CAE

CAE EndoVR

User Guide

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System Specifications

Hardware	
Equipment	Two 22” flat LCD touchscreen monitors Haptics device Scope holder Dual foot pedal
Dimensions	40.5” W x 35” D x 72” H (Adjustable) 103cm W x 89cm D x 183cm H (Adjustable)
Weight	245 lb (111 kg)
Electrical	100-120 V, 50-60 Hz, 10A 200-240 V, 50-60 Hz, 5A
Storage Temperature	-40˚C to +65˚C (-40˚F to +149˚F)
Storage Humidity	20% to 80% without condensation
Operating Temperature	10˚C to 32˚C (50˚F to 90˚F)
Operating Humidity	20% to 80% without condensation

Cautions and Warnings

Please read and understand these cautions and warnings before you begin using the simulator.

Operations

- Do not operate your equipment with any covers removed
- Do not use your equipment in a wet environment. Protect equipment for liquid intrusion
- Do not put any object on top of the bottom platform. Movement of the lift mechanism can cause crush hazard, resulting in possible bodily injuries and damaged equipment.
- Do not jam the motor lift mechanism onto an object. This is a misuse and subjects the motor to burn out. It can also result in possible bodily injuries and damaged equipment.

Ergonomics

- Tip-over hazard: Do not move your equipment without fully lowering the lift mechanism. Failure to do so can result in possible bodily injury and damaged equipment.
- Improper or prolonged keyboard use may results in injury
- Viewing a monitor screen for extended period of time may result in eye strain

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INTRODUCTION

Welcome to the CAE EndoVR Simulator user guide. This guide provides instructions on how to use the EndoVR simulator.

The EndoVR simulator provides a safe, virtual environment for learners to practice endoscopic techniques and skills. Learners can range from medical students to licensed medical professionals.

The EndoVR Simulator

Preprogrammed tasks and courses with didactic content, real-time simulation haptics and post-simulation evaluation metrics help create the comprehensive training experience for learners. Through the combination of these tools, learners begin to recognize anatomical structures and landmarks, intervention approaches and complication management. Learning within a virtual patient environment offers both students and faculty the opportunity to practice safely.

Equipment Overview

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

Standard Equipment
EndoVR Device
Monitor Pole and Monitor Arms
Monitors
Computer

EndoVR Device

The EndoVR device comes as a single entity. The haptic device (including external anatomy plates), keyboard, mouse and lifting mechanism are all part of the EndoVR device. The device is secured to a four-wheel platform for convenient mobility when storing the simulator.

The EndoVR Device

Monitor Pole and Monitor Arms

The monitor pole is shipped separately from the EndoVR device and requires some assembly before the simulator can be used. Two plates (one front and one back) connect to the EndoVR device to create the monitor pole. The monitor arms are attached to the monitor pole front plate.

Monitors

Two flatscreen monitors are provided with the purchase of an EndoVR simulator. The mounting plates to mount the monitors to the monitor arms are located on the back of the monitors.

Computer

The computer for the EndoVR simulator is shipped inside the EndoVR device. To access the computer, press on the access door located on the side of the simulator.

The Computer Access Door

Additional Equipment

For modules, which are sold separately, users must purchase additional equipment to fully utilize the curriculum and simulation procedures.

Bronchoscopy Equipment
Scope Head
Scope Tube
EBUS-TBNA Accessory Tool

Lower GI Equipment
Scope Head
Scope Tube
Accessory Tool
Foot Pedals

Upper GI Equipment
Scope Head
Scope Tube
Accessory Tool

Before Using the Simulator

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

- Read and understand the Cautions and Warnings in the beginning of this User Guide
- Do not power on any components until instructed in the text
- Do not install any Windows updates or anti-virus software when connecting to the network

USING THE SIMULATOR

The EndoVR simulator integrates replica gastrointestinal and bronchoscopic scope heads, accessories and pedals with an interactive software to provide learners with a comprehensive and quantitative training experience. Administrators and trainers are responsible for setting up the user accounts, managing the learners' curriculum and reviewing learners' results to identify areas for improvement.

Note: For optimal use, no other software programs should be open while the simulator software is running.

Note: To use the printing functions in the software, a network connection must be established. For further assistance, contact your system administrator.

Power On the Simulator

Before starting the software, ensure that the simulator is powered on. In the case that the simulator is not powered on, follow the instructions below.

To power on the simulator:

a. Ensure the top of the master power button, located on the back of the simulator, is pressed in

The Master Power Switch

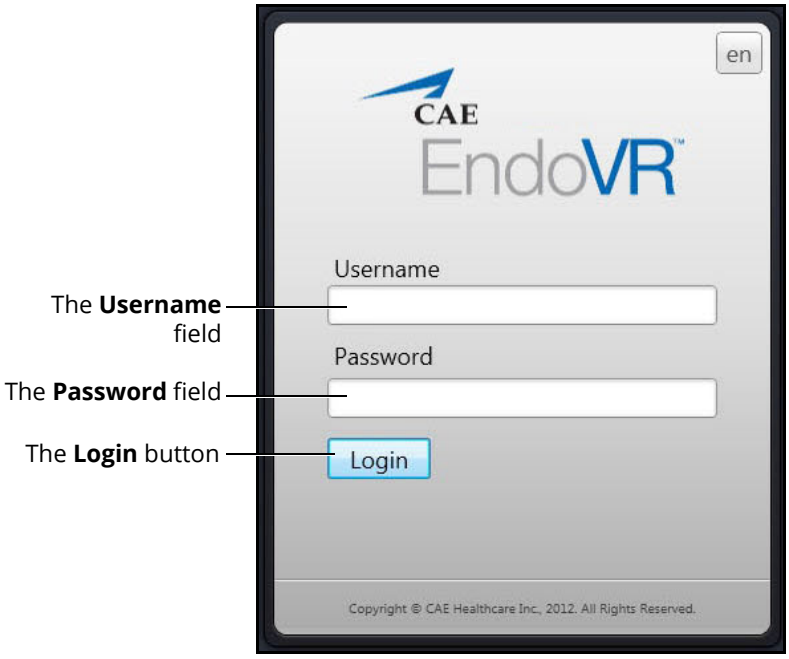
b. Press the top part of the orange power switch located on the back right side of the simulator

The Power Switch Illuminated

The switch illuminates when the simulator is powered on.

