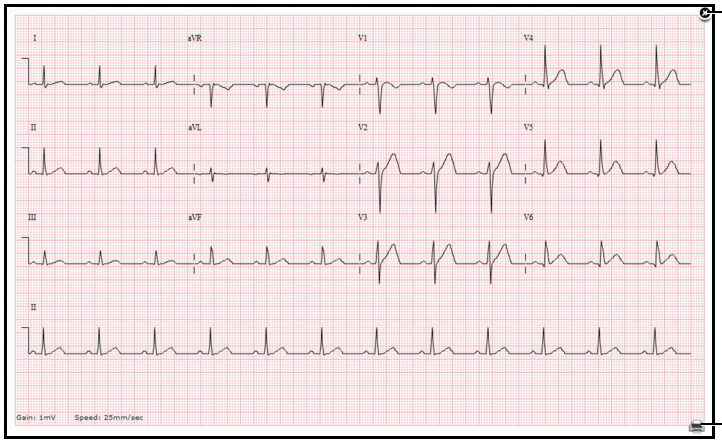
   Once a waveform is selected, the Audio Setup window automatically closes.

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



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 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**

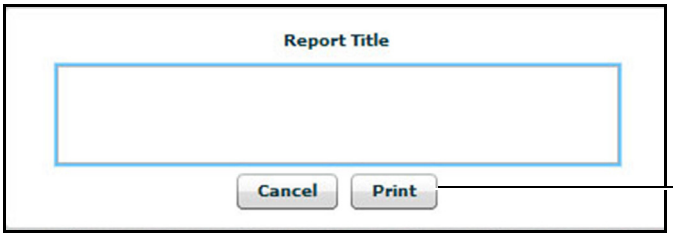
   The report saves as a PDF on the Macintosh Instructor Workstation.

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 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

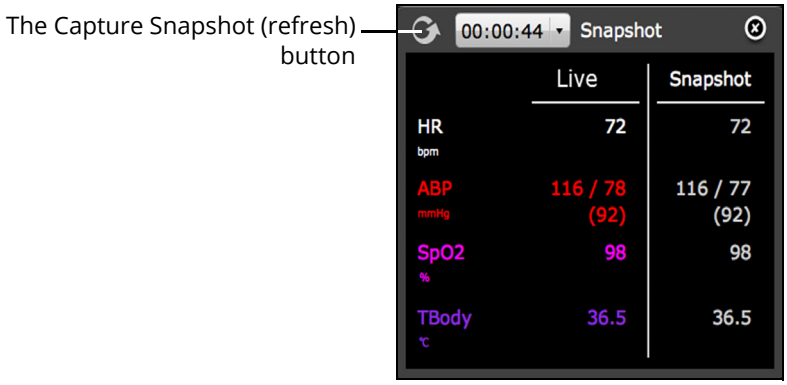
Snapshot

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



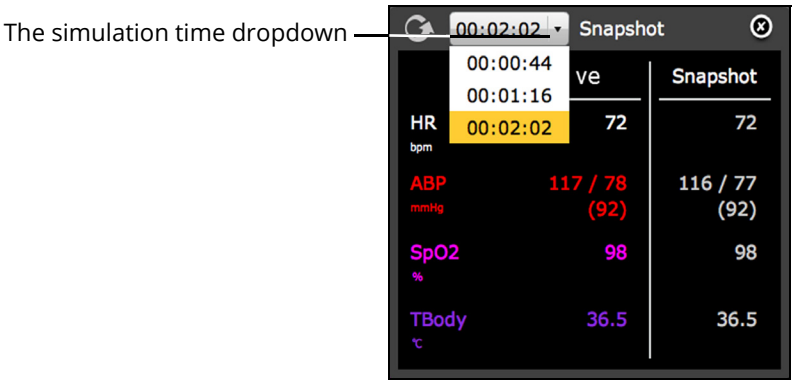
The Snapshot Window

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 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.

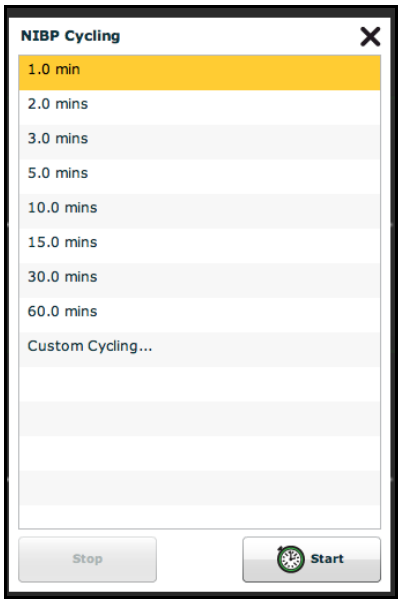
NIBP Cycling can be used to set the patient's NIBP to be updated at regular intervals.

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**

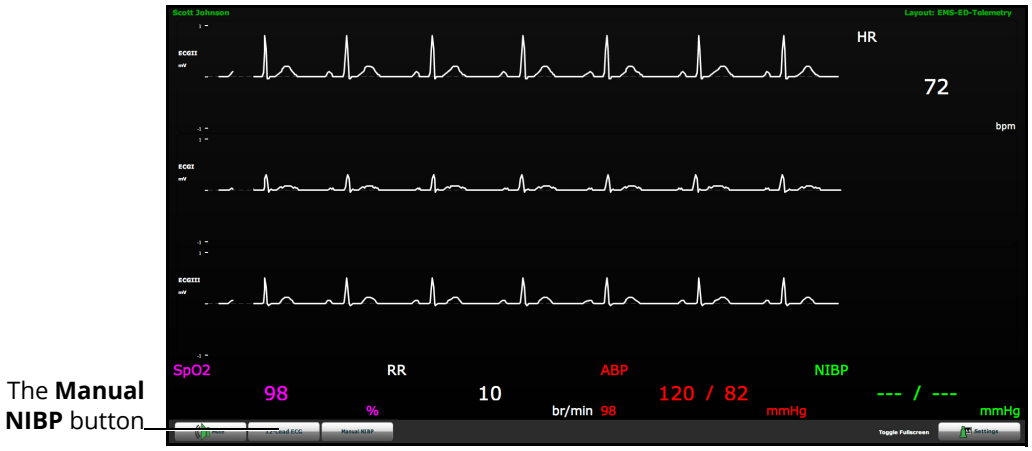


The NIBP Cycling Window

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

Note: Custom cycling is also available.

To display the patient's current NIBP, click 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

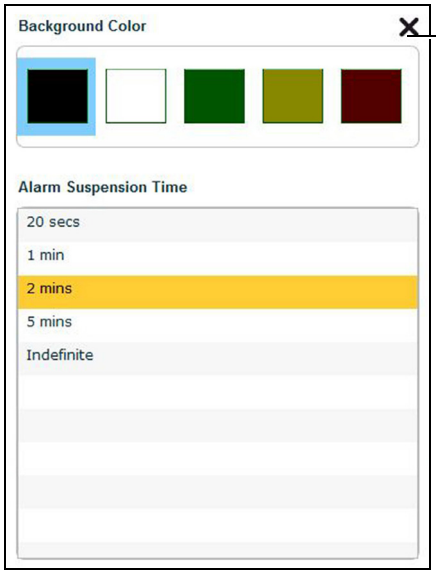
The background color and alarm suspension time can be set from the TouchPro Configure panel.

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

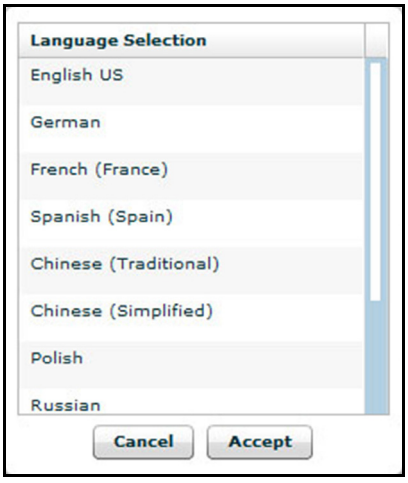
Changing the TouchPro Language

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:

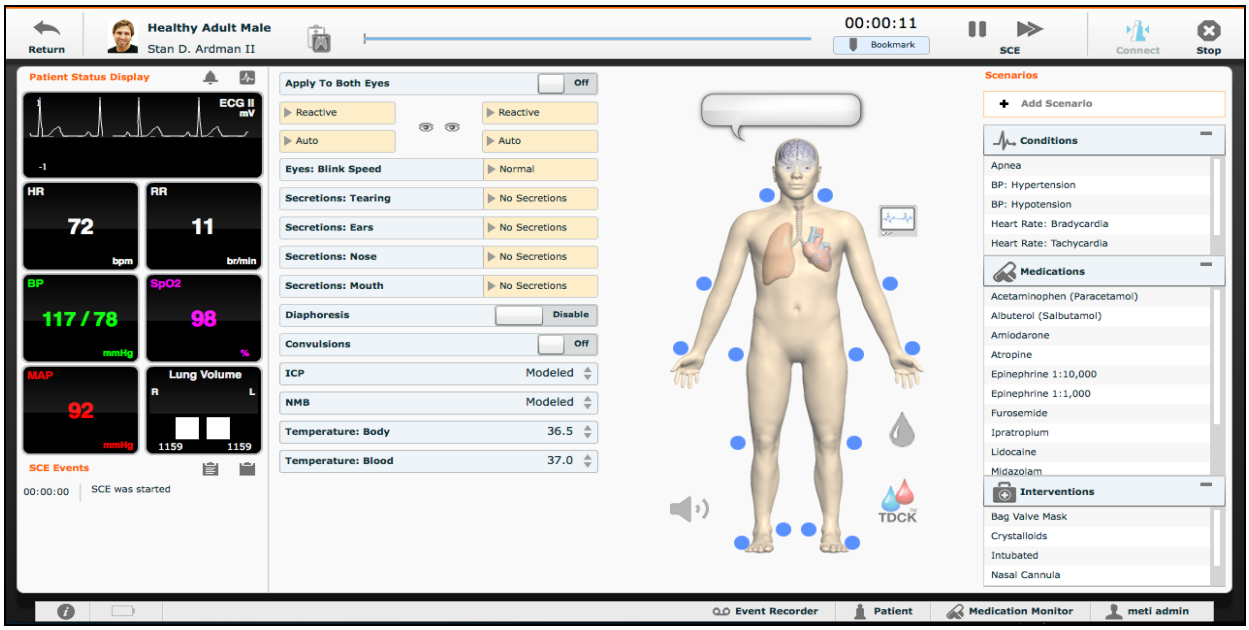
1. Click the **Settings** button from the bottom, right corner of the TouchPro screen

The Settings Button

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

USING iSTAN

Once iStan has been set up, the software has been loaded, and an SCE started (see the Using the Software section), the simulator is ready for learner interventions. From the Run screen, the features of iStan can be accessed. They are broken down into the following categories: Neurological, Respiratory, Cardiovascular, Fluids, and Sounds.



The Run Screen

Parameters

The Müse software has a number of parameters that control the physiological features of iStan. The parameters are grouped by category: Neurological, Respiratory, Cardiovascular, Fluids, and Sounds. Each screen lists default Basic parameters. However, when the **Basic/Additional** switch, located on the Run screen, is activated, more parameters become available.

Click the **Basic** switch to **Additional** to see more parameters

The Basic/Additional Switch

The following table lists the Basic iStan parameters.

Basic Parameters				
Neurological	**Respiratory**	**Cardiovascular**	**Fluids**	**TDCK**
Eyes: Pupil Size	Swollen Tongue	Blood Pressure	Fluid Loss Blood	Hemorrhage Channel 1
Eyes: Blink Speed	Airway Occluder	CVP	Fluid Loss Plasma	Hemorrhage Channel 2
Secretions: Tearing	Laryngospasm	PAP	Colloid Infusion	Hemorrhage Channel 3
Secretions: Ears	Needle Decompression	PCWP	Crystalloid Infusion	Hemorrhage Channel 4
Secretions: Mouth	Bronchial Occlusion	Heart Rate	PRBC Infusion	Hemorrhage Channel 5
Diaphoresis Convulsions	Respiratory Rate	Heart Rate Factor	Whole Blood Infusion	Hemorrhage Channel 6
NMB	Respiratory Rate Factor	Cardiac Output	Urine Output	
Temperature: Body	Shunt Fraction	Cardiac Rhythm	Bleeding	
Temperature: Blood	$EtCO_2$	PEA		
	SpO_2	Cyanosis: Toes		
	NMB	Cyanossis: Fingers		
	Tidal Volume	Arterial Catheter		
	Flail Chest	Central Venous Catheter		
	Intrapleural Volume: Left	PA Catheter		
	Intrapleural Volume: Right	PA Balloon		
	Trismus	Defib		
	Fraction of Inspired O_2	Pacing Current		
		Pacing Rate		
		Pacing Capture Threshold		
		Cold Fluid Inject		

The following table lists the Additional iStan parameters..

Additional Parameters				
Neurological	**Respiratory**	**Cardiovascular**	**Fluids**	**TDCK**
None	Respiratory Rate Chest Tube Air Leak Type: Right Tidal Volume Tidal Volume Factor pH Shift PEEP Chest Tube Enable: Left Chest Tube Enable: Right Chest Tube Flow: Left Chest Tube Flow: Right Chest Tube Air Leak Type: Left Chest Tube Air Leak Flow: Left Chest Tube Air Leak Flow: Right O_2 Consumption CO_2 Production Factor $PaCO_2$ 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	Perfusion Intensity Capillary Refill: Big Toe: Left Capillary Refill: Big Toe: Right Capillary Refill: Thumb: Left Capillary Refill: Thumb: Right Baroreceptor Maximum Pressure Baroreceptor Minimum Pressure Left Ventricle Contractillity Factor Right Ventricle Contractility Factor Systemic Vascular Resistance Factor Venous Capacity Factor Extrathoracic Arteries Elastance Intrathoracic Arteries Elastance Pulmonary Arteries Elastance Pulmonary Vasculature Resistance Factor Venous Return Resistance Factor Baroreceptor Gain (Overall) Factor Baroreceptor Gain (Peripheral) Factor Chest Compression Efficacy	None	None

Additional Parameters				
Neurological	Respiratory	Cardiovascular	Fluids	TDCK
None	Lung Compliance Factor: Left Lung Compliance Factor: Right Venous CO_2 Shift Left Bronchial Resistance Right Bronchial Resistance Alveolar Enflurance Alveolar Halothane Alveolar Isoflurane Alveolar Sevoflurane	Tamponade Volume Ischemic Index Sensitivity Ischemic Index Averaging Aortic Valve Resistance Factor Mitral Valve Resistance Factor Pulmonic Valve Resistance Factor	None	None

Neurological Features

iStan can simulate a variety of neurological clinical indicators, such as secretions and reactive eyes.

Neurological Features			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**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**	
Secretions	**Clear fluid can be secreted from the nose, mouth or ears.**	**The response to clinical intervention must be controlled by the instructor.** **VIEW: Neurological** **PARAMETER(S): Secretions: Tearing, Ears, Nose, Mouth**	***See Secretion System***
Temperature	**Body and blood temperature measured can be set using these parameters and 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, Blood**	

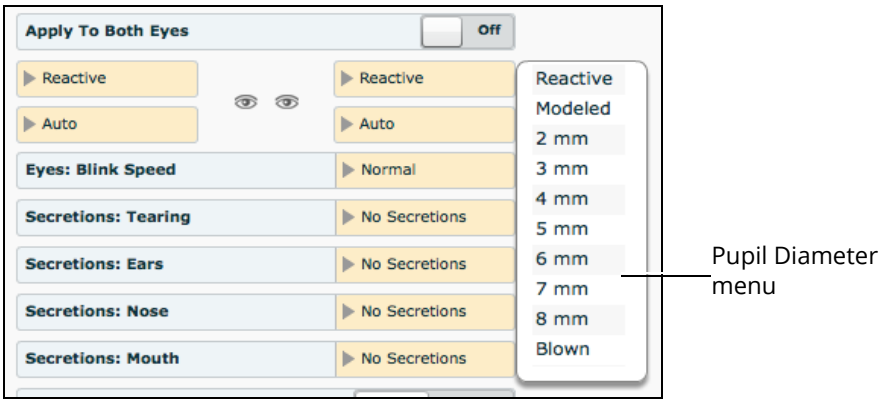
Eyes

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

The settings for Pupil Diameter are located on the **Neurological** view and accessed by selecting from the drop-down menu for the appropriate eye.

Currently, there are four pupil options that are used to control the diameter of the pupils in both eyes: **Modeled** (default), **Reactive, Blown,** or a Fixed Pupil Size from 2mm to 8 mm.

Setting the Pupil Diameter to **Reactive** causes the pupils to re-size in response to changes in light. If both pupils are set to **Reactive,** both pupils re-size accordingly. Other settings allow the user to fix one or both pupils to a specific size.



Altering Pupil Diameter

The settings for Blink Control are located on the **Neurological** view.

Choosing the **Auto** setting (which is also the default setting) sets the eyes in a blinking mode but allows the simulator to react to physiological changes that cause the eyes to close such as unresponsiveness or a comatose condition.

Though set in the **Closed** position, the eyelids can still be manually opened for clinical inspection.

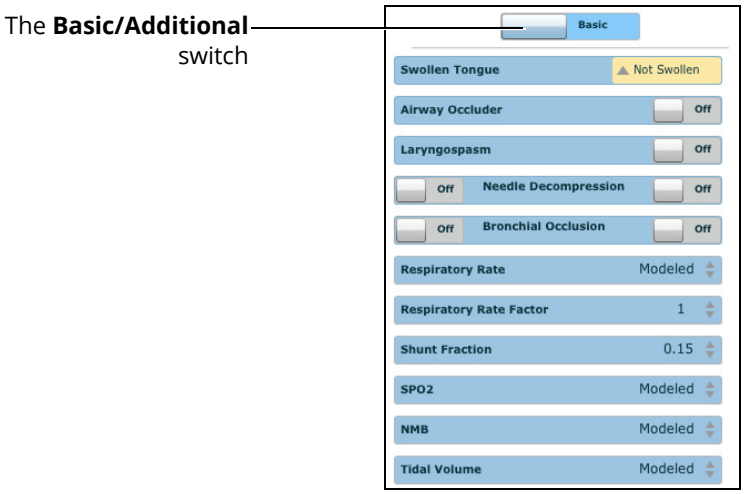
Additionally, eyelids can be programmed scenarios to open and close spontaneously or can be fixed in the closed position.

Blinking frequency can be set at one of three speeds: **Normal** (the default), **Slow** and **Fast**. To adjust the blinking frequency, click the desired option on the **Neurological** view.

Respiratory Features

iStan's anatomically realistic upper airway provides for the opportunity to intubate the patient (including mechanical ventilation and other airway interventions), while various clinical signs can be physically demonstrated (i.e., breath sounds, chest excursion, airway patency). A series of speakers inside the simulator can generate a range of breath and throat sounds used in patient assessment.