Starting the Software

Once the EndoVR simulator is powered on, the software launches automatically and the Login screen appears.



The Login Screen

To log in to the software:

1. Enter the assigned username in the **Username** field. To log in as a guest, enter *guest*

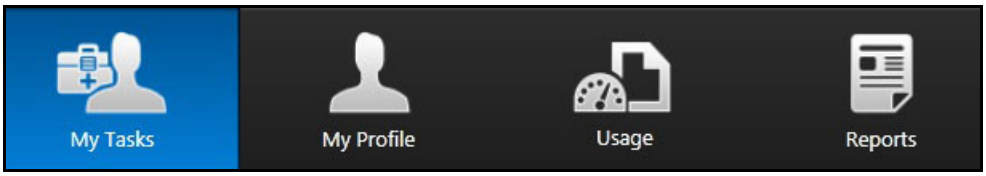
   Note: Any tasks performed while using the guest login will be recorded in the guest account only if the administrator selected Data Recorded in the guest personal data screen.
2. Enter the assigned password in the **Password** field. To log in as a guest, enter *guest*.
3. Click **Login**

The Home Screen

From the Home screen, users can select and start a simulation exercise, view personal data and print usage summaries and reports. Users are also able to modify language preferences and access the user guide from the Home screen.

Interface Overview

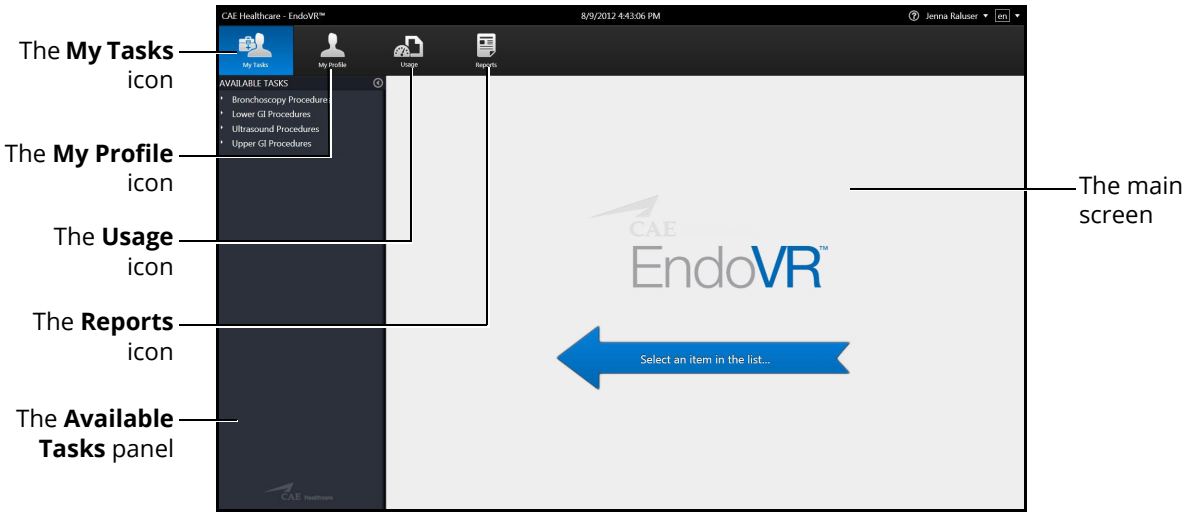
The EndoVR user interface contains a dashboard of icons that represent the tools available to users.



The Icon Dashboard

When an icon is selected, the icon will appear blue and the associated content will appear in the main screen on the interface. The left panel contains is a list of options for users.

The **My Tasks** icon is selected by default and referred to as the Home screen when users first login to the software.

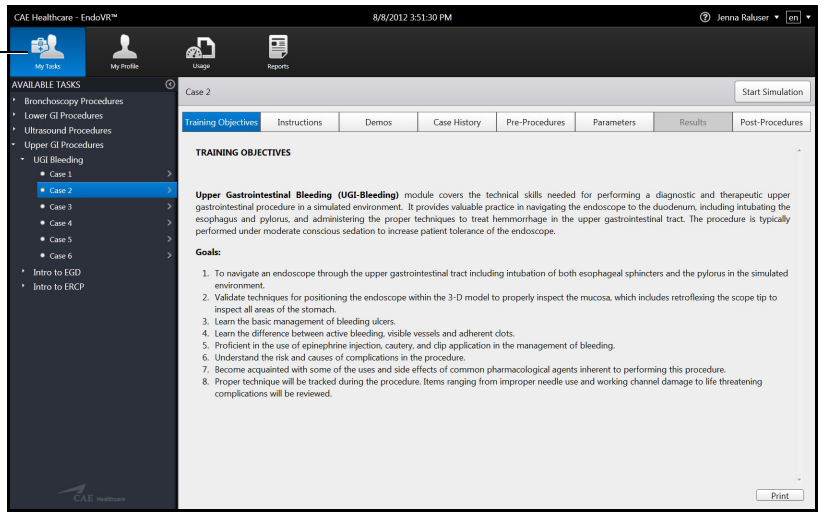


The Home Screen

My Tasks

From the My Tasks screen, users can choose a simulation, review didactic content, run a simulation and review results.

The **My Tasks** icon

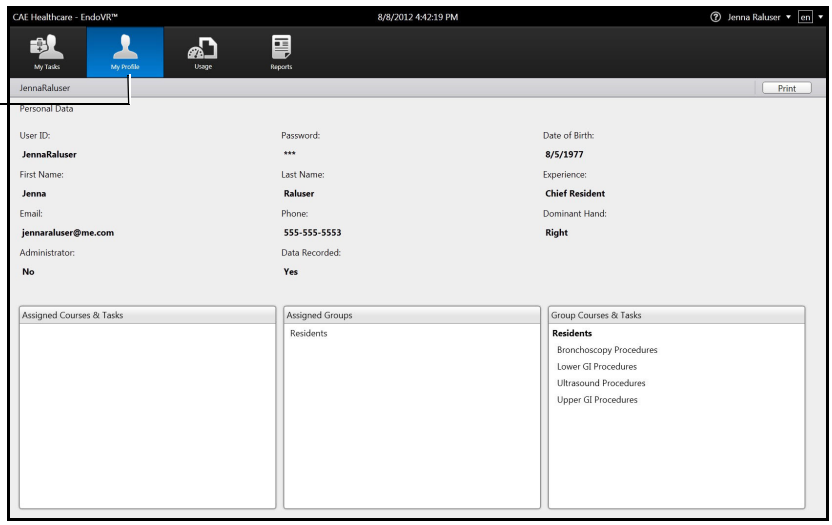


The My Tasks Screen

My Profile

From the My Profile screen, users can review their personal data including username, registration and contact information and privileges.

The **My Profile** icon

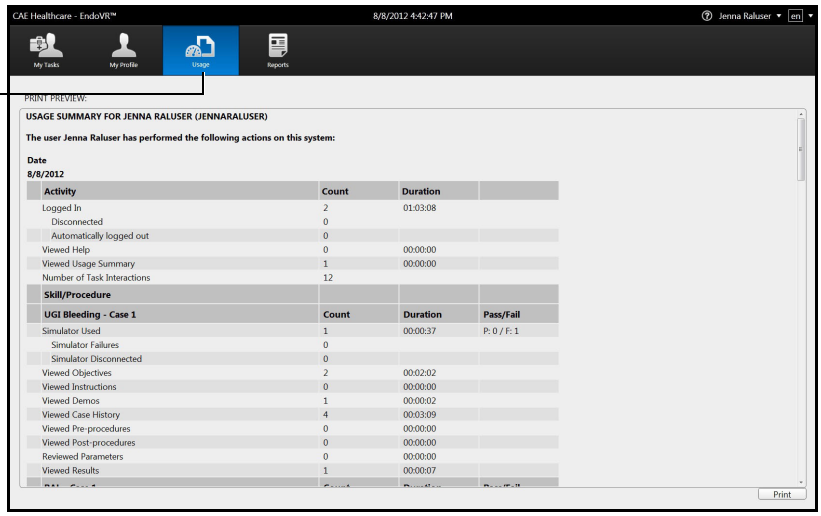


The My Profile Screen

Usage

From the Usage screen, review and print their usage summaries for completed simulations.

The **Usage** icon

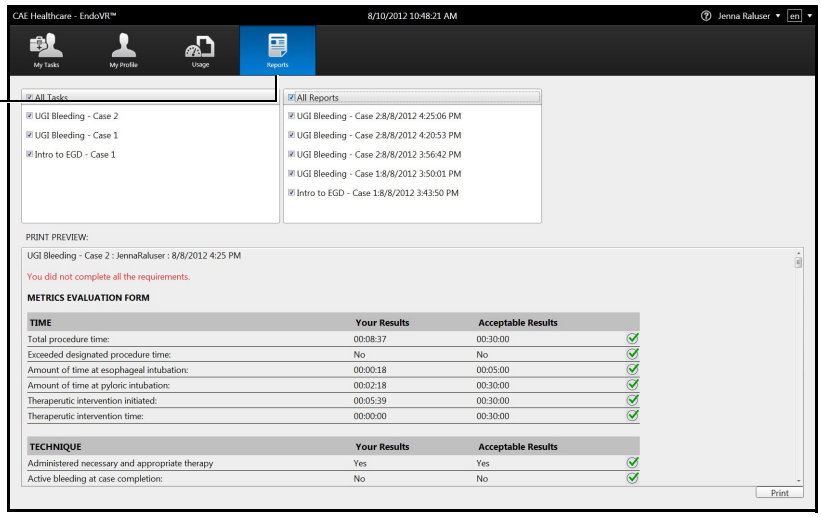


The Usage Screen

Reports

From the Reports screen, users can review and print reports for completed simulations.

The **Reports** icon



The Reports Screen

Selecting a Simulation

Each module in the software contains a specially-developed curriculum to test learners on their ability to perform acute endoscopic procedures. Based on the courses and tasks assigned to the learner by the administrator, the training experience is customized to help the learner meet the necessary educational objectives.

Note: Learners only have access to the curriculum assigned to them by the administrator.

To select a simulation:

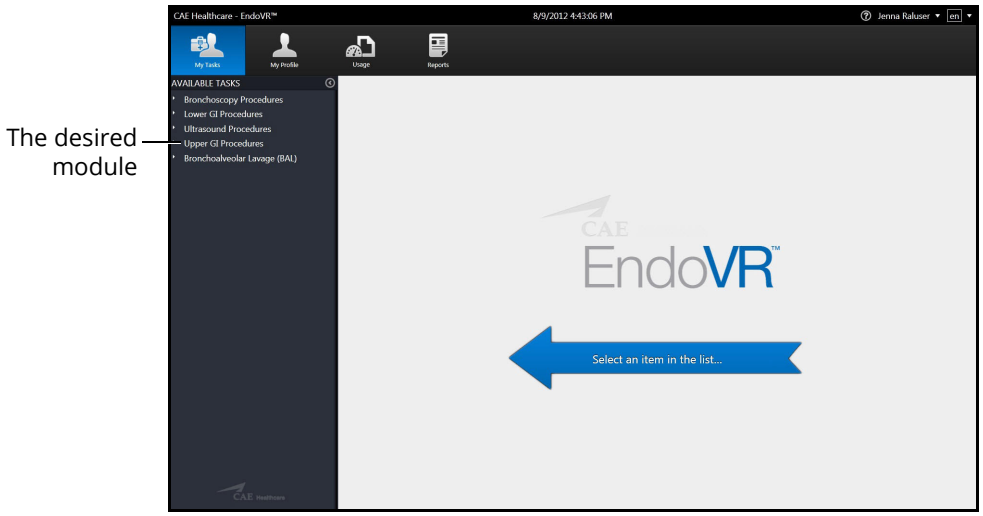
1. Ensure the **My Tasks** icon is selected and the Home screen is displayed

The Home Screen

Note: When selected, the icon on the dashboard is highlighted blue.