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 Respiratory View - Basic Parameters

Respiratory Features			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**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.**
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.**

Respiratory Features (Continued)			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
Articulated Mandible	Allows for jaw thrust when sensors in the lower jaw are grasped in a clinically appropriate manner.	None required.	
Breakaway Teeth	Upper front teeth can be dislodged if laryngoscopy is performed incorrectly.	None required.	*See Break-away Teeth.*
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.
Chest Tube Placement	Chest tubes can be inserted bilaterally into the mid-axillary line of the fifth intercostal space. Suction equipment can be applied to withdraw fluid from the simulated intrapleural space.	The instructor must adjust the amount of physiologic intrapleural fluid present. VIEW: Respiratory PARAMETER(S): Chest Tube Enable: Left, Chest Tube Enable: Right, Chest Tube Flow: Left, Chest Tube Flow: Right, Chest Tube Air Leak Type: Left, Chest Tube Air Leak Type: Right, Chest Tube Air Leak Flow: Left, Chest Tube Air Leak Flow: Right	*See Chest tube*
Cricothyroid Membrane	Allows needle cricothyrotomy, transtracheal jet ventilation, retrograde wire techniques and cricothyrotomy.	None required.	*See Cricothyrotomy*

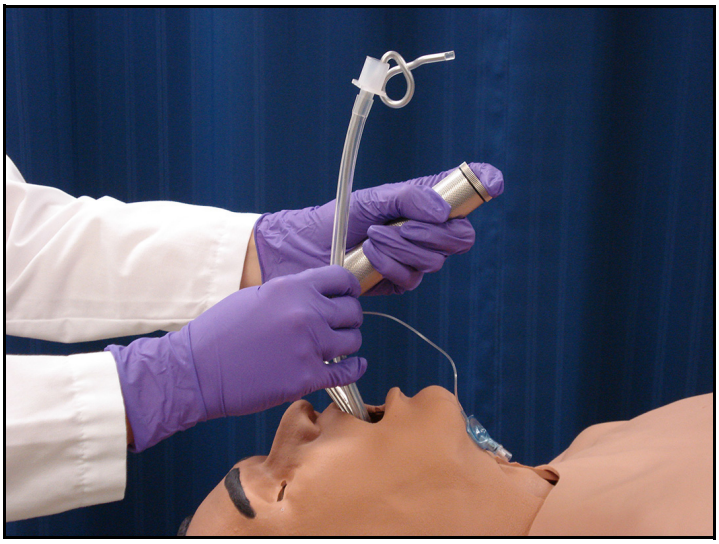
Respiratory Features (Continued)			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**Software Control**	**Manual Control**
Esophagus, Lower Esophageal Sphincter and Stomach	Esophageal intubation results in gastric distension and the absence of breath sounds, chest excursion and CO_2 output.	None required.	None required.
Exhaled CO_2	Measure the presence or absence of CO_2.	None required.	*see CO_2 canister*
Flail Chest	Abnormal mobility and loss of normal chest wall movement can present on the lower right side of the thoracic wall.	The instructor can set the level at which electrical capture and mechanical capture occur. VIEW: Respiratory PARAMETER(S): Flail Chest	None required.
Laryngospasm	Closes vocal cords and prevents intubation and ventilation. When used with posterior pharynx swelling, creates a "can't intubate, can't ventilate" scenario.	VIEW: Respiratory PARAMETER(S): Laryngospasm	None required.
Needle Decompression	Decompression of a pneumothorax can be performed bilaterally by inserting a needle at the midclavicular line of the second intercostal space.	The instructor must adjust the amount of physiologic intrapleural air present. VIEW: Respiratory PARAMETER(S): Needle Decompression, Intrapleural Vol: Left, Intrapleural Vol: Right	See *Needle decompres-sion*.
Posterior Pharynx Swelling	Obstructs view of larynx to prevent intubation, but allows mask ventilation "can't intubate, can 0ventilate" scenario.	VIEW: Respiratory PARAMETER(S): Airway Occluder	None required.

Respiratory Features (Continued)			
Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios.	Software Control	Manual Control
Pulse Oximetry	Oxyhemoglobin saturation (SpO2) 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	See *Oprional: Connect the SpO_2 probe*
Realistic Upper Airway (Oropharynx, Nasopharynx and Larynx)	Allows direct laryngoscopy, oral and nasal 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.
Tongue Swelling (Swollen, Semi-Swollen, Not Swollen)	Hinders, but does not prevent intubation.	VIEW: Respiratory PARAMETER(S): Swollen Tongue	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.
Trismus	Simulates the presence of a masculatory muscle spasm.	VIEW: Respiratory PARAMETER(S): Trismus	None required.

Respiratory Features (Continued)			
Anatomy, Physiology and Clinical Signs	**Clinical Interventions, Patient Monitoring and Scenarios.**	**Software Control**	**Manual Control**
Venous Blood Gases	**PvO2 and PvCO2 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 iStan is designed to allow for intubation and laryngoscopy. Oral and nasal intubation can be performed using a variety of airway devices, including LMAs, endotracheal tubes, nasal-pharyngeal airways and oropharyngeal airways.



Intubation

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

Intubation incorrectly applied into the esophagus causes abdominal distension.

IMPORTANT

Airways 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 silicone spray provided.

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

Lung Compliance

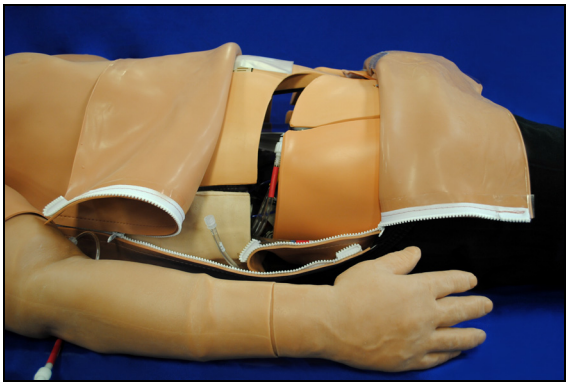
The iStan lung allows support for ventilation, including asynchronous mechanical ventilation. Lung compliance is adjusted independently on the manikin and in the Muse software. They both must be adjusted to equivalent levels to work effectively. Refer to the lung compliance settings table at the end of these instructions for equivalency settings.

Note: The default configuration, no flanges attached on the lung, is considered normal lung compliance in Muse. No hardware adjustments are needed.

IMPORTANT: To reduce the lung compliance, adjust the lung flange on the manikin first, then adjust the Muse software lung compliance.

To adjust the lung flange on the manikin:

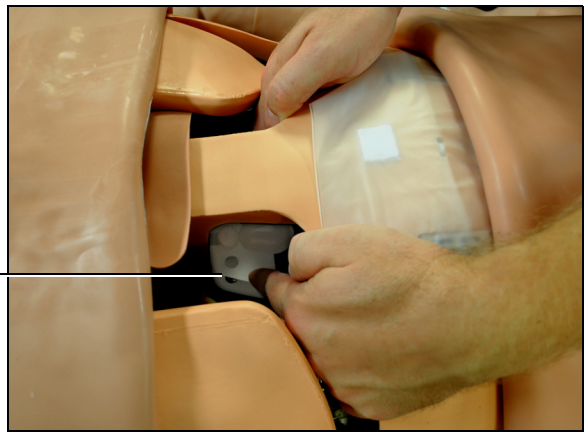
1. Unzip and fold back the iStan torso skin and shorts skin



The Manikin

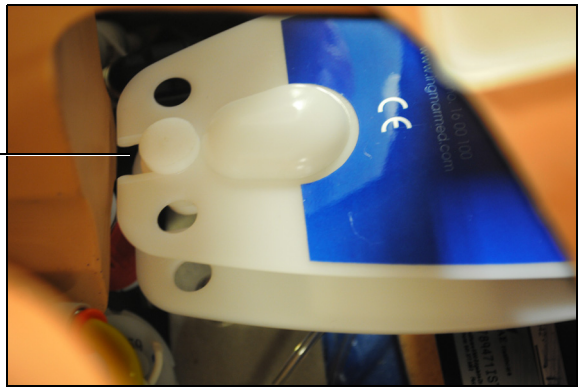
2. Use both hands to slightly bend and clip the top or bottom lung flange into the flange slot

   Note: Turning the manikin feet outward allows more room to reach inside the manikin.

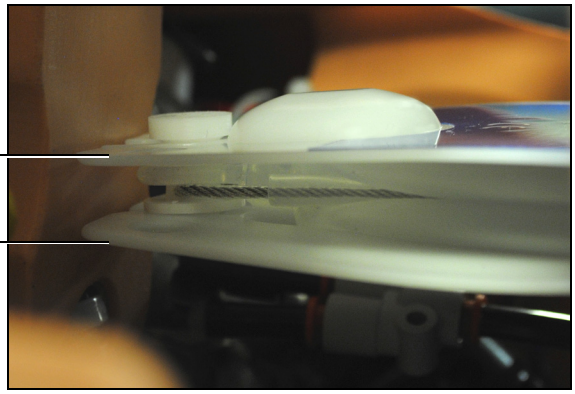


The Manikin Abdomen

Note: Clip the top lung flange for moderately reduced compliance. Clip both the top and bottom lung flanges for severely reduced compliance.



The Lung

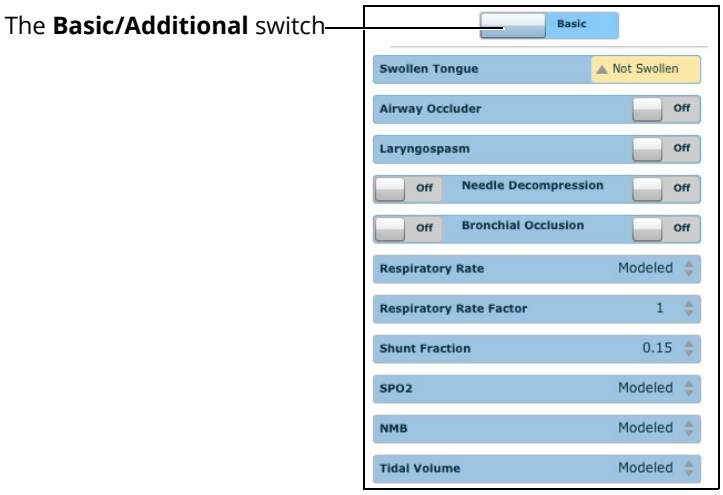


The Lung

3. Replace and zip the torso skin and shorts skin

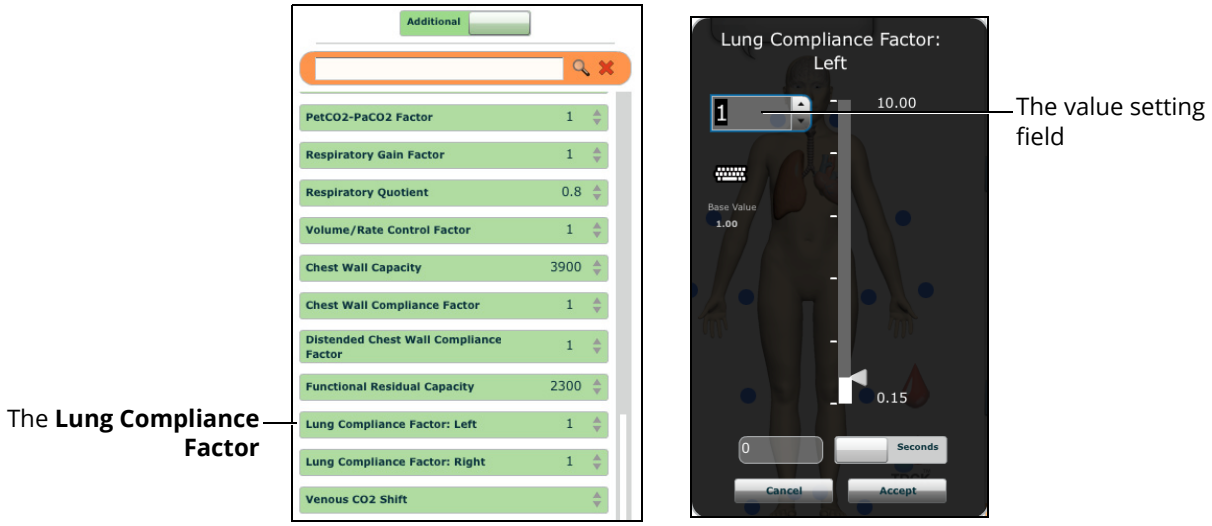
To adjust the lung compliance in the Muse software:

1. From the **Run** screen, click the lung on the homunculus figure



The Respiratory View - Basic Parameters

2. Click the **Basic/Additional** switch to view additional parameters
3. Click **Lung Compliance Factor: [Left/Right]** to adjust settings



The Lung Compliance Factor Parameter

4. Adjust compliance settings (click up/down arrows in the value setting field) and click **Accept** when done

   Note: Ensure both left and right lung compliance settings are adjusted accordingly.

iStan Lung Compliance Settings

Lung Flange Position	Muse Lung Compliance Factor: Left and Right
No Flanges Attached	Normal: 1.0
Top Flange Attached	Moderately Reduced: 0.5
Both Top and Bottom Flanges Attached	Severely Reduced: 0.3

Note: The lung flanges on the manikin should be returned to normal compliance (no lung clipped to the flange slot) after completion of use.

Muse Lung Compliance Settings

Use the **Lung Compliance Factor, Left and Right** in Muse to increase/decrease lung compliance. (In Muse, click the lung on the homunculus figure, then click the **Basic/Additional** switch to view additional parameters.)

Increase in Peak Inspiratory Pressures (PIPs) and Plateau Pressures are evident with reduced lung compliance. Actual PIPs and Plateau Pressures observed will depend on the ventilator settings:

- **Flow rate:** lower inspiratory flows will reduce resultant PIPs
- **Inspiratory time:** longer inspiratory times will reduce flow rates resulting in lower PIPs
- **Tidal volume:** smaller tidal volumes will reduce flow rates resulting in lower PIPs
- **PEEP:** Application of Positive End-Expiratory Pressure (PEEP) resulting in higher PIPs and Plateau Pressures

Example:

Ventilator Settings: VT: 450 mL, Rate: 12 breaths/min, I:E: 1:3, Inspiratory Flow: 27 L/min.

Lung Compliance Factor, L/R	Compliance Configuration (Manikin hardware)	Positive End-Expiratory Pressure (PEEP) (cm H_2O)	Peak Inspiratory Pressure (PIP) (cm H_2O)	Plateau Pressure (cm H_2O)	Static Compliance (mL/cm H_2O)
1	Normal	0	9 – 13	7 – 9	65 – 70
1	Normal	5	55 – 65	50 – 60	10 – 15‡
0.5	Moderately Reduced	0	18 – 24	14 – 20	25 – 35
0.5	Moderately Reduced	5	23 – 28	18 – 24	25 – 35
0.5	Moderately Reduced	10	30 – 36	26 – 32	20 – 25
0.5	Moderately Reduced	15	45 – 50	40 – 45	15 – 20‡
0.3	Severely Reduced	0	30 – 35	25 – 30	15 – 20
0.3	Severely Reduced	5	30 – 35	27 – 33	15 – 20
0.3	Severely Reduced	10	35 – 40	32 – 36	14 – 19
0.3	Severely Reduced	15	40 – 45	38 – 42	14 – 19
0.3	Severely Reduced	20	48 – 52	45 – 50	12 – 16

‡ Over-distention

Recommendations:

1. **PEEP:** If PEEP is set on the ventilator, the corresponding PEEP setting must be applied in Muse for physiologic response to PEEP [Location: Respiratory Parameters, Additional]
2. **Normal Compliance Configuration:** The application of PEEP on the ventilator is not recommended
    - Set the PEEP in the Muse SW only, not on the ventilator
3. **Over-distention:** Use the table above as a guide to the upper limit of ventilator applied PEEP
    - Use the Muse SW alone to demonstrate the physiologic response to higher PEEP settings

Muse Bronchial Resistance Settings

Use the **Bronchial Resistance Factor, Left and Right** in Muse to increase/decrease airway resistance. (In Muse, click the lung on the homunculus figure, then click the **Basic/Additional** switch to view additional parameters.)

Increase in Peak Inspiratory Pressures (PIPs) are evident with increased bronchial resistance. Actual PIPs observed will depend on the ventilator settings:

- **Flow rate:** lower inspiratory flows will reduce resultant PIPs
- **Inspiratory time:** longer inspiratory times will reduce flow rates resulting in lower PIPs
- **Tidal volume:** smaller tidal volumes will reduce flow rates resulting in lower PIPs

Example:

Ventilator Settings: VT: 450 mL, PEEP: 0 cm H_2O. **Hardware Lung Configuration:** Normal Compliance.

Bronchial Resistance Factor, L/R	Rate (breaths/ min)	Inspiratory Flow (L/min)	I:E	Peak Inspiratory Pressure (PIP) (cm H_2O)	Plateau Pressure (cm H_2O)	Static Compliance (mL/cm H_2O)
1	12	27	1:3	9 – 13	7 – 9	65 – 70
2	12	27	1:3	11 – 15	7 – 9	65 – 70
3	12	27	1:3	13 – 17	7 – 9	60 – 65
4	12	27	1:3	14 – 18	7 – 9	60 – 65
5	12	27	1:3	16 – 20	7 – 9	60 – 65
6	12	27	1:3	17 – 21	7 – 9	57 – 62
7	12	27	1:3	18 – 22	7 – 9	57 – 62
8	12	27	1:3	20 – 24	8 – 10	57 – 62
9	12	27	1:3	22 – 26	9 – 11	57 – 62
10	12	27	1:3	25 – 30	10 – 14	57 – 62
11	10	30	1:4	30 – 35	13 – 17	45 – 50
12	10	30	1:4	33 – 38	14 – 18	45 – 50
13	10	30	1:4	36 – 43	18 – 22	45 – 50
14	10	30	1:4	40 – 45	22 – 26	45 – 50
15	10	30	1:4	45 – 50	28 – 32	45 – 50

Recommendations:

1. **Tidal volumes:** The recommended maximum VT with mechanical ventilation is 450-500 mL. Higher values are likely to cause over-distention of the hardware lung.
2. **Onsets:** The use of Onsets when making changes to the Bronchial Resistance Factor settings is not recommended as this may yield inconsistent behavior, e.g., run-to-run variation in PIPs
3. **PEEP:** For the normal compliance lung configuration, the application of PEEP on the ventilator is not recommended
    - Set the PEEP in Muse only, not on the ventilator.
4. **CO2:** To adjust the modeled response to hardware settings (bronchial resistance / lung compliance), consider using the following Muse parameters (Location: *Respiratory Parameters, Additional*).
    - **O_2 Consumption –** Used to change rate of O_2 consumption and production of CO_2
    - **CO_2 Production Factor –** Allows for the manipulation of metabolic CO_2 production

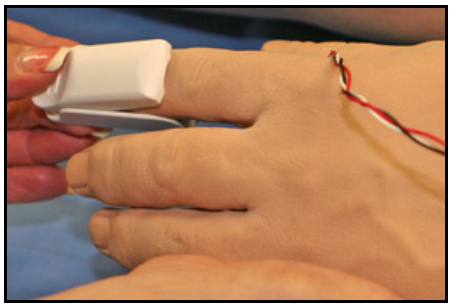
Articulated Mandible

An articulated mandible permits jaw thrust so when sensors in the lower jaw are grasped in a clinically appropriate manner, the mandible may be extended.

This action is recorded in the Events log and in the Simulation Session.

SpO_2 Probe

The SpO_2 probe is integrated with the Patient Status Display and the physiological model.



SpO_2 Probe

The connection for the SpO_2 probe is located on the left side of the simulator.

Scan or click the QR code to access the *Connecting the SpO_2 Probe to iStan* video tutorial on *caehealthcare.com.*

Cricothyrotomy

To replicate a needle cricothyrotomy:

1. Spray the silicone lubricant onto the airway adjunct prior to the simulation session
2. Locate the simulated cricothyroid membrane sealed with tape underneath the neck skin
3. Follow standard clinical techniques and palpate to find the cricothyroid space
4. Puncture the space through the neck skin of the patient simulator and into the tape "membrane." This puncture goes all the way through to the "trachea," simulating the clinical procedure.

Users must replace the tape that simulates the cricothyroid membrane after each cricothyrotomy.

A replacement neck skin, airway lubricant and spools of tape are available in the Replacement Kit.

Scan or click the QR code to access the *Preparing iStan for Cricothyrotomy* video tutorial on *caehealthcare.com.*

Replacing the Cricothyrotomy Tape

To replace the cricothyrotomy tape:

1. Remove the old, punctured tape completely from the cricoid feature and use alcohol (an alcohol prep pad works well) to clean the glue residue from the surface
2. Allow to dry
3. Cut an approximately 2.25 inch (6 cm) length of the double-sided tape from the roll provided
4. Carefully remove the paper backing and lightly stretch the newly revealed adhesive side of the tape over cricoid hole and down the far side of the cricoid feature. Use the non-stick paper backing to press the tape against the cricoid feature.
5. Cut a 2.5 to 3.0 inch (7 to 8 cm) length of red tape and apply it over the cricoid feature and the tape

Resealing the Membrane After a Puncture

To reseal the cricoid feature apply a small piece of red tape over the punctured area. This can be repeated a brief number of times, but when the number of layers impedes the cricothyrotomy, all existing tape must be removed and replaced with new tape.

Teeth with Breakaway Incisors

iStan is equipped with Breakaway Teeth whose front incisors become dislodged with improper handling of a Laryngoscope.

The teeth are tied to the upper denture with a lanyard, which prevents losing the teeth down the airway or misplacing them during storage.

Chest Tube

A chest tube can be inserted at the mid-axillary line of the fifth intercostal space on either side of the simulator.

Using ordinary chest tube equipment, fluid and air can be withdrawn from the pleural space. The volume removed influences the patient's physiology to reflect improvement in pulmonary mechanics and gas exchange

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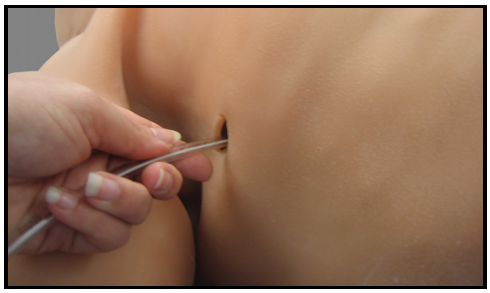


Chest Tube Placement

Correct insertion of the chest tube is entered into the log for use during debriefing and can be used as a scenario transition.

The chest tube feature is primed and enabled using the **Chest Tube Enable** parameter located on the Respiratory view.

To prime the Chest Tube feature:

1. Insert the chest tube into the simulator as far as possible
2. On the Respiratory view, select the **Prime** option under **Chest Tube Enable: Left** or **Chest Tube Enable: Right** or both, depending on need

Chest Tube Enable

3. Once water begins to flow, remove the tube
4. Prior to use, select **Enable** under **Chest Tube Enable: Left** or **Chest Tube Enable: Right** or both, depending on the location(s) utilized

Three additional parameters allow the user to set air flow and fluid rate as well as to determine the type of air leak:

- **Chest Tube Air Leak Flow** - determines the quantity of air that drains with the chest tube output
- **Chest Tube Air Leak Type** - sets whether the leak is a pneumothorax or an air leak with the chest tube or the chest wall
- **Chest Tube Flow** - specifies the rate at which fluid can be removed from the simulated pleural space via a chest tube drainage system

All three parameters are located on the Respiratory view under Additional Parameters.

The Intrapleural Volume parameter allows intrapleural volume to accumulate, for example, as happens during pneumothorax, hydrothorax and hemothorax.

To simulate a pneumothorax, set the corresponding intrapleural volume to a value greater than 0 mL. Values above 500 mL reduce the corresponding lung volume significantly. Breath sounds are automatically diminished on the appropriate side due to decreased ventilation of the affected lung.

Scan or click the QR code to access the Using iStan's Chest Tube Feature video tutorial on caehealthcare.com.

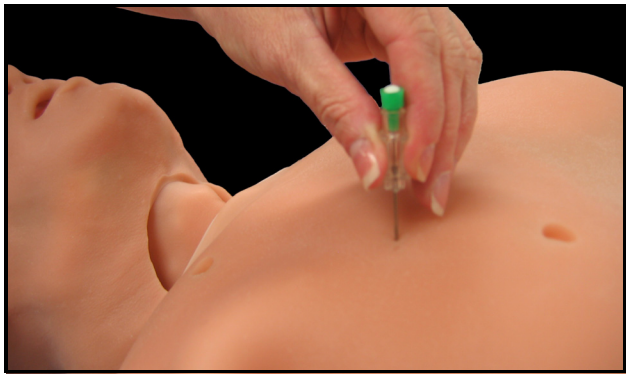
Needle Decompression

To set up a Pneumothorax Needle Decompression, enable the feature using the Needle Decompression parameter on the Respiratory screen.

Needle Decompression Switch

Select **ON/OFF** to activate the feature.

Needle decompression can be performed bilaterally into the small hole located in the mid-clavicular line of the second intercostal space. Insert a needle until the hissing sound of the valve release is heard.



Needle Decompression

The Intrapleural Volume parameter can be used to allow intrapleural volume to accumulate.

Effective needle decompression immediately reduces the intrapleural volume. The hissing sound stops when intrapleural volume is zero.

Scan or click the QR code to access the *Performing Needle Decompression on iStan* video tutorial on *caehealthcare.com.*

Pulses

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

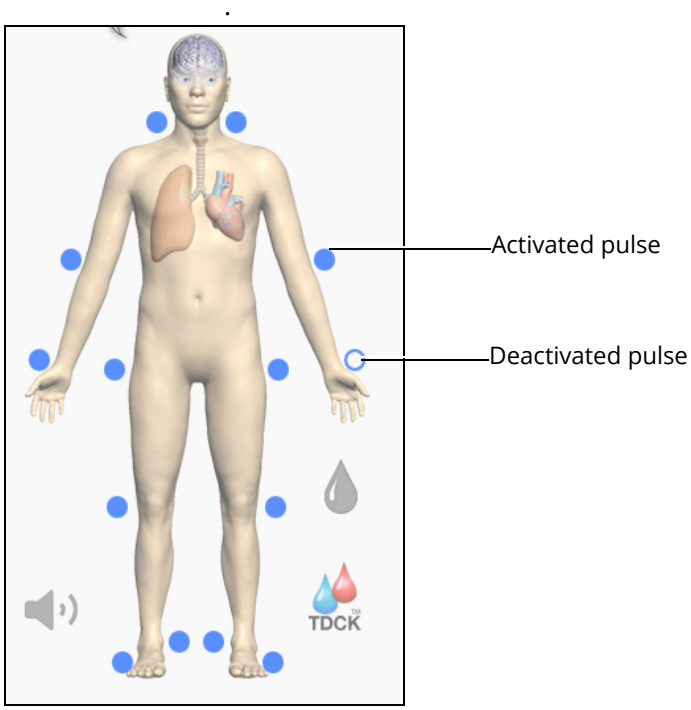
- Carotid (2)
- Brachial (2)
- Radial (2)
- Femoral (2)
- Popliteal (2)
- Posterior Tibial (2)
- Dorsalis Pedis (2)

When a pulse is activated and when that pulse is no longer being palpated the action is recorded on the Events Log and in the Simulation Session for later review.

Pulses are visible and can be controlled from any physiological view. All pulses, unless altered by an SCE, are enabled by default.

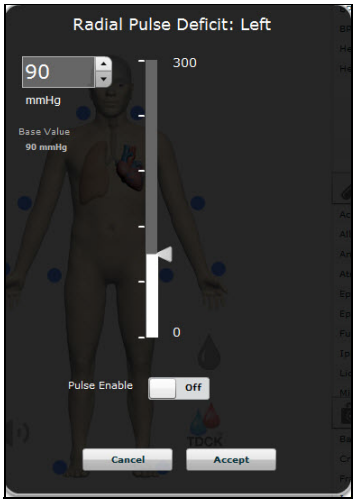
To disable a pulse:

1. Click the pulse location on the human form



Pulses – Active and Inactive

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



3. Click **Accept**.

   The pulse can be re-enabled with the same steps.

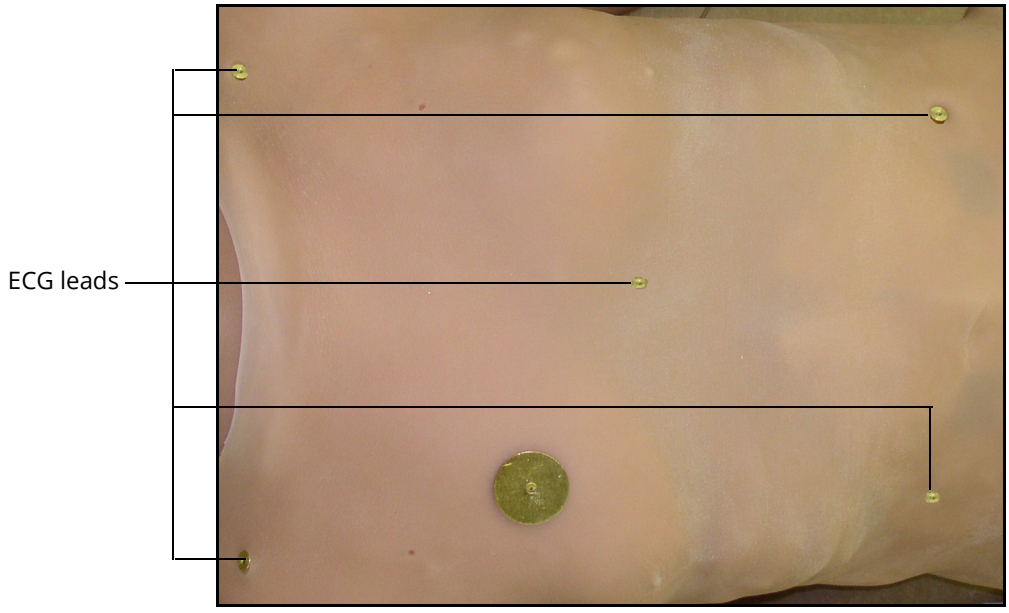
When a pulse is palpated, the event is recorded on the Events Log and the Simulation Session for later review.

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

Palpable Pulse Threshold	
Carotid	**60mmHg**
Brachial	**80mmHg**
Radial	**90mmHg**
Femoral	**70mmHg**
Popliteal	**80mmHg**
Posterior Tibial	**80mmHg**
Dorsalis Pedis	**80mmHg**

3-Lead or 5-Lead ECG

A 3-lead or 5-lead ECG is emitted from the appropriate positions for display on a standard monitor. A contact is available on iStan's chest for each of five cables.



ECG Sites

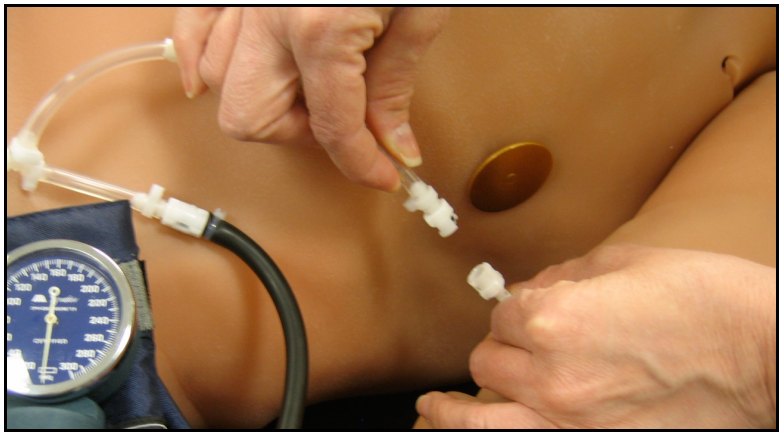
The simulator generates a normal sinus ECG, as well as a broad range of abnormalities such as myocardial ischemia, sinus tachycardia and bradycardia, ventricular fibrillation and asystole. The hemodynamic response to the arrhythmias is physiologically correct. Myocardial oxygen balance and cardiac ischemia 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.

Manual Blood Pressure

Blood pressure can be taken manually on the left arm.

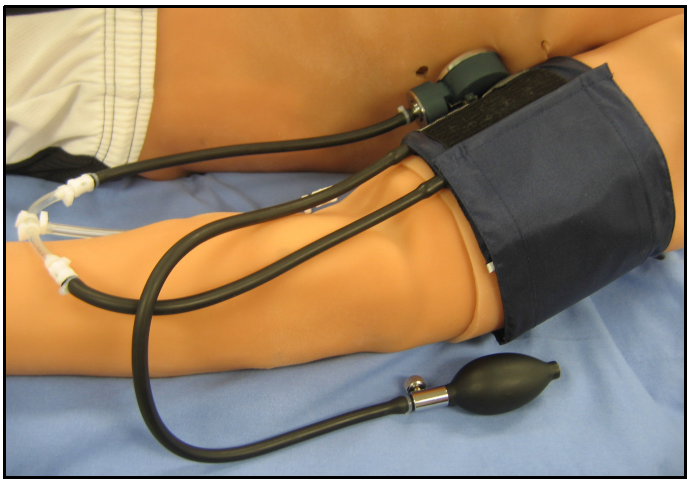
Non-invasive blood pressure monitoring techniques can be used by attaching the standard cuff modified with a T-fitting and adapters.

The extension from the T-fitting is connected to the hose located inside the left upper-arm skin.



Connecting the Blood Pressure T-Fitting

Connect the T-fitting extension to the hose and take the noninvasive blood pressure reading using the return-to-flow technique.



An Attached Modified Blood Pressure Cuff

Store the modified blood pressure cuff with the system for future use.

Scan or click the QR code to access the *Non-invasive Blood Pressure Measurements with iStan* video tutorial on *caehealthcare.com.*

Korotkoff Sounds (5 phases)

Korotkoff sounds can be auscultated on the left arm.

To auscultate Korotkoff sounds,

a. Place the stethoscope on the left arm, just above the brachial pulse
b. Let the cuff pressure drop slowly by opening the valve on the bulb slightly
c. 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

iStan 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:

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.

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. For example, 20 or 25 discharges without any recovery interval may damage the system. Leave at least 20 minutes recovery period after a sequence of more than 10 consecutive discharges.

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 chest dry. Special attention should be taken when using the urinary system or the chest tube feature.

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.

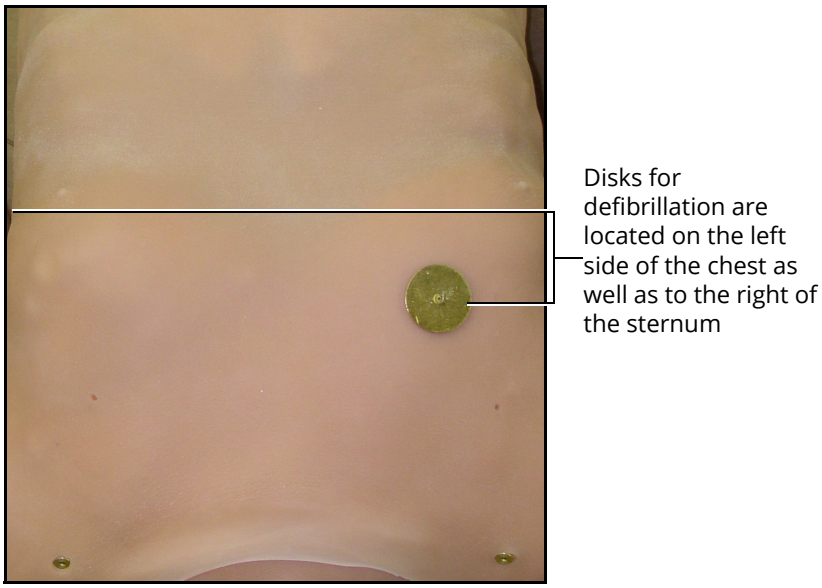
When using a manual defibrillator, the ECG can be monitored via the defibrillator paddles. Coarse ventricular fibrillation and high-rate ventricular tachycardia cardiac rhythms are automatically recognized as "shockable" rhythms.

With each defibrillation, the iStan 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 has two anterior defibrillation disks, which can be unscrewed leaving threaded connections if required.



Defibrillation Sites

The **Defib** parameter is available for virtual defibrillation. The Defibrillation parameter is located on the Cardiovascular view.

Scan or click the QR code to access the Defibrillation, Cardioversion, and Pacing video tutorial on caehealthcare.com.

Cardiac Pacing

A standard transthoracic cardiac pacemaker can be connected to the simulator using the anterior contacts. 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

Many of iStan's fluids, such as Bleeding, IV Fluid Administration and Urine Output, can be managed from the Fluids view.

Fluid Anatomy, Physiology and Clinical Signs	Clinical Interventions, Patient Monitoring and Scenarios	Software Control	Manual Control
Bleeding	**Two simultaneous bleeding sites may be used. Bleeding is linked to physiology and may take place at all four limbs as well as the chest/belly.**	**VIEW: Fluids**	***See Secretion System*.**
IV Access	**The right and left arms of the simulator provides intravenous access locations.**	**None required.**	**See Permanent IV Access Ports.**
IV Medication Administration	**Bolus injections are administered utilizing standard syringes while continuous IV infusions can be administered using infusion devices. Injections can be administered in the IV arm or in two permanent access catheters located at the right jugular and left femoral veins.**	**Administered IV medications must be set by the instructor. Medications are administered via the Medications and Interventions palettes.**	**All administered IV medications are collected in the bag attached to the IV Drain hose located on the simulator's right hip.**
IV/IO Fluid Administration	**IV fluids can be administered in the IV arm or in the two permanent access catheters located at the right jugular and left femoral veins. Intraosseous (IO) sites are available at the sternum and bilaterally at the tibia.**	**Administered IV fluids must be set by the instructor.** **VIEW: Fluids** **PARAMETER(S): Colloid Infusion, Crystalliod Infusion, PRBC Infusion, Whole Blood Infusion** **IV/IO fluid administration can also be achieved by using the Intervention palettes.**	**All administered IV medications are collected in the bag attached to the IV Drain hose located on the simulator's right hip.**

Bleeding

iStan is capable of bleeding simultaneously at two sites. The integrated hemorrhage system allows for the physical and modeled simulation of venous or arterial bleeding at moulaged wound sites at all four limbs as well as at the chest/belly.

Blood loss is continuously reported to the physiological models. The models respond to the reported blood loss with the appropriate cardiovascular and respiratory system changes to heart rate, blood pressure, and respiratory parameters.

Switch the desired control to **On** to enable the bleeding feature.

To change the bleeding type, size and/or location, this must be done during SCE creation.