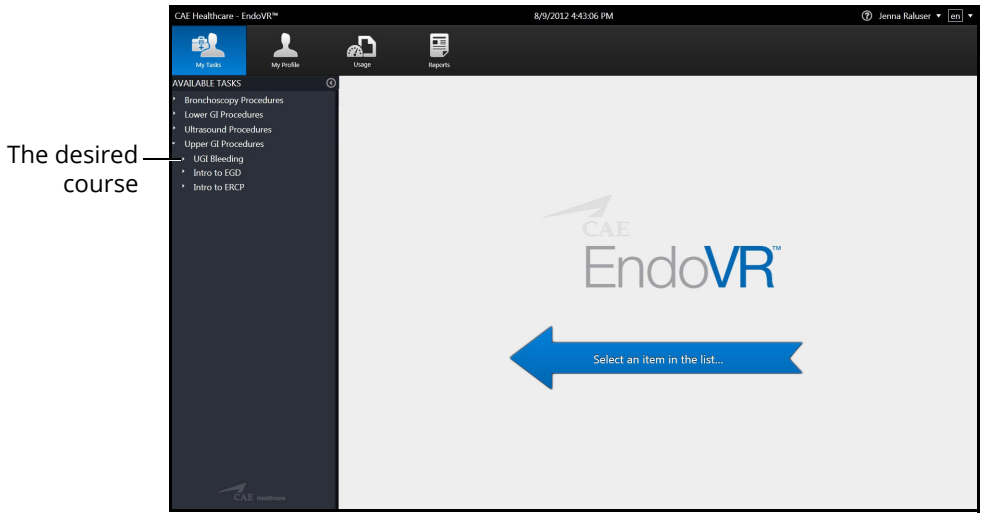
The Icon Dashboard

2. From the **Available Tasks** panel on the left side of the screen, click the desired module



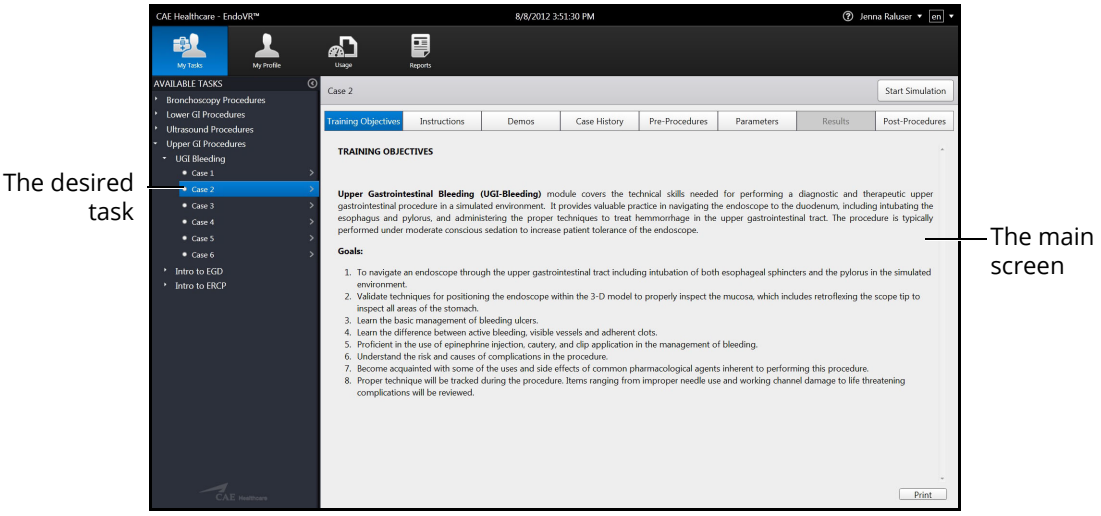
The Home Screen

3. Click the desired course



The My Tasks Screen

4. Click the desired task



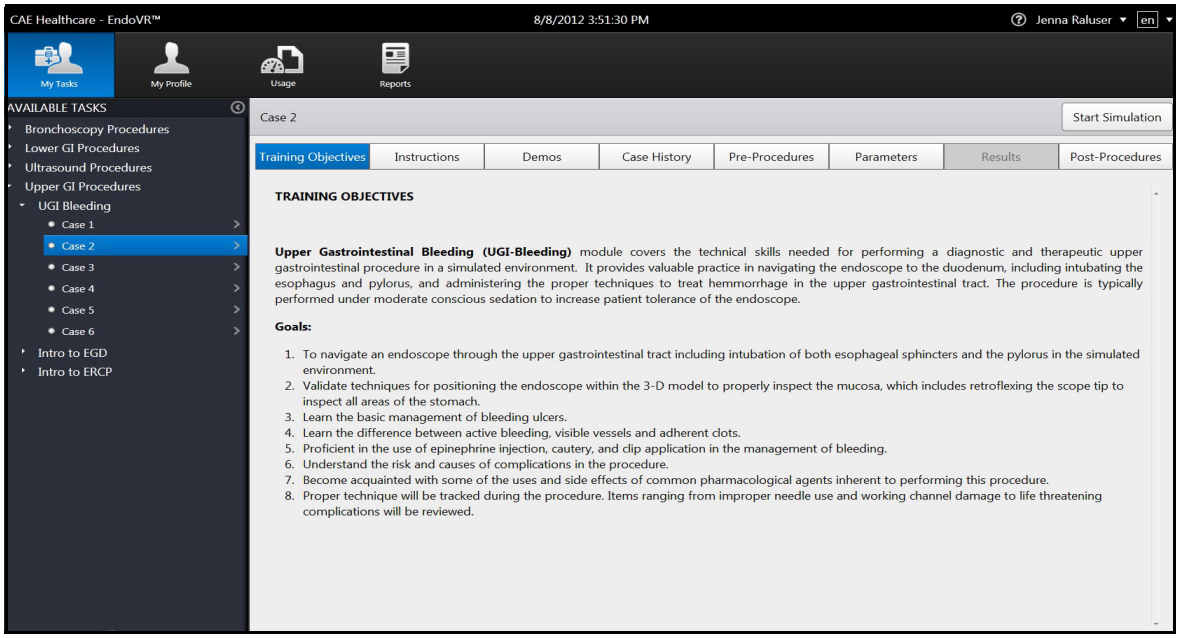
The My Tasks Screen

The didactic content appears in the main screen of the software.