When selected, Bleeding registers an automatic loss of blood from the physiologic models with subsequent changes in hemodynamics. Venous settings produce a continuous bleed at three user-adjustable flow rates. Arterial settings produce a pulsing flow based on the patient's heart rate, at three user-adjustable flow rates. Blood loss occurs at a rate dependent on wound size and Mean Arterial Pressure (MAP).

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 were 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 initial Hematology Model does not yet distinguish between the differing clinical effects of colloids versus crystalloids. For example, osmotic pressures and capillary leakage rates are not taken into account. Likewise, fluid kinetics and how fluids distribute within the circulation, the interstitial, and intracellular spaces are also not presently 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

Hemorrhage Setup

The user determines the type and placement of the bleeding moulage for the lesson. An optional Moulage Kit (*see page 10*) can provide molded gunshot wounds, broken and protruding bones, amputations and an abdominal wound as well as theatrical components.

To decrease the likelihood of staining, apply a thin coat of petroleum jelly to the area of bleeding.

Using one of the moulage wounds from the Moulage Kit:

1. Secure the wound over the simulator using the integrated straps
2. Connect this haptic to the wound umbilical, the hose running along the arm or leg downward from the red Bleeding Connector for each limb (or abdomen)

The Bleeding Connectors for the legs can be found behind the skin on either side of the simulator at the hip. The Bleeding Connector for the arms can be found protruding from the upper arm skins. The Bleeding Connector for the abdomen is also located behind the skin on the right side of the simulator at the hip. Look for a male shut-off fitting marked with a red label.

Hemorrhage Control

The bleeding rates at moulaged wound sites are monitored for effective hemorrhage control therapy (e.g. hemostat, tourniquet). Data from the physiological blood models is recorded in the physiologic logs for use during debriefing.

Tourniquet Application

A tourniquet may be applied to stop the flow of blood.

The wound umbilical contains an 18-inch section of soft tubing that allows the use of a tourniquet to stop the flow of blood. Use the included tape to hold the hose in the correct location for tourniquet usage.

For added realism, the simulator should be dressed in clothing that can be torn to “conform” with the type of injury being demonstrated. Bleeding moulages and the wound umbilical should be concealed under the victim’s clothing with only the wound showing.

Applying a Tourniquet

To stop bleeding, apply the tourniquet between the wound and heart.

Genitourinary System

The simulator allows for the insertion of urinary catheters and excretion of urine with a flow rate that is controlled by the instructor.

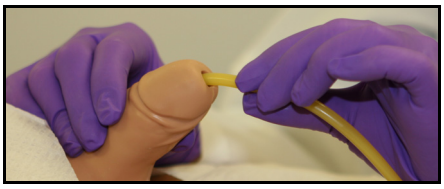
Scan or click the QR code to access the *Using iStan's Genitourinary System* video tutorial on *caehealthcare.com.*

Urinary Catheterization

Prior to use, ensure the clear secretions tank is full.

Catheterize the simulator using a standard urinary catheter lubricated with silicone spray.

If color is desired, place the desired amount of yellow food coloring in the Foley bag.



Urinary Catheritization

The bladder for the simulated urine is accessed directly via the urethra.

From the Fluids view, set the **Urine Output** to the maximum level (500 mL/hr) in the software until fluid flows through the catheter.

Urinary Output

Urinary output can be controlled by adjusting the Urine Output parameter on the Fluids view.

Selecting Urine Output

Changing the Simulator's Genitalia

iStan comes with male and female genitalia.

To switch genitalia:

1. Remove iStan's skin shorts
2. Pull apart the hook and loop fastener (Velcro®) holding the genitalia
3. Loosen and remove the urethra connector

   Note: This connection may be tight when genitalia are removed the first time.
4. Remove the genitalia
5. Attach urethra tube to the urethra connector
6. Attach the desired genitalia using the hook and loop fastener (Velcro®)
7. Replace iStan's skin shorts

Scan or click the QR code to access the *Changing iStan's Genitalia* video tutorial on *caehealthcare.com.*

Pharmacology System

iStan supports pharmacological interventions through pre-programmed pharmacokinetic and pharmacodynamic parameters that are established for more than 50 intravenous drugs.

Standard syringes and infusion devices can be utilized to administer medications and fluids through ports on the left and right arms.

Additionally, medications and fluids can be administered through the permanent access catheters located at the right jugular and the left femoral veins.

Permanent IV Access Ports

Permanent IV access ports are located at the left and right antecubital, the right jugular and the left femoral veins. The IV system must be primed before the IV ports can be used.

To prime the IV access ports:

1. Verify caps are present on the Drain port and the Jugular IV, Femoral IV, Left and Right Antecubital, IV Prime, Sternum IO Prime and Left and Right Tibial IO Prime ports

   As you prime the system, you will need to temporarily remove the caps from the Drain port and IV ports, one at a time, to drain and prime the lines. Be sure to replace the cap on the port used after each step below. All caps must be connected for air and fluid to move through the system properly.
2. In preparation, drain the fluid reservoir by connecting a 60 mL syringe to the Drain port on the right side of the simulator
3. Withdraw air and excess moisture from the reservoir until a vacuum is formed (the plunger is difficult to pull)
4. Connect a 60 mL syringe filled with distilled water to the Jugular IV port and prime the line with approximately 10 mL.
5. Move the 60 mL syringe to the Left Femoral IV port and prime the line with approximately 10 mL.
6. Move the 60 mL syringe to the Left Antecubital IV port and prime the line with approximately 10 mL.
7. Move the 60 mL syringe to the Right Antecubital IV port and prime the line with approximately 10 mL.
8. Using an empty 60 mL syringe connected to the IV Prime port located in the mid-clavicular region, withdraw trapped air from the system until the plunger is difficult to move
9. Connect a 60 mL syringe filled with distilled water to the IV Prime port and firmly inject all 60 mL. This charges the system for Flash and fills a small bladder to support drawing blood samples.

Note: For added realism, if desired, use distilled water tinted with red food coloring.

Intravenous fluids and medications can be administered by attaching the tubing from a standard IV solution set to the desired port. If administering more than 100 mL, connect an external IV bag to the Drain port in iStan's right hip to prevent overfilling the simulator.

Intraosseous Infusion

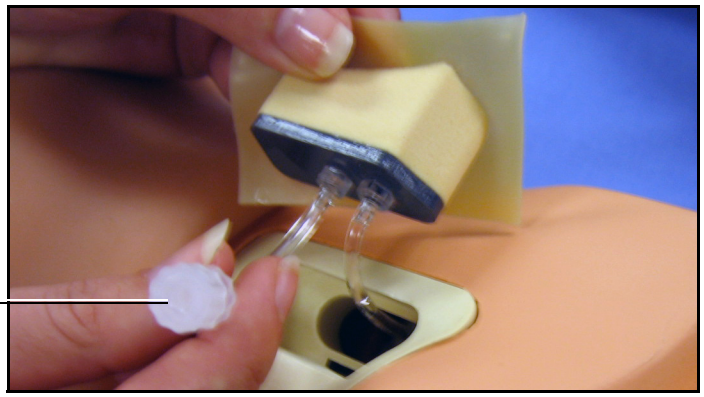
iStan has three intraosseous (IO) sites, one at the sternum and one on each tibia, where the patient can be infused. The IO system must be primed before the IO sites can be used. Only the sites to be used need to be primed.

To prime the IO sites:

1. Using the 60 mL syringe, inject 30 mL of distilled water into the Jugular IV port. For added realism, if desired, use distilled water tinted with red food coloring.
2. Locate the IO ports to be used:

   To expose a Tibial IO insert, carefully roll up the ankle skin on the desired side. Pull the Tibial IO insert from the IO port until the priming tube can be accessed.

   To expose the Sternum IO insert, carefully pull back the chest skin.



The IO Insert

3. Insert a 60 mL syringe into the priming tube of each IO port to be used
4. Pull the plunger until fluid begins to flow into the syringe
5. Replace the insert and return the skin to its normal position

Fluids can now be aspirated from a correctly applied intraosseous infusion.

Scan or click the QR code to access the *Priming iStan's Intraosseous Infusion Sites* video tutorial on *caehealthcare.com*.

Sounds

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

Speech

Using speech in simulations can be achieved using the Vocal Sounds and Speech Sounds features on the software or by using an external microphone.

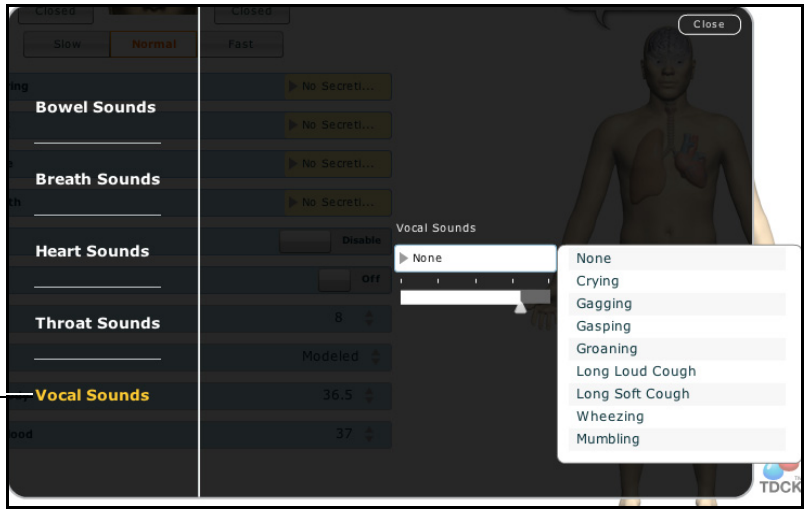
Vocal Sounds

A variety of programmable vocal sounds are available. Vocal sounds are male or female based on the gender of the active patient.

Vocal Sounds
None
Audible Wheezing
Crying
Gagging
Gasping
Groaning
Long loud cough
Long soft cough
Mumbling

To select a sound from the Vocal Sounds drop-down menu, click the **Sound** icon on the Run screen. The Sounds panel appears. Click Vocal Sounds and select the type of sound desired from the Vocal Sounds drop-down menu.

Click **Vocal Sounds** to access the Vocal Sounds menu



Vocal Sounds Menu

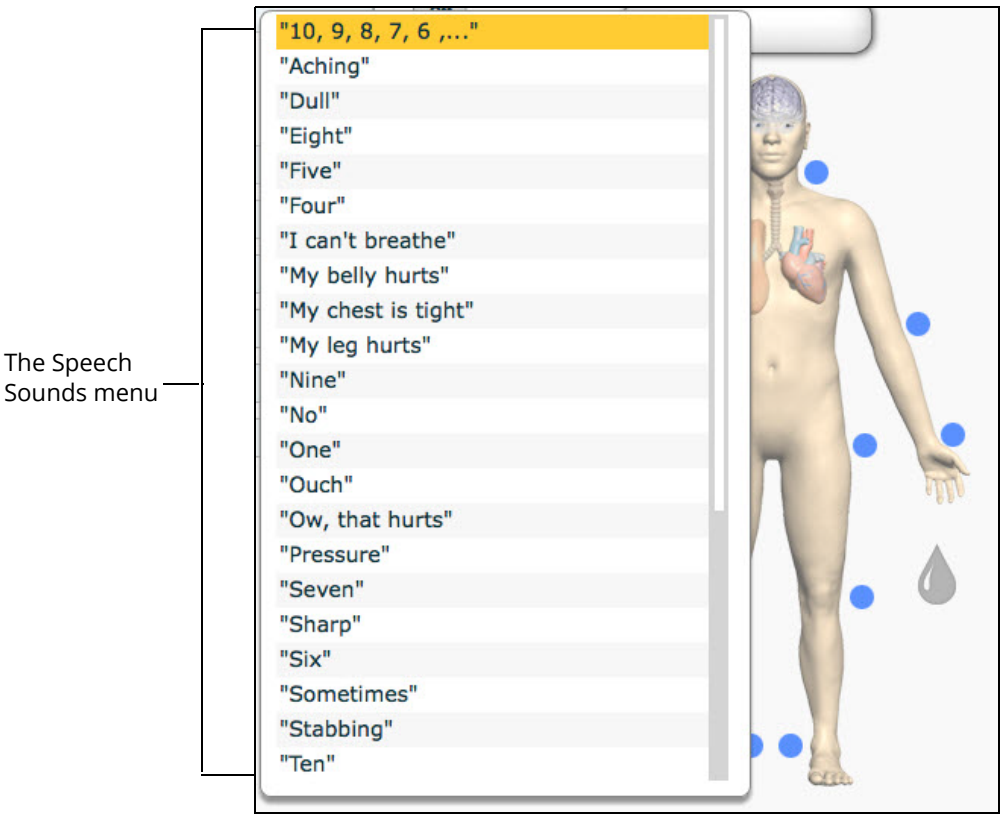
Vocal Sounds play continuously when selected and are emitted immediately when selected from the Vocal Sounds drop-down menu. To stop playing one of the vocal sounds, select **None** from the list.

Speech Sounds

Speech Sounds include a male or female voice that can utter pain rating indicators from 0 to 10, various phrases and a series of other utterances. Unlike Vocal Sounds, Speech Sounds only play once.

Speech Sounds
Loud Cough
Soft Cough
Short Loud Cough
Short Soft Cough
Scream
Grunt
“Yes”
“No”
“Sometimes”
“Ouch”
“My leg hurts”
“My belly hurts”
“My chest is tight”
“I can’t breathe”
“Ow, that hurts”
“0” through “10” - Pain Ratings
“Sharp”
“Pressure”
“Aching”
“Dull”
“Stabbing”

To play a Speech Sound, click the Speech balloon. A list of Speech Sounds appears.



The Speech Sounds Menu

Select the desired sound. The sound plays, and the list disappears.

To replay the last sound, click the **Play** button in the Speech balloon.

Wireless Voice Capability

In addition to the pre-programmed speech, any response can be transmitted through the speakers using the wireless microphone.

Wireless Microphone

The microphone volume can be adjusted on the microphone itself using the volume control. The microphone volume is also controlled via the Vocal Sounds menu.

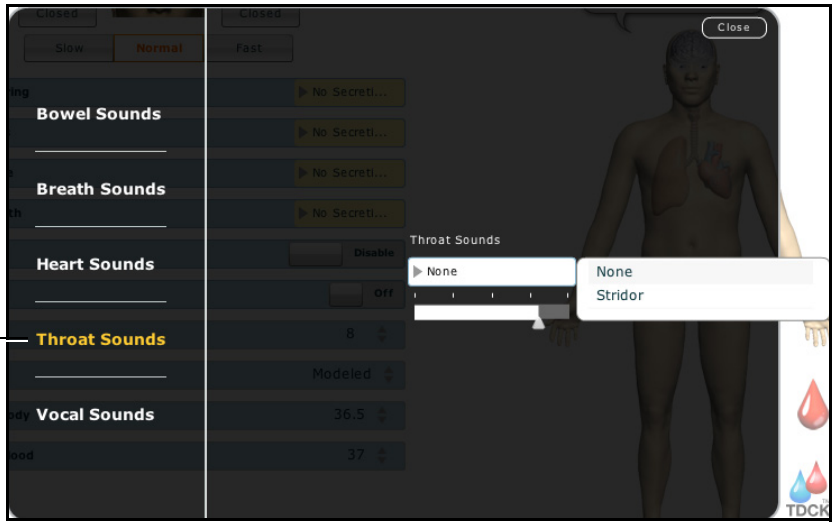
Wireless Voice Link

If a wireless voice link package was included with the iStan simulator, see *Wireless Voice Link* section for additional instructions.

Throat Sounds

Stridor throat sounds can be enabled using the software. Throat sounds can be adjusted by clicking the **Sound** icon on the Run screen. When the Sounds panel appears, select Throat Sounds.

Click **Throat Sounds** to access the Throat Sounds menu



The Throat Sounds Menu

Click the Throat Sounds drop-down menu to change the type of sound. Click and drag the slider to adjust the volume.

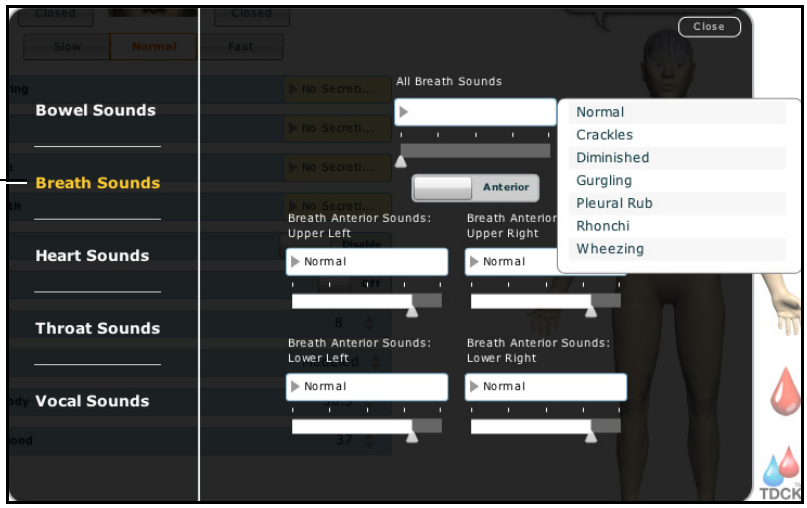
Breath Sounds

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. Each of the four quadrants of the torso can be set independently to produce a particular breath sound

Breath Sounds
Normal
Crackles
Diminished
Gurgling
Pleura Rub
Rhonchi
Wheezing

Breath sounds can be adjusted by clicking the **Sound** icon on the Run screen. When the Sounds panel appears, select Breath Sounds.

Click **Breath Sounds** to access the Breath Sounds menu



The Breath Sounds Menu

Click any one of the Breath Sounds drop-down menus that control one of four quadrants to change the type of sound. Click and drag the slider for each location to adjust the volume.

By default, Normal breath sounds are heard.

Heart Sounds

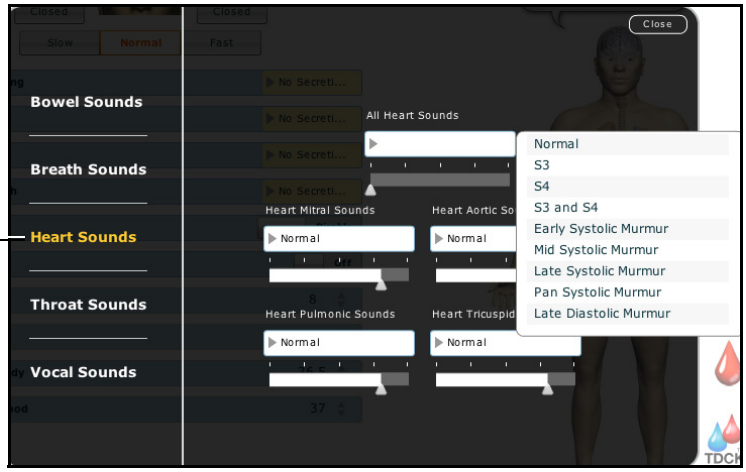
Heart sounds emanate from four speakers and are synchronized with the cardiac cycle. Heart sounds can be auscultated over the left and right sternal border, right lower sternal boarder and apex.

By default, heart sounds are set to the Normal sound. The following sounds are available:

Heart Sounds
Normal S1-S2
S3
S4
S3 and S4
Early Systolic Murmur
Mid Systolic Murmur
Late Systolic Murmur
Pan Systolic Murmur
Late Diastolic Murmur

Heart sounds can be adjusted by clicking the **Sound** icon on the Run screen. When the Sounds panel appears, select Heart Sounds.

Click **Heart Sounds** to access the Heart Sounds menu



The Heart Sounds Menu

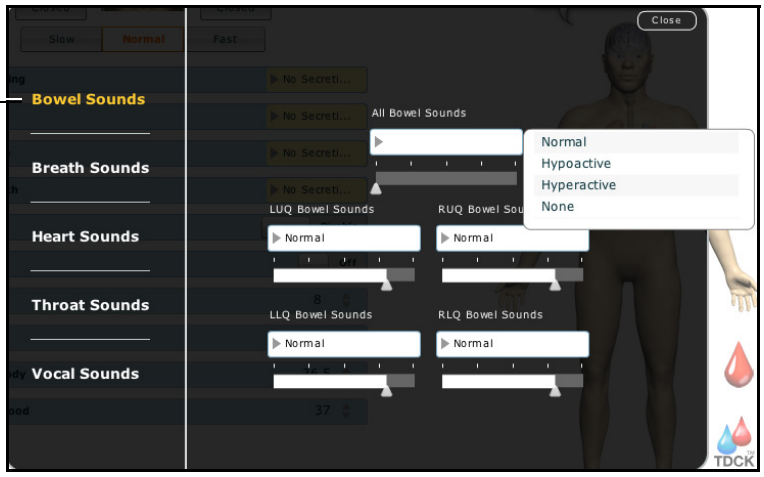
Click the Heart Sounds drop-down menu to change the type of sound. Click and drag the slider to adjust the volume.

Bowel Sounds

Learners can auscultate bowel sounds over each of four intestinal quadrants: the Upper Right, Upper Left, Lower Right and Lower Left. The sounds can be independently set in each anatomical region to Normal, Hypoactive, Hyperactive or None (bowel sounds are absent).

Bowel sounds can be adjusted by clicking the **Sound** icon on the Run screen. When the Sounds panel appears, select Bowel Sounds.

Click **Bowel Sounds** to access the Bowel Sounds menu



The Bowel Sounds Menu

Click any one of the Bowel Sounds drop-down menus that each control one of four quadrants to change the type of sound.

Click and drag the slider for each location to adjust the volume.

Normal bowel sounds are present by default.

iStan Care and Maintenance

Maintaining iStan requires careful treatment of the electronic and mechanical components. Each time iStan is assembled or disassembled, make sure all components are properly handled and either removed from or placed into storage correctly.

iStan Warranty Programs

General Information

CAE patient simulator products come with a one-year Manufacturer's Warranty (excluding batteries and consumables). All warranties begin at date of shipment or CAE installation. You may upgrade your first year Warranty to an Enhanced Warranty and receive remedial and planned maintenance. To prevent equipment downtime and delays after your warranty expires, we encourage you to contract for extended maintenance services for all subsequent years.

Units Out of Agreement

For units no longer under warranty requiring repairs, the Time and Materials service plan will apply

To place an out-of-warranty unit under a warranty contract, 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 warranty contract.

The repairs required, as the result of the examination, will be quoted on a time and material basis.

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.

Contract Period

Warranty contracts are not ordinarily offered for periods of less than one year. However, multiple-year warranty contracts may be arranged for up to an additional three years. Discounts are available for purchase of multiple year contracts.

Limitations of Agreement

Your exclusive remedy for any defective patient simulator 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 defective material. CAE's replacement material will be manufactured from new and/or serviceable parts. CAE's agreement applies to repaired or replaced materials for the balance of the applicable period of the original warranty 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 warranty, whichever is greater.

CAE shall not be liable under this warranty 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 warranty does not cover normal wear and 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.

CAE's warranty does 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. This warranty 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, you will be given an RMA number and instructions for product return. An unauthorized return, e.g., one for which an RMA number has not been issued, will be returned at your expense. Authorized shipments are to be shipped prepaid to the address on the RMA. Your original box and packaging materials should be kept for storing or shipping your product. To request an RMA, please contact Customer Service.

System Software Upgrade Support

Customers with current warranty contracts are entitled to receive upgrades to applications software previously purchased. Installation of the system software is the user’s responsibility.

The System Software Upgrades Support includes software upgrades for base software and purchased optional software modules.

This does not apply for major upgrades or technological enhancements.

Pricing Structure

Time and Materials

For those systems not under agreement, service will be provided as required on a Time and Material basis:

Description	In-House	On-Site
Technical Support	As quoted at time of repair	CAE's prevailing labor rate with a minimum of four hours labor
Material	As quoted at time of repair	As quoted at time of repair
Travel	N/A	Priced at CAE's fully burdened cost plus fee

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 the principle period is billed at the premium rate (hourly rate x 1.5)

Note: A minimum of 48 hours notice is required for scheduling an on-site support call. Urgent on-site support with less that 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.

Breakdown

After each use, iStan should be properly disassembled and stored in a secure place. To ensure that iStan remains in good working condition, follow the prescribed CAE breakdown procedures below. These procedures are estimated to take less than 30 minutes.

Breakdown Steps
Clean the Simulator and the Fluid System
Shut Down the Software
Power Off the Simulator

Step 1: Clean the Simulator and the Fluid System

If you used fluids, to remove them, the Müse software must be launched.

Step 2: Shut Down the Software

Shut down the Müse software and any optional TouchPro computers.

To shut down the Müse software on the Instructor Workstation:

a. In the Müse software, click the **Disconnect** icon on the Run screen
b. Stop any running SCEs. The Stop Simulation dialog box appears
c. Click the **Stop Simulation** button. The Simulation stops and returns to the Home page.
d. Click the Account Name in the lower, right-hand corner of the screen. The Logout dialog box appears.
e. Click **Logout** to exit the software

To shut down the TouchPro software (optional):

a. Click the **Settings** button in the bottom, right-hand corner of the TouchPro screen
b. From the Settings menu, click **Shutdown**
c. Click **Shutdown**

Step 3: Power Off the Simulator

1. Carefully pull pack the skin on iStan's left hip and flip the power switch to the OFF position
2. Carefully pull the skin back into place for storage

Scan or click the QR code to access the *Shutting Down the iStan Simulator* video tutorial on *caehealthcare.com.*

Maintenance Advice

Simple care and maintenance helps to ensure that iStan 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

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, urinary catheters and chest tubes with silicone 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 trauma, genitourinary or IV features of the iStan system have been used, flush out the simulator as described in the following pages. Failure to flush the systems may cause problems for the system during attempts at future use.

Storage

When in regular use, iStan's breakdown procedure and general cleanup should be 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 41 F (5 C)
- If a soft-sided simulator case is being used, the simulator should lay flat
- The simulator should NEVER be stored or shipped with fluids in the system

CAE also recommends storing the simulator with a cervical collar in place to protect the neck.

Care of 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

Airway Inspection

iStan is equipped with an anatomically accurate airway that supports the practice of difficult 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) during connection to a ventilator, it may not be obvious during spontaneous or bag and mask ventilation.

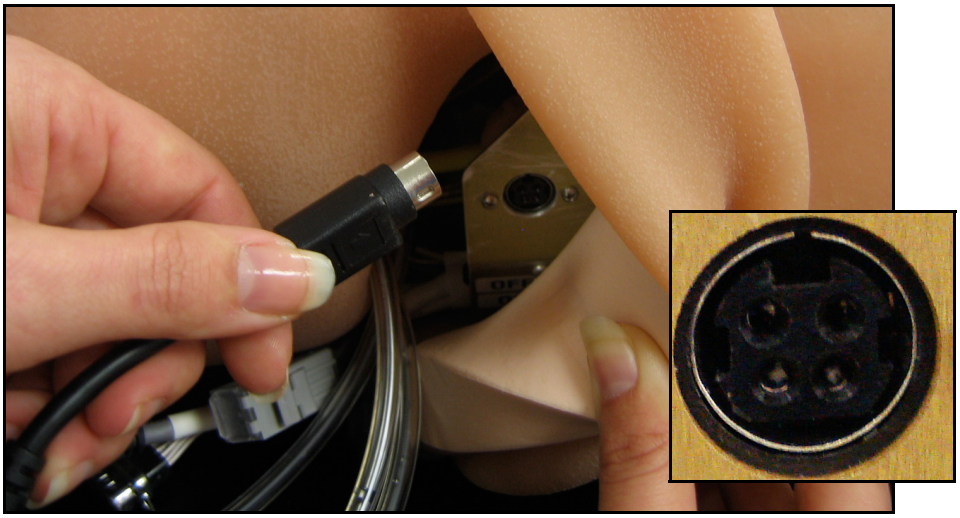
Because damage can occur, occasional visual inspection of the airway is recommended. Using the light of a laryngoscope blade or a flashlight, visually examine both the upper and lower airway. While tears in the upper airway resulting from intubation may be obvious, needle holes in the lower bronchus resulting from techniques such as transtracheal jet ventilation 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.

Recharging the Battery

The battery should be recharged after approximately seven to eight hours. The iStan battery will NOT charge while the unit is in operation.

To recharge the battery, connect the power adapter to the receptacle inside the skin on iStan's left hip. Note that the power adapter connection is keyed. Care must be taken so that the adapter is properly oriented (the flat side of the connector is on top) when the connection is made.



Power Adapter and Receptacle

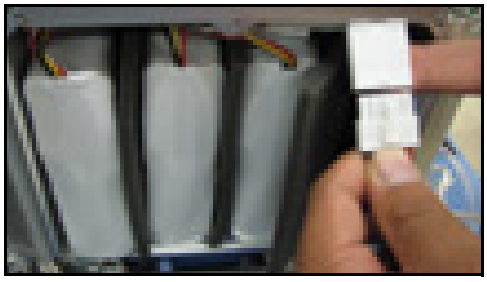
Recharging should take approximately five hours.

Replacing the Battery

1. BE CERTAIN iStan's power ON/OFF switch located in iStan's left hip is in the OFF position
2. Position iStan so that the battery compartment located in iStan's lower lumbar region is accessible
3. Lift the top layer of skin from the waist up to mid-torso and remove the lower lumbar foam piece covering the compartment panel
4. Remove the panel to the battery compartment by loosening the thumbscrew hardware by hand

The Battery Compartment

5. One by one, carefully lay in each battery pack, connecting each one to the nearest battery pack input cable. The color of the battery pack cable wires should match those of the input connector.



Inside the Battery Compartment

6. Refasten the battery compartment cover, tightening the thumbscrews
7. Return the lumbar foam piece to its original location
8. Carefully pull the top skin layer back into place
9. Plug in the external 20VDC, 150W AC/DC power supply into the nearest AC outlet. The fast-charge process lasts four to six hours and can only be done while iStan is powered down and the external power supply is plugged in.

Reducing Cervical Motion

To reduce cervical motion:

1. Remove the neck skin and pull the skin at the back of the head toward the front to expose the neck from the rear
2. Locate the neck joint at the base of the skull

The Base of the Skull

3. Locate the steel cable attached to the back of the skull
4. Locate the U-shaped plate at the end of the cable
5. Slide the U-shaped plate onto the neck joint

The Neck Joint

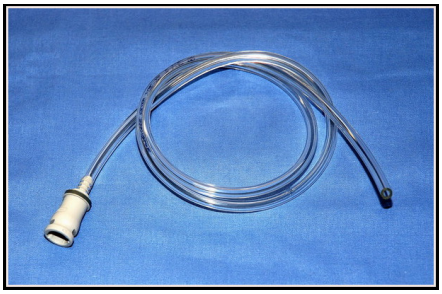
Draining Condensation from the Simulator

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 the inventory kit



The Condensation Drain Hose

2. Bring the hose and a small bucket to the simulator location
3. Separate the skin on the left side of the simulator at the hip to reveal a hose with the appropriate gray connector mate. Bring to the outside for use in later steps.
4. With help from assistants, place iStan into a sitting position. (A 45-degree angle is fine.)
5. Turn iStan on, but do not start the application. Give enough time for the internal compressor to pressurize the system. (The pump will turn off automatically.)
6. Turn iStan off
7. Place the tubing end of the Condensation Drain Hose into the small bucket and then connect the gray fitting onto the simulators drain connector 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.
8. Disconnect the Condensation Drain Hose from the simulator

Cleaning the Simulator and the Fluid System

Note: A small bucket is recommended to collect wastewater during cleaning and flushing operations.

Cleaning and Flushing After Use of Hemorrhage

To clean simulated blood from the simulator and fluid system:

1. Remove any wound haptic(s) from the wound umbilical(s) and rinse with distilled water
2. Wipe the simulator off immediately to remove red fluid. The food color will stain more readily if left on for an extended period.
3. Connect the blue and yellow connectors of an empty Trauma Fill Tank to the blue “fill” and yellow “vent” connectors on the right side of the simulator
4. Disconnect the Overfill Bottle from the Trauma Fill Tank
5. Using a haptic tube from the Inventory Kit, connect the haptic tube to the Overfill Bottle port on the Trauma Fill Tank
6. Place the other end of the haptic tube into an empty bucket to collect the wastewater
7. On the Fluids view of a preconfigured SCE, turn both bleeding channels to **ON**. This setting turns on all valves to maximize the flow of the remaining blood mixture into the Trauma Fill Tank.
8. Pressurize the Trauma Fill Tank by pumping no more than 20 times
9. Connect the wound umbilical(s) to the bleeding site(s) that were used, keeping the ends in the wastewater bucket
10. When fluid stops flowing, turn both of the bleeding channels to **OFF**
11. Disconnect the blue and yellow lines of the Trauma Fill Tank from the simulator
12. Rinse the Trauma Fill Tank thoroughly with distilled water
13. Using a Trauma Fill Tank with clear, distilled water, pump the distilled water into the simulator
14. Repeat steps 1-13 until waters flows clear
15. **Optional**: To flush the chest tube lines, with a chest or priming tube in place and an empty bucket to catch fluid, from the **Respiratory** view of an SCE, select **Chest Tube Enable: Left** and **Chest Tube Enable: Right** to **Prime**. When fluid stops flowing, stop the SCE.

Cleaning and Flushing After Blood Secretions

To clean simulated blood from the simulator and fluid system:

1. Wipe the simulator off immediately to remove red fluid. The food color will stain more readily if left on for an extended period.
2. Connect the Trauma Fill Tank containing the red fluid to the blue “fill” connector on the right side, but do not connect the yellow “vent” connection
3. Turn the yellow pressure relief knob clockwise (open) on the Trauma Fill Tank. Alternatively, loosen the Trauma Fill Tank lid so that the tank is able to vent during the subsequent process.
4. From the Fluids view of a preconfigured SCE, turn both bleeding channels to **ON**. This setting turns on all valves to maximize the flow of the remaining blood mixture into the Trauma Fill Tank.
5. When fluid stops flowing, turn both of the bleeding channels **OFF**
6. Disconnect the Trauma Fill Tank from the simulator
7. Rinse the Trauma Fill Tank thoroughly
8. Pour approximately 16 ounces (the size of the Overfill Bottle) of clean distilled water into the tank
9. Pump the distilled water into the simulator
10. If a chest tube was used, flush that system by clicking **Chest Tube Enable** (right or left) from the **Respiratory** view of a preconfigured SCE and select **Prime**
11. Place a chest catheter in each side until the distilled water runs clear
12. Run until the distilled water runs clear
13. If fluid remains in the system, reconnect the Trauma Fill Tank containing the red fluid to the blue “fill” connector on the right side, being sure not to connect the yellow “vent” connection.
14. Turn the yellow pressure relief knob clockwise (open) on the Trauma Fill Tank
15. From the Fluids view of a preconfigured SCE, turn both of the bleeding channels to **ON**. When fluid stops flowing into the Trauma Fill Tank, stop the SCE.

Draining the On-Board Clear Fluid System

To remove fluid from the on-board clear fluid system:

1. Connect the blue connector of an empty Trauma Fill Tank to the blue “fill” connector on the left side of the simulator. Do NOT connect the yellow connector of the Trauma Fill Tank to the simulator.
2. Ensure the yellow pressure relief knob on the Trauma Fill Tank is open so that the tank is able to vent during the subsequent process
3. From the Fluids view of a preconfigured SCE, turn both bleeding channels to ON. This maximizes the flow of the remaining clear fluid into the Trauma Fill Tank.
4. When fluid stops flowing, turn both of the bleeding channels OFF
5. Disconnect the Trauma Fill Tank from the simulator
6. Empty the Trauma Fill Tank, rinse thoroughly and allow the tank to dry

Note: Once a month, it is advised to flush the system with a 50/50 mix of distilled water and white vinegar to keep mineral and algae build up to a minimum. Always flush with distilled water to remove any trace amounts of vinegar.

Scan or click the QR code to access the *Draining iStan’s On-Board Clear Fluid System* video tutorial on *caehealthcare.com.*

Flushing the Fluid System for Storage

When storing iStan for substantial periods of time, make certain that all moisture has been removed from the system.

After draining the reservoirs, flush the system with air using the following steps:

1. Connect a clean and dry Trauma Fill Tank to both the yellow and blue connectors on the right side
2. Unlock the Trauma Fill Tank's handle and stroke up and down 25 to 35 times to pressurize the tank. This pressure air is transported to the on-board reservoir.
3. Lock the pump handle back into the pump assembly by turning clockwise
4. After approximately one minute, disconnect the Trauma Fill Tank
5. Connect a clean and dry Trauma Fill Tank to both the yellow and blue connectors on the left side
6. Unlock the Trauma Fill Tank's handle and stroke up and down 25 to 35 times to pressurize the tank. This pressure air is transported to the on-board reservoir.
7. Lock the pump handle back into the pump assembly by turning clockwise
8. After approximately one minute, disconnect the Trauma Fill Tank
9. If a chest tube was used, flush that system by clicking **Chest Tube Enable** (right or left) from the Respiratory view of a preconfigured SCE and select **Prime**
10. Place a chest catheter in each side until no distilled water runs out
11. If fluids were used for head secretions, on the Neurological view of a preconfigured SCE, click the **Secretion: Ears** (**Mouth** and **Nose**) parameter and select **Prime**
12. Continue until no distilled water runs out
13. If Hemorrhage bleeding was used, from the Fluids view of a preconfigured SCE, turn both bleeding channels **ON**, then connect the wound umbilical to each location until no distilled water runs out. When all the water has emptied, stop the SCE.

Note: Once a month, it is advised to flush the system with a 50/50 mix of distilled water and white vinegar to keep mineral and algae build up to a minimum. Always flush with distilled water to remove any trace amounts of vinegar.