Reviewing the Didactic Content

Before beginning a simulation, users should review the didactic content for the selected procedure. The didactic content contains information users need to know before and after performing a specific procedure.

The didactic content for tasks may include Training Objectives, Didactics, Instructions, Case History, Diagnostic Images, Pre-Procedures, Parameters and Post-Procedures. The Results screen is only accessible after a task is completed. The content included in each module varies depending on the procedure.



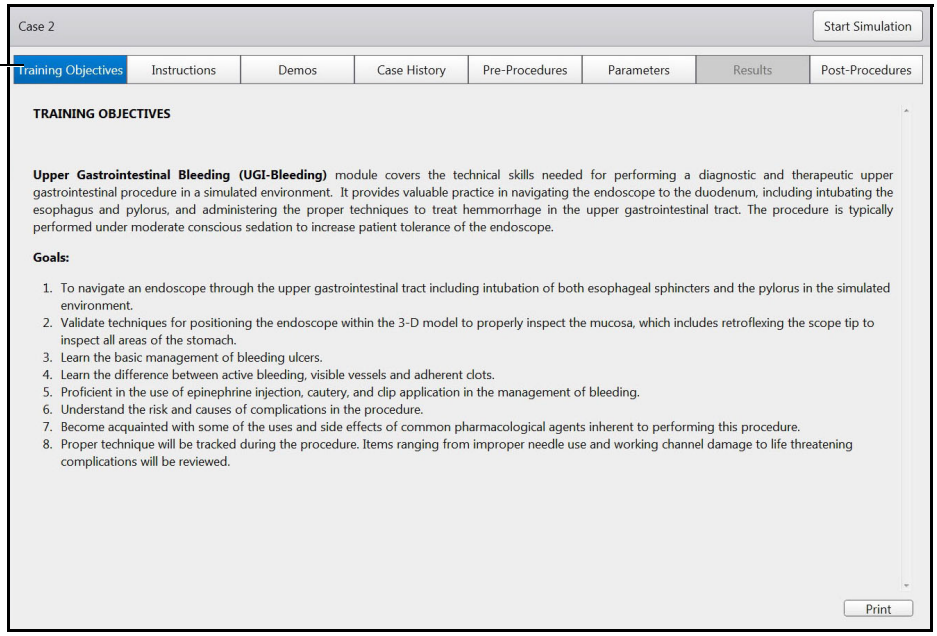
Didactic Content Screen for Upper GI Module

Note: Parameters can only be changed for specific tasks when the user parameters are unlocked by an administrator.

Training Objectives

To access the Training Objectives screen, click the **Training Objectives** tab. When selected, the tab appears blue and the Training Objectives screen appears.

The **Training Objectives** tab



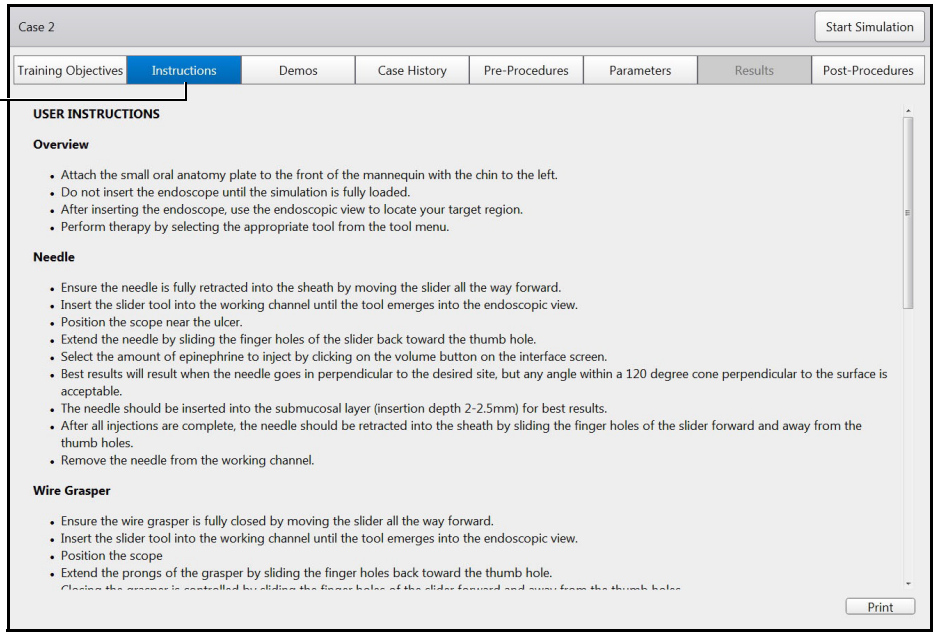
The Training Objectives Screen

The Training Objectives screen outlines the training goals and objectives users meet upon successful completion of the procedure.

Instructions

To access the Instructions screen, click the **Instructions** tab. When selected, the tab appears blue and the Instructions screen appears.