Flushing the IV System

To purge fluid from the IV system:

1. Connect an external empty 1.0 L IV bag to the Drain port on the simulator's right hip
2. Connect a 60 mL syringe to IV Prime port and withdraw all fluid
3. Slowly push 30mL of air into the Left Antecubital port. Replace the cap
4. Slowly push 30 mL of air into the Right Antecubital port. Replace the cap
5. Slowly push 60 mL of air into the IV Prime port and repeat (120 mL total)
6. Replace the cap
7. Slowly push 30 mL of air into Jugular IV port
8. Replace the cap
9. Slowly push 30 mL of air into Femoral IV port
10. Replace the cap
11. Using a 60 mL syringe, withdraw all remaining air from the IV Prime port
12. Replace the cap
13. Disconnect the external IV bag and evacuate all remaining air or fluids from the IV Drain port using a 60 mL syringe
14. Replace the cap
15. If red fluid was used in the IV system, proceed to steps 16 and 17

    Note: If red fluid was not used, you do not need to proceed any further.
16. Repeat the entire priming process using clear, distilled water
17. Repeat steps 1 through 14

Scan or click the QR code to access the *Flushing iStan's IV System* video tutorial on *caehealthcare.com.*

Flushing the IO System

After each use, the IO systems should be flushed. Only the sites that were used need to be flushed.

To purge fluid from the IO system:

1. Connect an external empty 1.0 L IV bag to the Drain port on the simulator's right hip
2. If red fluid was used to prime the IO system, slowly push 60 mL of clear, distilled water into the Jugular IV port
3. lowly push 60 mL of air into the Jugular IV port and replace the cap
4. Locate the IO ports that were used
5. To expose a Tibial IO insert, carefully roll up the ankle skin on the desired side
6. To expose the Sternum IO insert, carefully pull back the chest skin
7. Ensure the needle that was used for IO infusion is still connected to the IO insert
8. Connect an empty 60 mL syringe to the IO needle
9. If red fluid was used to prime the IO site, inject 30 mL of clear, distilled water into the needle
10. Inject 30 mL of air into the IO needle
11. Disconnect the external IV Bag and evacuate all remaining air or fluids from the IV Drain port using a 60 mL syringe and replace the cap
12. Remove the needle from the IO insert
13. Replace the insert and return the skin to its normal position

Cleaning the Trauma Fill Tank and the Umbilical

To prolong the life of the Trauma Fill Tank assembly and the fluid reservoirs, wash and flush the tank and connections after each use with clean distilled water.

Note: A small bucket is recommended to collect wastewater during cleaning and flushing operations.

Do NOT store liquids in the Trauma Fill Tank. If simulated blood mixtures are stored in the tank, they may clog the system when they dry and possibly damage seals, filter and other components.

1. Remove and rinse the Overflow Bottle
2. Remove and rinse the pump assembly
3. Rinse the tank to remove all traces of the simulated blood
4. Pour 480 mL (16 oz) of distilled water into the tank and reinstall the pump assembly

   Note: The Overflow Bottle holds 16 ounces.
5. Place the Overflow Bottle lid with umbilical attached into the wastewater bucket
6. Attach the fill (blue-labeled) and vent (yellow-labeled) fittings together at the other end of the umbilical
7. Pump the tank 25 times while making sure the wastewater is going into the bucket
8. Allow the tank to empty completely (the remaining air pressure will purge the fluid from the lines
9. Reinstall the lid onto the Overflow Bottle and place the bottle back onto the tank assembly
10. Remove the pump assembly and pour any remaining fluid out of the tank
11. Reinstall the pump
12. Disconnect the fill and vent fittings from each other and wrap the Trauma Tank Umbilical around the neck of the tank

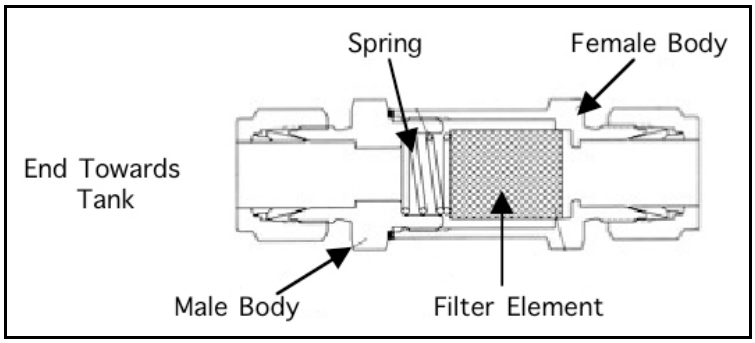
Always depressurize the tank, remove trauma fluid and clean the tank before performing maintenance. The pump assembly may need periodic lubrication. Call CAE Customer Service for details if the pump loses the ability to create pressure, squeaks loudly or is difficult to move.

Scan or click the QR code to access the *Cleaning the Trauma Fill Tank* video tutorial on *caehealthcare.com.*

Cleaning the In-Line Filter

To clean the In-line filter:

1. Disconnect the umbilical from the Overflow Bottle lid
2. Using two 3/4" (or adjustable) wrenches, separate the halves of the filter by holding the top nut (end towards tank) stable and turning the bottom. Be sure to capture the spring as the halves are separated.



In-Line Filter Diagram

3. Remove the filter element from the female half by placing a screwdriver between the top edge of the filter element and the female housing and gently prying the filter. Once the filter breaks loose, do the same on the opposite side. This should allow you to turn the housing over and have the filter element fall out.
4. Once the filter element is out, rinse the outside of the element, and then the inside. Then, take a 60 mL syringe filled with distilled water and shoot the water through the open end of the element, repeating this process five to six times. This will back-flush the filter element and dislodge any trapped particles.
5. Wipe down the filter spring with a soft, lint-free cloth
6. Place a paper towel or soft cloth on a hard surface. Tap the open end of the long female filter housing on the hard surface to knock out any large debris.
7. While holding the female housing with the open end pointed downward, use the syringe to shoot distilled water in the housing and rinse any remaining debris out, then wipe down the inside of housing with a soft, lint free cloth
8. Pour approximately 16 ounces of clean distilled water into the Trauma Fill Tank
9. Aim the short hose with the male fitting toward a wastewater bucket and pump one time. This should flush the hose and the male fitting clear of any remaining debris. Stop the flow by turning the pressure relief valve.
10. Wipe down the inside of the male filter housing
11. While holding the female housing with the open end up, place the filter element with the open end down into the housing, Using the tip of your finger, or a small, soft instrument (e.g. the eraser end of a pencil), to gently apply pressure to the filter element and push into place.
12. Place spring into housing
13. Screw the two halves together hand tight, and then use the two wrenches to tighten the connection
14. Pump ten times to verify that the filter assembly has no leaks

15. Place the Overflow Bottle lid with umbilical attached into the wastewater bucket
16. Attach the blue and yellow connectors together at the other end of the umbilical. This will flush the umbilical and wash any debris out.

Troubleshooting the Trauma Fill Tank

Before making any repairs, ALWAYS depressurize the tank, remove all trauma solution and clean the tank.

Problem	Cause	Solution
Tank can be pressurized, but only air comes out.	**Siphon tube has detached from insert.**	**Remove hose from tank and reinsert siphon tube.**
Pressure does not buildup. No fluid is transported to simulator.	**(1) Pump assembly not sealed tightly into tank or** **(2) Damaged pump cylinder gasket or o-ring.** **(3) Tank pressure relief valve is set to "open."**	**(1) Thoroughly clean pumpcylinder gasket or o-ring and surrounding area and apply a light coating of silicone to pump gasket or o-ring.** **(2) Contact CAE for service.** **(3) Turn valve until it returns to a "sealed" position.**
Simulator fill time takes too long. (more than 5 minutes)	**(1) Not enough strokes applied to create pressure or** **(2) The In-line Filter is dirty or** **(3) The umbilical is discon-nected at Overflow Bottle or** **(4) Too much fluid in fill tank.**	**(1) Pump 25 to 35 times for best performance.** **(2) Clean filter.** **(3) Reconnect the overflow fitting.** **(4) The Trauma Fill Tank works best with 1 gallon (3.6 liters) of fluid inside. If greater amounts of fluid are used, tank may require additional pumps as fluid is transported to simulator.**

Handling CO_2 Canisters

Careful handling is required in the use of CO_2 canisters. Please read and follow all appropriate cautions and warnings.

Removing CO_2 Canisters from the Regulator

The following instructions will show you how to safely remove the CO_2 canister from the regulator assembly for replacement or shipping.

CAUTION: If unsure that CO2 canister is empty, eye and hand protection must be worn to protect from release of freezing gas or liquid.

1. Remove the CO_2 regulator assembly from the simulator
2. While holding the regulator assembly firmly, slowly unscrew the CO_2 canister from the regulator. There is a small relief hole in the side of the regulator from which any remaining CO_2 will bleed. If this should happen, no harm will be done to system, but it is rather noisy and the rapid release of CO_2 gas can freeze the canister's surface and frostbite unprotected skin.
3. Continue unscrewing the canister until it is free from the assembly

Scan or click the QR code to access the *Using a CO_2 Canister with iStan* video tutorial on *caehealthcare.com.*

Important Canister Information

The 16 Gram CO_2 Canister with threaded neck is available at most Sports Equipment Retailers - most often used for bicycle tire inflators. We recommend purchasing Leland brand canisters (P/N 82122Z), which are also available from CAE.

Punctured canisters are considered to be empty. No residue remains in the canister after use. The steel used is a low carbon type, which will turn to rust quickly if disposed in a landfill. If your community requires recycling, then place with normal household recycling.

CO_2 Canisters are considered by the U.S. Department of Transportation to be "Other Regulated Materials - Domestic" (ORM-D). Ground shipping containers must be clearly marked with this label. CO_2 Canisters are considered hazardous material when offered for air transportation so different rules apply. Contact carrier for details and instructions.

Related CAUTIONS/WARNINGS

CO_2 Canister

- Store the CO_2 canisters in a dry location between 32° and 104° F (0 to 40°C)
- Do not expose the CO_2 canister to heat above 140° F as rupture may occur
- Never point the CO_2 canister towards your face or someone nearby
- Use only CAE specified CO_2 canisters

CO_2 Regulator Assembly

- Care must always be taken when using high-pressure equipment
- Do not disassemble or alter regulator
- Dry completely if the regulator becomes wet
- Discontinue use of this equipment if leakage or visible damage is evident

Use of Equipment

- Canister end becomes punctured when screwed into regulator base and therefore should not be removed until empty
- Unscrewing canister before it is empty will result in sudden release of all high-pressure gas with a possibility of liquid CO_2 spray. Unprotected skin could receive freezing burns.
- Wear protective gloves and eye protection when removing canister from regulator assembly
- Remove CO_2 canister from regulator assembly when shipping simulator

Recommended Clinical Supply Sizes

The following clinical supply sizes are recommended for use with iStan. Other sizes may cause damage to iStan and should not be used.

Recommended Tube, Needle and Airway Sizes	
Urinary Catheter	16 Fr
Nasogastric Tube (NGT)	14 Fr
Endotracheal (ETT)	7.5 - 8.0 mm
Laryngeal Mask Airway (LMA)	3
Oropharyngeal Airway	90 mm
Nasopharyngeal Airway	30 mm
Chest Tube	28 Fr
Needle Decompression	14 gauge, 3 - 6 cm length
Combitube	37 Fr

Condition Guidelines for Programming iStan with Müse

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

The Müse software has a number of parameters that control the physiological features of the simulator. The parameters are grouped by category: Neurological, Respiratory, Cardiovascular, Fluids and Sounds.

Each physiological view lists the Basic parameters by default. However, when the **Basic/Additional** switch is activated, additional parameters become available.

The Basic/Additional Switch

The following is a brief description of each parameter. Each parameter description lists the default settings for the Stan D. Ardman and Norma L. Female patients as well as the ranges, if available, for all patients.

Neurological - Parameters

The iStan 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
Secretions: Tearing
Secretions: Ears
Secretions: Nose
Secretions: Mouth
Diaphoresis
Convulsions
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.

Other settings allow the user to fix one or both pupils to a specific size.

Default: Modeled

Eyes: Blinking

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

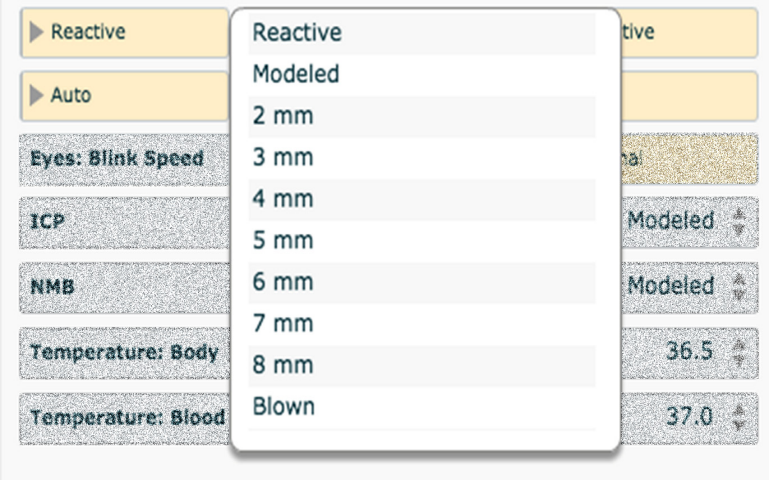
Reactive Pupils

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

Secretions: Tearing

When activated, the **Secretions: Tearing** parameter is capable of producing tearing at the eyes.

Default: No Secretions

Secretions: Ears

When activated, the **Secretions: Ears** parameter is capable of producing clear secretions at the ears.

Default: No Secretions

Secretions: Nose

When activated, the **Secretions: Nose** parameter is capable of producing clear secretions at the nose.

Default: No Secretions

Secretions: Mouth

When activated, the **Secretions: Mouth** parameter is capable of producing clear secretions at the mouth.

Default: No Secretions

Diaphoresis

When enabled, the **Diaphoresis** parameter is used to simulate the presence of diaphoresis on the forehead of the simulator. At this time, diaphoresis is not linked with the physiological models.

Default: Disable

Seizures

The **Seizures** parameter is used to simulate the presence of seizures. They are either **On** or **Off**.

Default: Off

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: 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

Respiratory – Basic Parameters

Respiratory Parameters – Basic
Swollen Tongue
Airway Occluder
Laryngospasm
Needle Decompression
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

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

Swollen Tongue

This parameter is used to create two degrees of tongue swelling: **Semi-Swollen** and **Swollen**. The **Not Swollen** setting returns the tongue to its normal anatomic state.

Default: Not Swollen

Range: Not Swollen, Semi-Swollen and Swollen

Airway Occluder

Using the **Airway Occluder** parameter, swelling of the posterior oropharynx can be activated to obstruct the view of the larynx and prevent intubation but allow mask ventilation of the patient's lungs, thereby creating a "cannot intubate, can ventilate" scenario.

Default: Off

Laryngospasm

Use the **Laryngospasm** parameter to simulate a laryngospasm. A laryngospasm actuator closes the patient's vocal cords and prevents both ventilation and intubation. When activated with the **Airway Occluder** parameter, a "cannot intubate, cannot ventilate" crisis scenario is achieved.

Default: Off

Needle Decompression

The **Needle Decompression** parameter is used to activate the **Needle Decompression** hardware in the simulator to relieve a pneumothorax in the simulator. This causes a rush of air to be heard on successful decompression. The amount of decompression is automatically subtracted from the **Intrapleural Volume** set.

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.

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 O2.

$EtCO_2$

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

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

Flail Chest

When enabled, **Flail Chest** is used to simulate the characteristic appearance of the abnormal mobility and loss of normal chest wall movement due to trauma. This feature is only present on the lower right side of the thoracic wall.

Default: Disable

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

Trismus

The **Trismus** feature is used to simulate the presence of masticatory muscle spasm leading to difficulty opening the mouth.

Default: Disable

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
Chest Tube
Chest Tube Flow
Chest Tube Air Leak
Chest Tube Air Leak Flow
O2 Consumption
CO2 Production Factor
PaCO2 Set-point
PaO2 Set-point
I to E Ratio (1:X)
PetCO2-PaCO2 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 CO2 Shift
Bronchial Resistance Factor: Left Bronchial Resistance Factor: Right
Alveolar Enflurane
Alveolar Halothane
Alveolar Isoflurane

Respiratory Parameters – Additional

Alveolar 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

Chest Tube

The **Chest Tube** parameter is used to activate the chest tube hardware in the simulator. The **Prime** option has no physiologic impact. Instead, it is used to prepare the feature by allowing fluid to flow through the apparatus, thereby removing air from the line.

When a chest tube is placed into the simulator, this is sensed and recorded in the Event Log. It is also possible to have a scenario transition on chest tube placement, which can be scripted using the Scenario Designer.

Default: Disable

Note: The **Chest Tube** and **Needle Decompression** features cannot be enabled simultaneously.

Chest Tube Flow

The **Chest Tube Flow** parameter is used with the chest tube feature of the simulator. The Chest Tube Flow specifies the rate at which fluid can be removed from the simulated pleural space via a chest tube drainage system. As the chest tube drains, the volume is automatically subtracted from the set amount of Intrapleural Volume.

Default: 50 mL per minute

Range: 0 mL per minute - 50 mL per minute

Chest Tube Air Leak

The **Chest Tube Air Leak Type** parameter is used to set the type of air leak present in the simulated patient. This can be either a pneumothorax or an air leak in the chest tube itself or from the chest wall.

When **Pneumothorax** is selected, the amount of drainage (both air and fluid) removed from the simulator is automatically subtracted from the set amount of intrapleural volume.

When **Chest Tube Air Leak** is selected, the amount of air mixed in the drainage being removed from the simulator will not be automatically subtracted from the set amount of intrapleural volume. Thus, only the fluid being drained from the chest tube affects the intrapleural volume.

This parameter is designed to be used with **Chest Tube Air Leak Flow**.

Default: Pneumothorax

Chest Tube Air Leak Flow

The **Chest Tube Air Leak Flow** parameter is used with the chest tube feature and determines how much air drains with the chest tube output. This parameter should be used in conjunction with **Chest Tube Air Leak Type**.

Default: 0 mL per minute

Range: 0 mL per minute - 50 mL per minute

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%

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%

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%

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%

Cardiovascular – Basic Parameters

Cardiovascular Parameters
Blood Pressure
CVP
PAP
PCWP (Pulmonary Capillary Wedge Pressure)
Heart Rate
Heart Rate Factor
Cardiac Output
Cardiac Rhythm
Pulseless Electrical Activity
Cyanosis: Toes
Cyanosis: Fingers
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.

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 LBBB

- 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%
- Pulseless Electrical Activity

- 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

Cyanosis: Toes

The **Cyanosis: Toes** parameter is used to simulate the presence of cyanosis in the nail beds of the toes. The intensity of the cyanosis may be set with the **Perfusion Intensity** parameter. At this time, cyanosis is not linked with the physiological models.

Default: Off

Note: This parameter may not be used at the same time as the **Capillary Refill** parameters.

Cyanosis: Fingers

The **Cyanosis: Fingers** parameter is used to simulate the presence of cyanosis in the nail beds of the fingers. The intensity of the cyanosis may be set with the **Perfusion Intensity** parameter. At this time cyanosis is not linked with the physiological models.

Default: Off

Note: This parameter may not be used at the same time as the **Capillary Refill** parameters.

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
Perfusion Intensity
Capillary Refill: Big Toe
Capillary Refill: Thumb
Autoinjection
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
Pericardiocentesis
Pulses

Perfusion Intensity

The **Perfusion Intensity** parameter adjusts the brightness of the LEDs used to simulate both cyanosis and capillary refill. The intensity may be adjusted for different ambient light conditions (e.g., from completely dark indoor environments to bright outdoor settings.) As the intensity is adjusted toward 100%, the LEDs become increasingly profound in their intensity.

Default: 45%

Range: 0% - 100%

Capillary Refill: Big Toe

The **Capillary Refill: Big Toe** parameter is used to simulate the capillary nail refill test done by blanching the nail bed. When activated, the nail bed refills based on the selection of less than or greater than three seconds. The intensity of the capillary refill may be set with the **Perfusion Intensity** parameter. At this time, capillary refill is not linked with the physiological models.

Note: This parameter may not be used at the same time as the **Cyanosis** parameters.

Default: Off

Options: Less than 3 seconds

- Greater than 3 seconds
- Off

Capillary Refill: Thumb

The **Capillary Refill: Thumb** parameter is used to simulate the capillary nail refill test done by blanching the nail bed. When activated, the nail bed refills based on the selection of less than or greater than three seconds. The intensity of the capillary refill may be set with the **Perfusion Intensity** parameter. At this time, capillary refill is not linked with the physiological models.

Note: This parameter may not be used at the same time as the **Cyanosis** parameters.

Default: Off

Options: Less than 3 seconds

- Greater than 3 seconds
- Off

Autoinjection

The **Autoinjection** parameter is used to activate the mechanism on the lateral aspect of each thigh for autoinjector use. Once activated, simulating the injection by pressure on the lateral aspect of each thigh causes the immediate administration of atropine 2 mg intramuscularly. An autoinjector mechanism should be used **without** a needle to avoid damaging the simulator.

Default: Disable

Options: Disable

- Enable

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 not 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 not 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

Pulses

The table(s) below shows the defaults and ranges for the pulses and pulse deficits.

Pulse	Default	Range
Left Carotid	On	N/A
Right Carotid	On	N/A
Carotid Deficit	60	0 - 300
Left Brachial	On	N/A
Right Brachial	On	N/A
Brachial Deficit	80	0 - 300
Left Radial	On	N/A
Right Radial	On	N/A
Radial Deficit	90	0 - 300
Left Femoral	On	N/A
Right Femoral	On	N/A
Femoral Deficit	70	0 - 300
Left Popliteal/Pedal	On	N/A
Right Popliteal/Pedal	On	N/A
Popliteal/Pedal Deficit	80	0 - 300
Left Popliteal/Pedal	On	N/A
Right Popliteal/Pedal	On	N/A
Popliteal/Pedal Deficit	80	0 - 300
Left Dorsalis Pedis	On	N/A
Right Dorsalis Pedis	On	N/A
Dorsalis Pedis Deficit	80	0 - 300

All pulses, unless altered by an SCE, are enabled by default. To disable a pulse, click the pulse location on the human form. Then, from the pulse window, click the **Pulse Enable** switch and **Accept** to turn the pulse off. A pulse can be re-enabled with the same steps. Click any pulse location to adjust the pulse deficit.

Fluids

The Fluids icon provides a means of controlling the amount of fluid lost by or infused into the patient. The amount of fluid to be lost or infused and the time frame during which the fluid loss or infusion takes place can be entered.

Fluid Parameters
Fluid Loss Blood
Fluid Loss Plasma
Colloid Infusion
Crystalloid Infusion
PRBC Infusion
Whole Blood Infusion
Bleeding Channel
Urine Output

Fluid Loss Blood

When used, the **Fluid Loss Blood** parameter reflects a decrease in total blood volume. Blood loss proportionally decreases both the red blood cell volume and the plasma volume according to the current hematocrit.

Range: 0 mL - 4000 mL

Fluid Loss Plasma

When used, the **Fluid Loss Plasma** parameter reflects a decrease in plasma volume. Plasma loss decreases the plasma volume without changing the red blood cell volume. It refers collectively and generically to all fluid losses, including evaporative, transcellular, bowel and third space fluid losses.

Range: 0 mL - 4000 mL

Colloid Infusion

When used, the **Colloid Infusion** parameter reflects an addition to the plasma volume without changing the red blood cell volume. Colloids include modified fluid gelatin starch solutions, dextran and human albumin.

Range: 0 mL - 4000 mL

Crystalloid Infusion

When used, the **Crystalloid Infusion** parameter reflects an addition to the plasma volume without changing the red blood cell volume. The term crystalloid is used to describe salt solutions for infusion (e.g., normal saline, dextrose in water, Ringer's Lactate).

Range: 0 mL - 4000 mL

PRBC Infusion

Packed red blood cells are a preparation of 70% red blood cells and 30% liquid plasma, often administered in severe anemia to restore adequate levels of hemoglobin and red cells without overloading the vascular system with excess fluids.

Range: 0 mL - 4000 mL

Whole Blood Infusion

The term whole blood is used to refer to blood that has not been separated into its various components. It represents a preparation of 40% red blood cells and 60% liquid plasma.

Range: 0 mL - 4000 mL

Bleeding Channel

The **Bleeding Channel** parameter is used to activate a bleeding channel. Two bleeding channels (**Bleeding Channel 1** and **Bleeding Channel 2**) can be activated simultaneously.

Default: Off

Note: Do not set both bleeding channels to the same location.

Urine Output

This parameter is used to control the rate of urinary output. When fluid is set up for use with the genitourinary system and the genitourinary system is primed, setting **Urine Output** causes urine to flow from the manikin at the specified rate. The **Urine Output** parameter does not affect the patient's physiology.

Range: 0 mL - 1000 mL

Sounds

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

Bowel Sounds

Bowel sounds can be adjusted by clicking on the Sound icon on the Run screen. When the Sounds panel appears, select **Bowel Sounds**. The Bowel Sounds menu will appear.

Normal, **Hypoactive**, **Hyperactive** and absent bowel sounds (**None**) are selected using this parameter.

Bowel Sounds
Normal
Hypoactive
Hyperactive
None

Independent control of the type and volume of bowel sounds may be selected in each anatomical region.

Bowel Sounds Locations
All Bowel Sounds
LUQ Bowel Sounds
RUQ Bowel Sounds
LLQ Bowel Sounds
RLQ Bowel Sounds

To affect the bowel sounds simultaneously in all anatomical regions, select **All Bowel Sounds** and the desired sound.

Default: Normal

Note: The volume control slider underneath each area may be used to adjust the amplitude of the sound. The volume control slider is only enabled while connected to a simulator.

Breath Sounds

Normal and abnormal breath sounds are selected using this parameter. Breath sounds are synchronized with ventilation of the left and right lungs.

Breath sounds can be adjusted by clicking on the Sound icon on the Run screen. When the Sounds panel appears, select **Breath Sounds**. The Breath Sounds menu will appear.

To change breath sounds, select the desired sound from the **Breath Sounds** menu.

Default: Normal

Options: Normal

- Crackles
- Diminished
- Gurgling
- Pleural Rub
- Rhonchi
- Wheezing

Note: The volume control slider can be used to adjust the amplitude of the sound.

Heart Sounds

Heart sounds are synchronized with the cardiac cycle and can be auscultated over the left and right sternal border, left lower sternal border and apex.

Heart sounds can be adjusted by clicking on the Sound icon on the Run screen. When the Sounds panel appears, select **Heart Sounds**. The Heart Sounds menu will appear.

Default: Normal

Options: Normal

- S3
- S4
- S3 and S4
- Early Systolic Murmur
- Mid Systolic Murmur
- Late Systolic Murmur
- Pan Systolic Murmur
- Late Diastolic Murmur

Note: The volume control slider can be used to adjust the amplitude of the sound.

Speech Sounds

Speech Sounds include a male or female voice that can utter pain rating indicators from 0 to 10, various phrases and a series of other utterances. Unlike Vocal Sounds, Speech Sounds only play once.

To play a Speech Sound, click the **Speech Sounds Controls** balloon and a list of Speech Sounds will appear. Select the desired sound. The sound plays, and the list disappears.

To replay the last sound, click the Play button in the Speech balloon.

Speech Sounds
“10, 9, 8, 7, 6...”
“0” through “10” - Pain Ratings
“Aching”
“Dull”
“I can’t breathe”
“My belly hurts”
“My chest is tight”
“My leg hurts”
“No”
“Ouch”
“Ow, that hurts”
“Pressure”
“Sharp”
“Sometimes”
“Stabbing”
“Yes”
Grunt
Loud Cough
Scream
Short Loud Cough
Short Soft Cough
Soft Cough

Audible Breathing Sounds

Audible breathing sounds are selected using this parameter.

Default: None

Options: None

- Normal
- Wheezing
- Crying
- Gagging
- Stridor
- Gasping
- Groaning
- Long Loud Cough
- Long Soft Cough
- Grunting
- Puffing
- Mumbling

Note: The volume control slider can be used to adjust the amplitude of the sound.

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

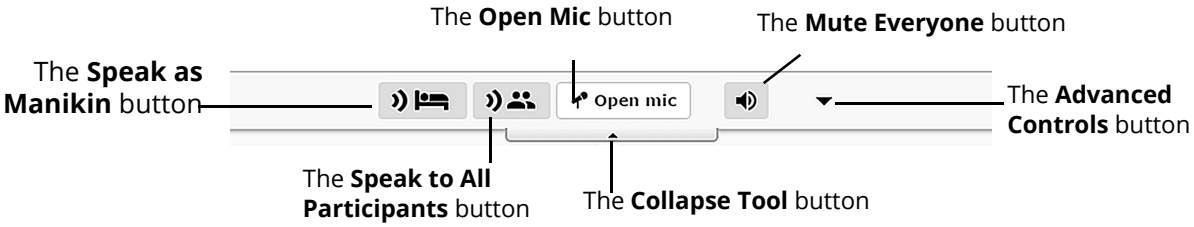
The voice communications controls are located in a supplemental toolbar at the top of the Müse software.

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.



Supplemental Toolbar

Clicking the **Advanced Controls** button opens the **Advanced Controls** tool.

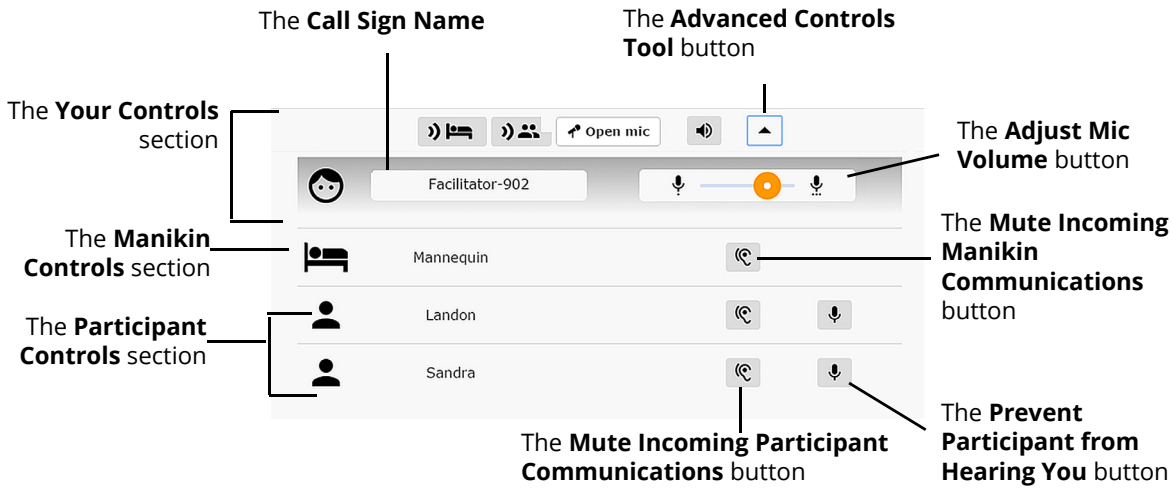
Voice Communication Controls in Standalone Software

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

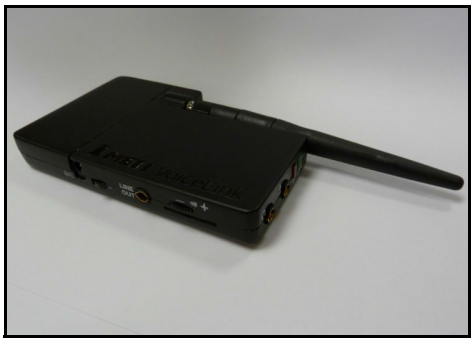
Wireless Voice Link Devices

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.

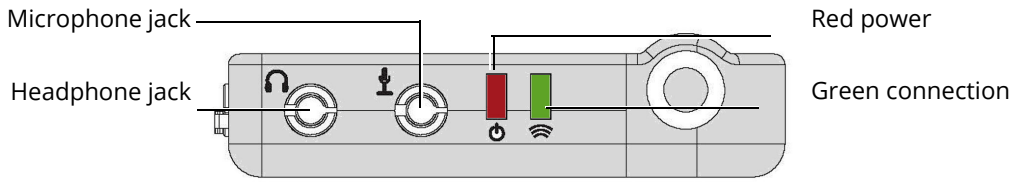


WVL Base Station

Physical Features

The following features are located on the top of the WVL devices:

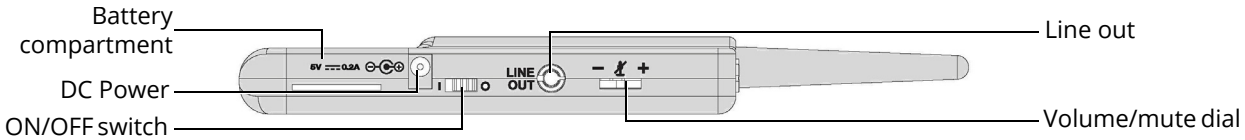
- **Headphone jack:** Used to plug in headphones or an iPhone compatible headphone/ microphone combination
- **Microphone jack:** Used to plug in a standalone microphone
- **Red power light:** Indicates when the unit is powered on by blinking. Also indicates when the Mute button is activated by solidly 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.

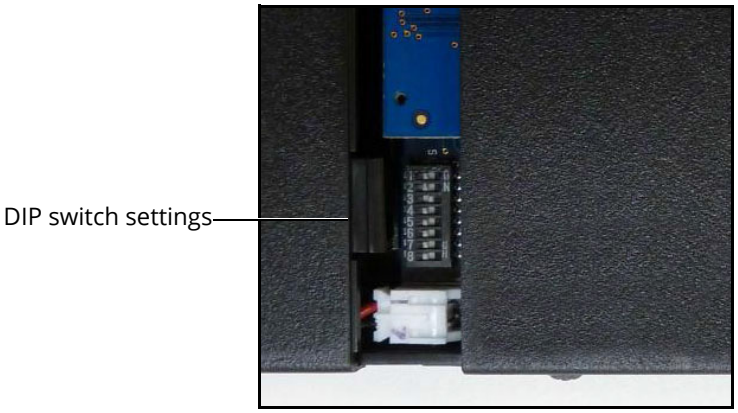
On the WVL base station, the dial serves as the volume control for the speakers inside the simulator. Moving the dial toward the plus sign increases the volume. Moving the dial toward the minus sign decreases the volume and setting. On the handset, pressing straight down on the volume dial in the center 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.

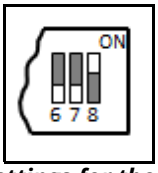


Dip Switch Settings

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



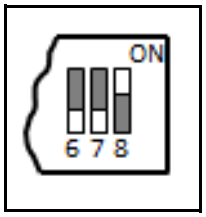
DIP Switch Settings for the Base Station

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

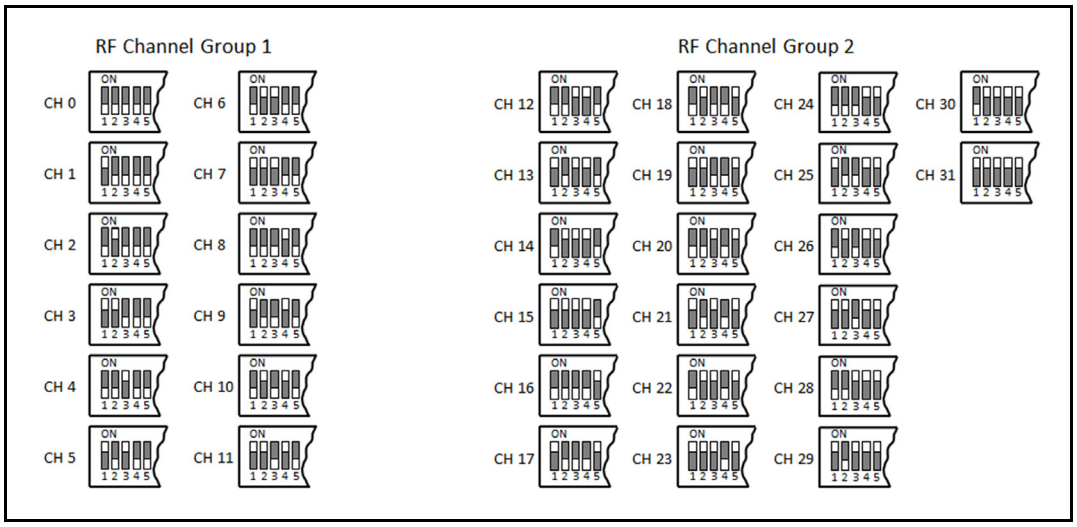
There are two ways to configure the radio frequency (RF) channel spacing. The first method reduces channel-to-channel interference, but allows only 12 channels to operate simultaneously. The second method increases the number of channels that can be used simultaneously to 20 channels. However, this method 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

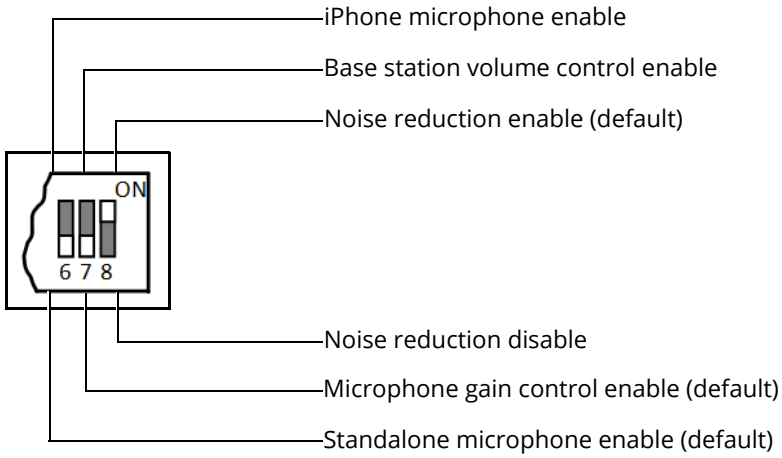
DIP switch position 6 on the handset determines if the iPhone microphone input or the standalone microphone input is enabled. When DIP switch position 6 is set to the OFF position, the standalone microphone jack is enabled for the standalone microphone, provided by CAE.

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.



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

Defibrillation Calibration Utility

The Defibrillation Calibration Utility allows users to ensure the accuracy of their pacing and defibrillation device. All simulators are calibrated for defibrillation and pacing prior to shipment; however, when using a new or different defibrillator (e.g., switching between monophasic and biphasic), running the calibration utility is necessary.

The following items are required to complete the calibration:

- CAE Simulator (ECS, PediaSIM, BabySIM or iStan)
- Macintosh Instructor Workstation with HPS6 software
- Defibrillation Calibration Utility
- AED/Defibrillator/Pacing Device

Getting Started

Before running the utility, power on the simulator and allow three minutes for the simulator to fully power up prior to turning on the instructor workstation.