The **Instructions** tab

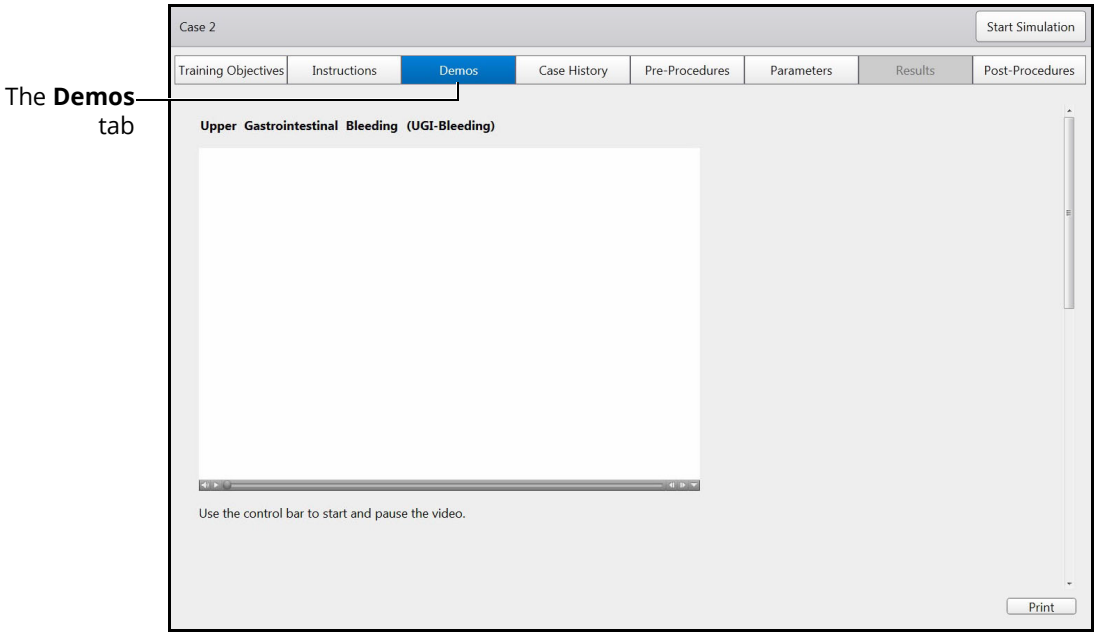


The Instructions Screen

The Instructions screen provides an overview of the procedure and directions for navigating through and performing the procedure.

Demos

To access the Demos screen, click the **Demos** tab. When selected, the tab appears blue and the Demos screen appears.

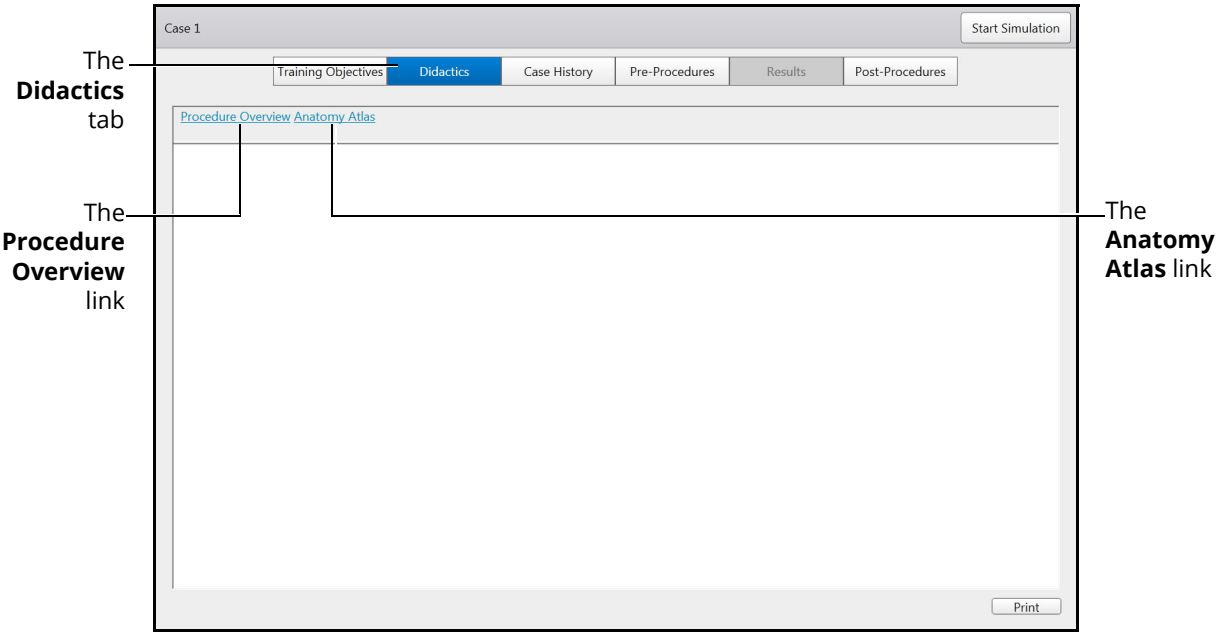


The Demos Screen

The Demos screen provides users with a tutorial on how to perform the selected procedure.

Didactics

To access the Didactics screen, click the **Didactics** tab. When selected, the tab appears blue and the Didactics screen appears.