Once the simulator is on, connect the defibrillation device cables or AED pads to the chest.

See *Using iStan* section for more information on how to connect defibrillator devices or AED.

After the defibrillation device is connected to the simulator, turn on the device, but do NOT start the HPS6 software application.

Setting Up the Calibration Utility

When a defibrillator is being used for the first time with a simulator, the pair should be calibrated to each other. Running the calibration utility ensures that the Joule or mA values logged by the simulator match the defibrillation or pacing device

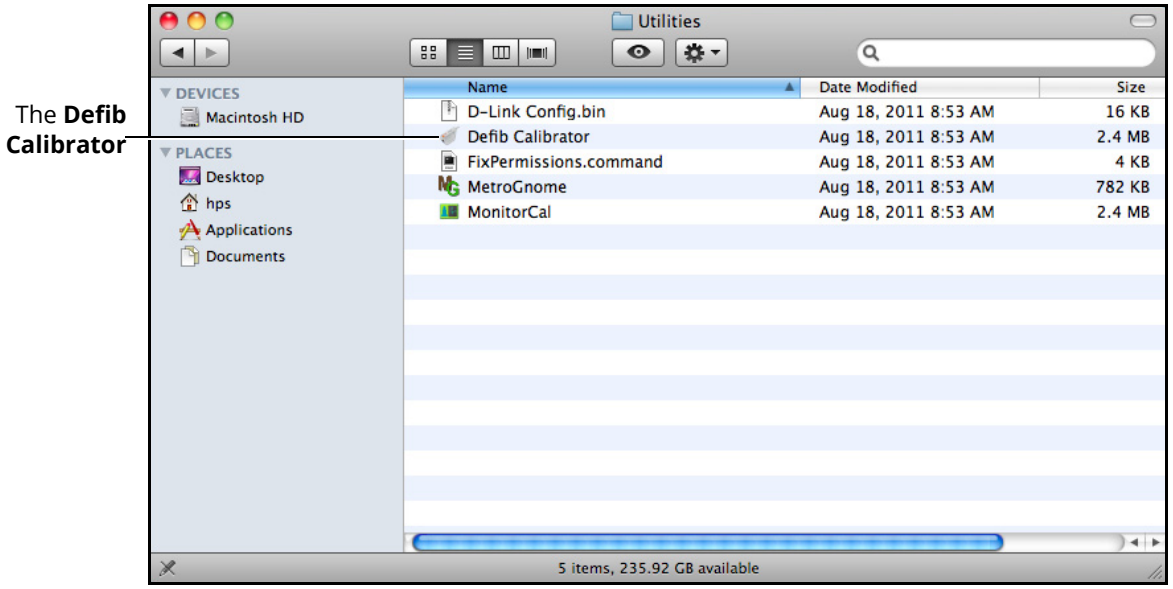
.

IMPORTANT: Before beginning the calibration, be sure to select a minimum of 3 to 4 joule parameters (ranging 50-360 Joules for Adult) for the defibrillation calibration and up to 20 pace parameters (ranging 20-180 mA for Adult) for pacing calibration.

See Recommend Ranges at the end of this section for more information.

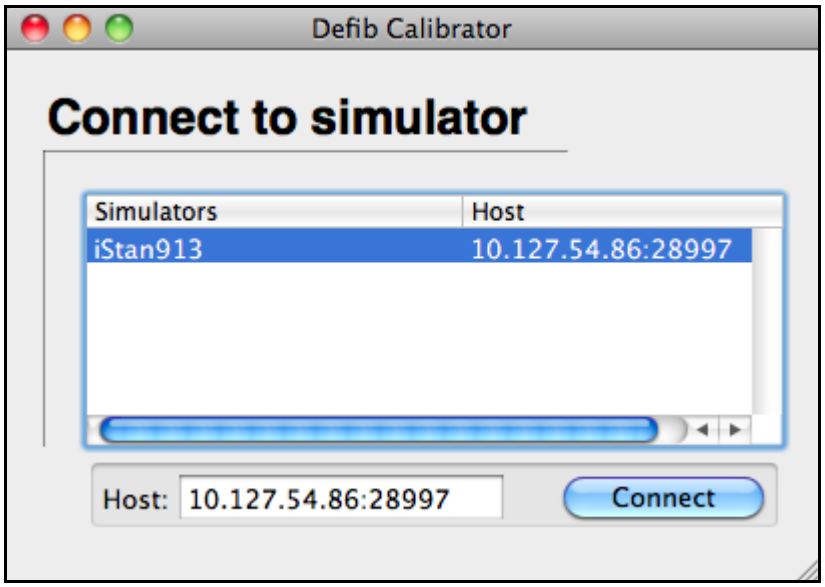
To begin the utility:

1. Navigate to the Menu Bar at the top of the screen and click **Go**. The drop-down menu appears
2. Select **Applications** from the drop-down menu
3. Select the HPS Version 6 folder
4. From the HPS Version 6 folder, select the Utilities folder
5. Click **Defib Calibrator**



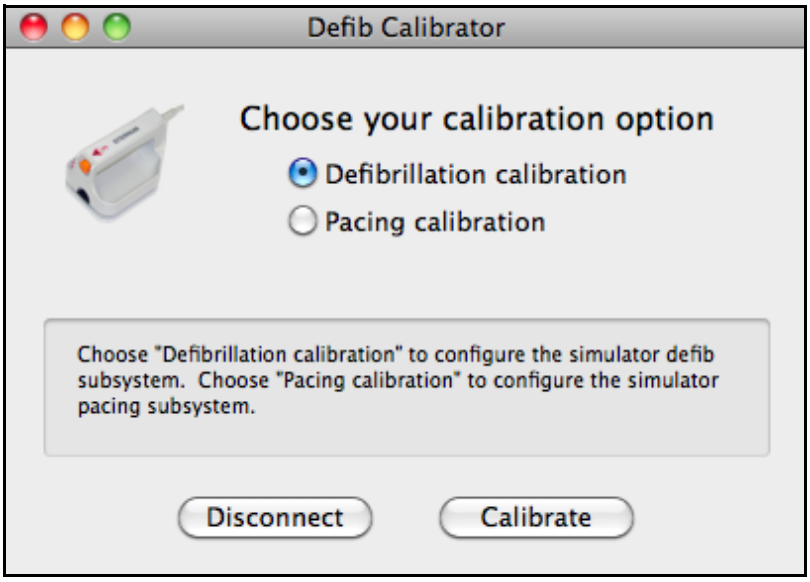
The Applications Window

6. Click on the desired simulator and click **Connect t**o begin the calibration utility



Select Simulator and Click Connect

7. Click the radio button next to Defibrillation Calibration or Pacing Calibration to select which type of calibration to perform, and click **Calibrate**



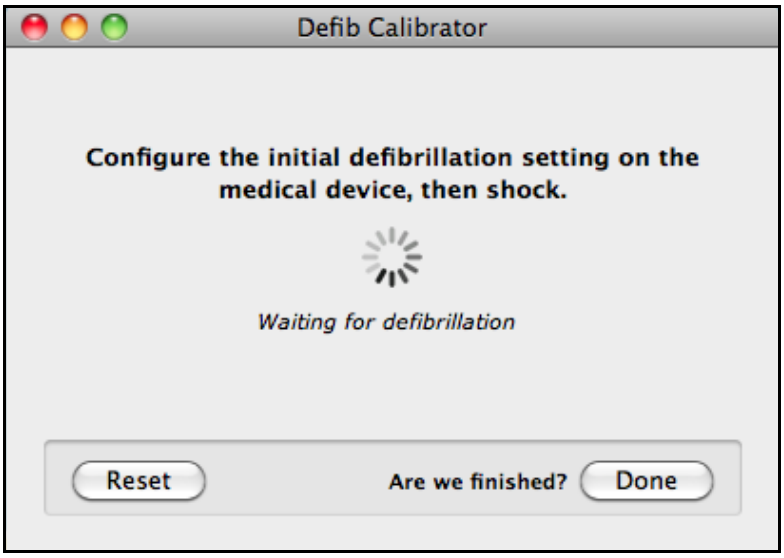
Choose the Defibrillation Calibration Option

Running the Defibrillation Calibration Utility

Before beginning the Defibrillation Calibration Utility, it is important to have a minimum of 3 to 4 joule parameters to enter on the defibrillation device for calibration.

See *Recommend Ranges* at the end of this section for more information.

After choosing the Defibrillation Calibration option and clicking the Calibrate button, the **Configure Initial Defibrillation** window appears.

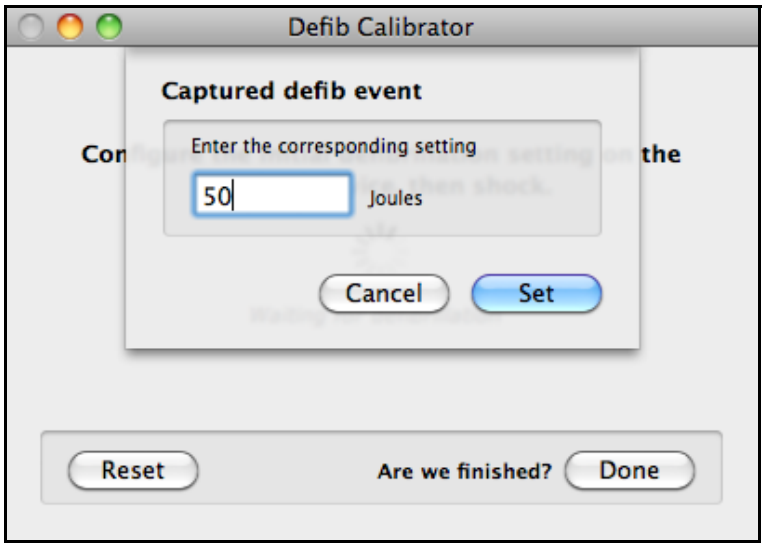


Configure Initial Defibrillation window

To start the defibrillation calibration:

1. Input the desired calibration parameter for Joule measurement on the defibrillation device (e.g., 50 Joules as first calibration parameter for Adult). Make sure that you as well as any bystanders are clear of the simulator, and press **Shock** on the defibrillation device to administer the defibrillation to the simulator.

Once the defibrillation device indicates the shock has been administered (typically, a "beep" sound), the Captured Defib Event window appears.

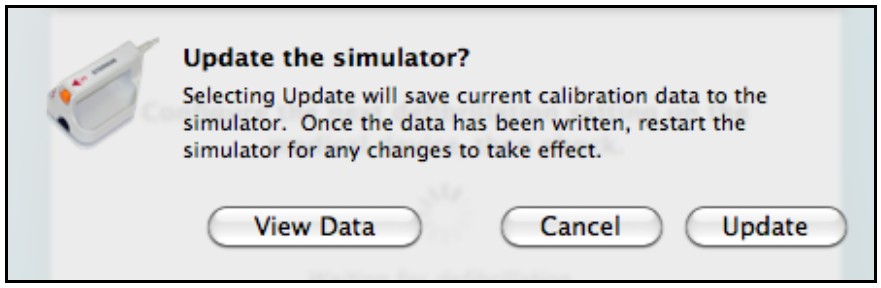


Captured Defib Event window

2. Click **Set** and repeat Step 1 as many times as needed, using different calibration parameters

   See *Recommend Ranges* at the end of this section for more information.

3. After the desired calibration parameters have been measured, and Step 2 of the last parameters had been completed, click **Done**



Update the Simulator window

4. Three options are available on the Update the Simulator window:
    - Click **View Data** to view the calibration information in a data log
    - Click **Cancel** to perform additional calibration or navigate back to the Reset option
    - Click Update to save the current calibration data to the simulator

Update Complete window

5. Click **Continue** to proceed with the Pacing Calibration and return to the main calibration screen, or click **Disconnect** to end the utility and reboot the simulator. The simulator must be rebooted for the calibration to take effect and the simulator should not be turned off until the utility is closed.

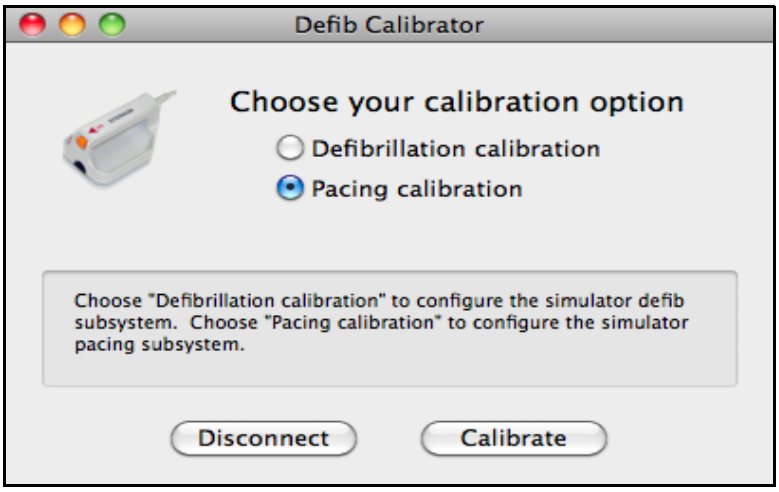
Running the Pacing Calibration Utility

Before beginning the Pacing Calibration Utility, it is important to determine the pace parameters to enter on the pacing device for calibration.

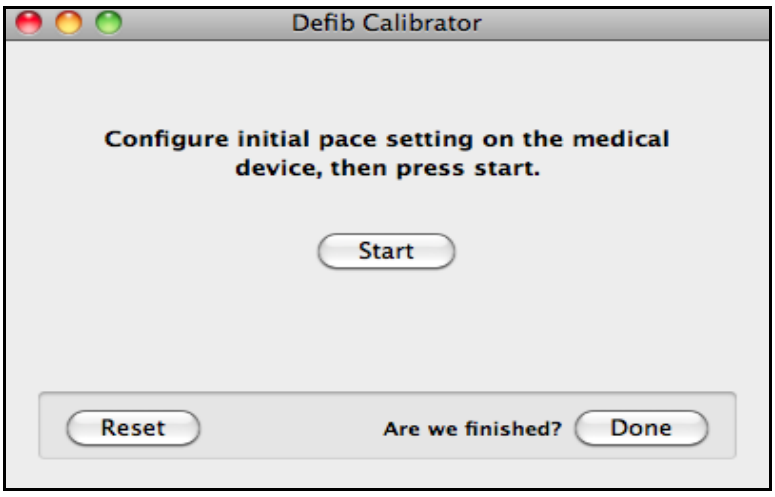
See *Recommend Ranges* at the end of this section for more information.

To begin the pacing calibration:

1. Click the radio button next to the Pacing Calibration option and click the **Calibrate** button



Choose the Pacing Calibration Option



Configure Initial Pace Setting Window

2. Set the Rate on pacing device to 60 PPM
3. Input the desired calibration parameter for mA measurement on the pacing device (e.g., 20 mA as first calibration parameter for Adult) using the Current function

   See *Recommend Ranges* at the end of this section for more information.

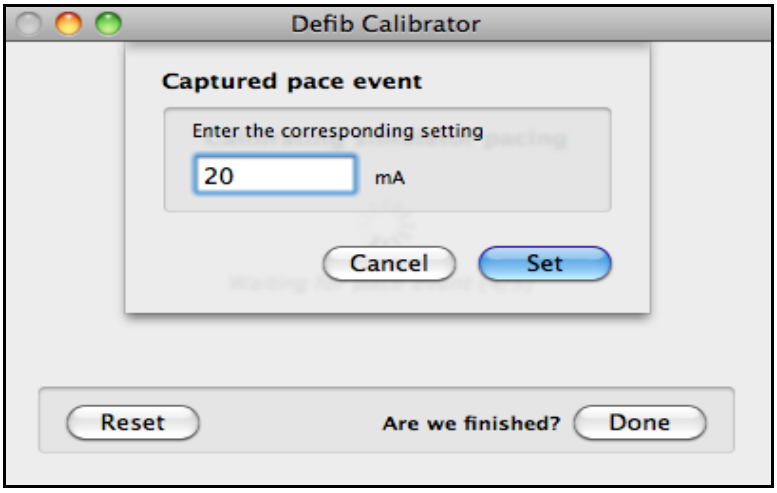
4. Click **Start** in the Configure Initial Pace Settings window

   The Calibrating Simulator Pacing window appears while 5 current samples are transmitted from the device to the simulator.

Calibrating Simulator Pacing window

   Once the pacing device indicates the current has been administered, the **Captured Pace Event** window appears.

5. Enter the mA that was set on the pacing device and click **Set**

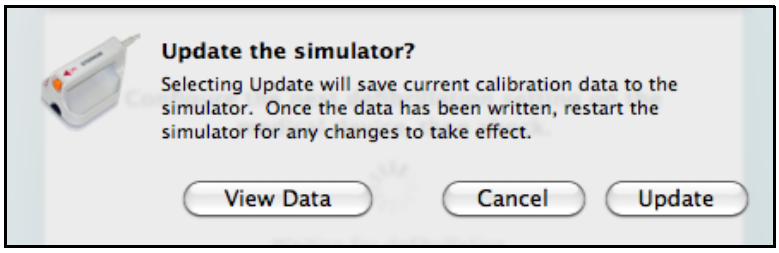


Captured Pace Event window

6. Repeat Steps 1 through 5 as many times as desired using different calibration parameters each time

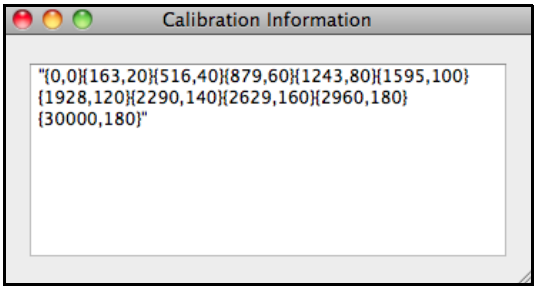
   See *Recommend Ranges* at the end of this section for more information.

7. When the desired number of calibration parameters are reached, click **Done**



Update the Simulator window

8. Three options are available on the Update the Simulator window:
    - Click **View Data** to view the calibration information in a data log



Calibration Information window

    - Click **Cancel** to perform additional calibration or navigate back to the Reset option
    - Click **Update** to save the current calibration data to the simulator

Update Complete window

9. Click **Disconnect** to end the utility and reboot the simulator. The simulator must be rebooted for the calibration to take effect and the simulator should not be turned off until the utility is closed.

Troubleshooting

During the calibration process, a “Calibration Points Too Close Together” error message may appear if the measurement parameters are too close in intervals.

In this instance, there are three options available to move forward with the calibration:

- Click **Ignore** and the calibration process will proceed
- Click **Show Errors** to review the calibration pairs that are too close together
- Click **Redo Calibration** and use a different Joules/mA amount

Recommended Ranges

The following table contains the recommended biphasic ranges for defibrillation and pacing for Adult, Pediatric, and Baby simulators.

Simulator	Defibrillation	Pacing Current
Adult (iStan, ECS)	**50-360 Joules**	**20-180 mA**
Pediatric (PediaSIM)	**20-200 Joules**	**20-100 mA**
Baby (BabySIM)	**10-40 Joules**	**10-40 mA**

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.

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