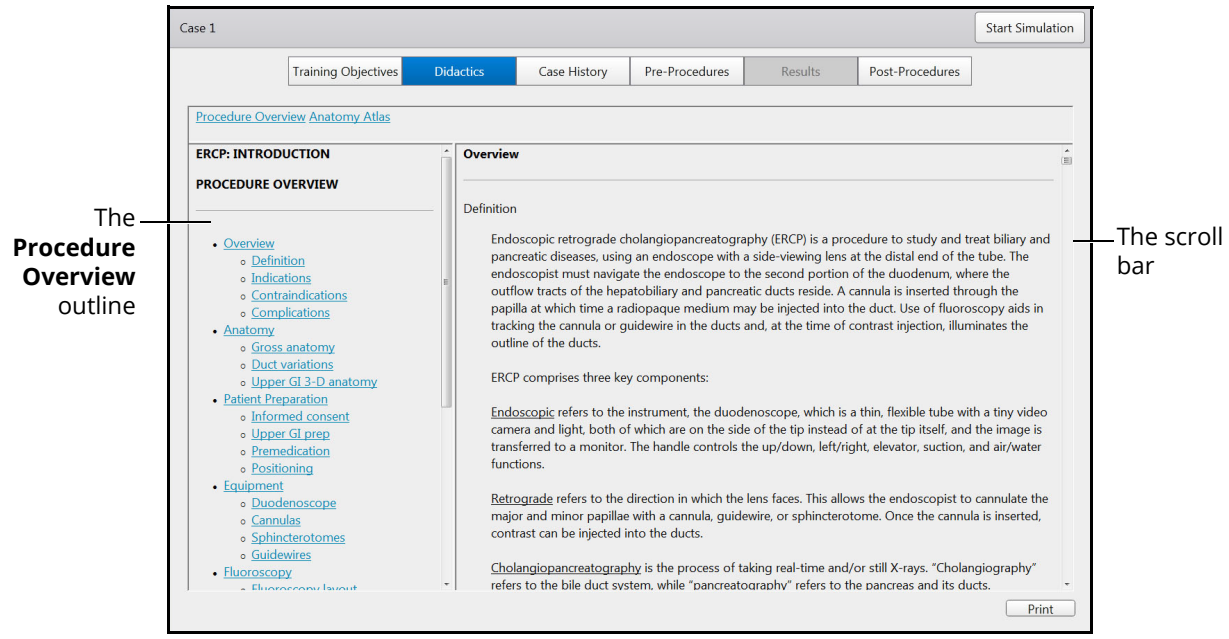


The Didactics Screen

The Didactics screen contains two outlines of content for the user to navigate: **Procedure Overview** and **Anatomy Atlas** (or **Pathology Atlas**).

Procedure Overview

The Procedure Overview screen contains an outline of procedural information, videos and instructions created by endoscopy specialists and physicians.

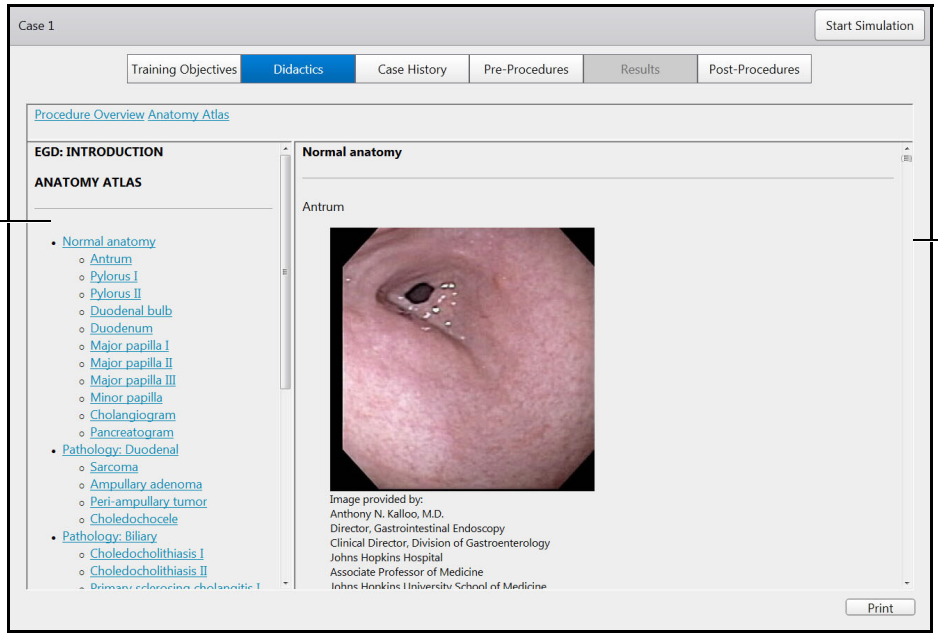


The Procedure Overview Screen

Learners can select the content to review by clicking on the outline hyperlinks or scrolling down the Procedure Overview screen.

Anatomy Atlas

The Anatomy Atlas screen contains images of specific parts of the anatomy for the learner to review prior to beginning a procedure.

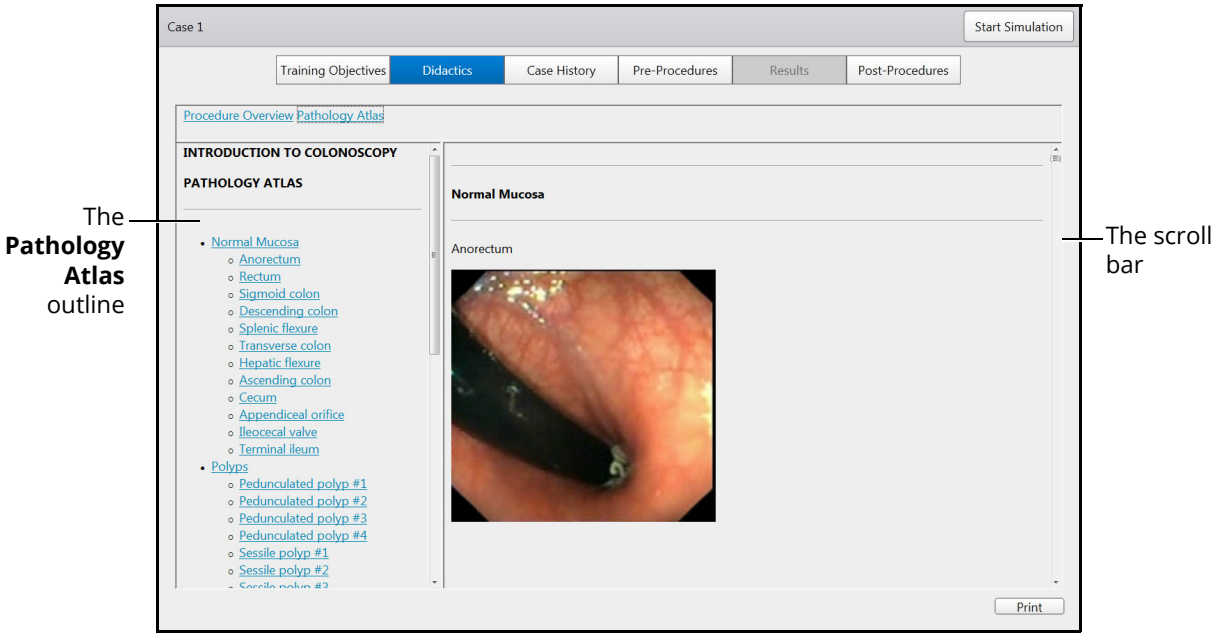


The Anatomy Atlas Screen

Learners can select the content to review by clicking on the outline hyperlinks or scrolling down the Anatomy Atlas screen.

Pathology Atlas

The Pathology Atlas screen contains images of pathologies for the learner to review prior to beginning a procedure.



The Pathology Atlas Screen

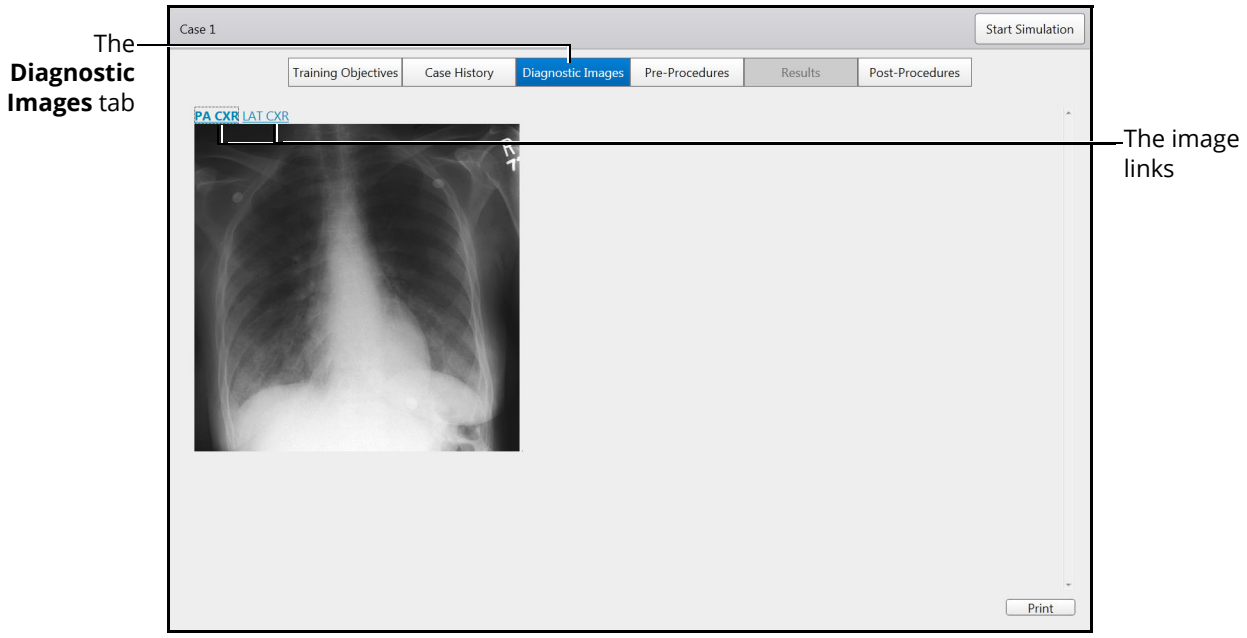
Learners can select the content to review by clicking on the outline hyperlinks or scrolling down the Pathology Atlas screen.

Diagnostic Images

To access the Diagnostic Images screen, click the **Diagnostic Images** tab.

Note: In some modules, the **Diagnostic Images** tab replaces the **Diadactics** tab.

When selected, the tab appears blue and the Diagnostic Images screen appears.

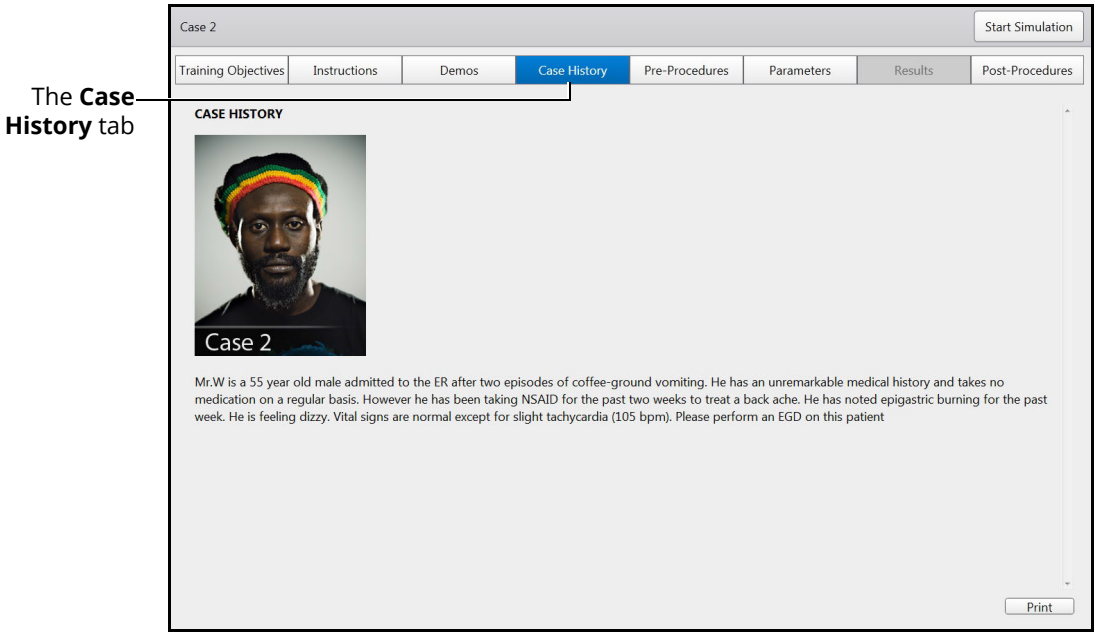


The Diagnostic Images Screen

The Diagnostic Images screen contains helpful images for learners to review prior to beginning the procedure. Click on an image link to view a diagnostic image.

Case History

To access the Case History screen, click the **Case History** tab. When selected, the tab appears blue and the Case History screen appears.

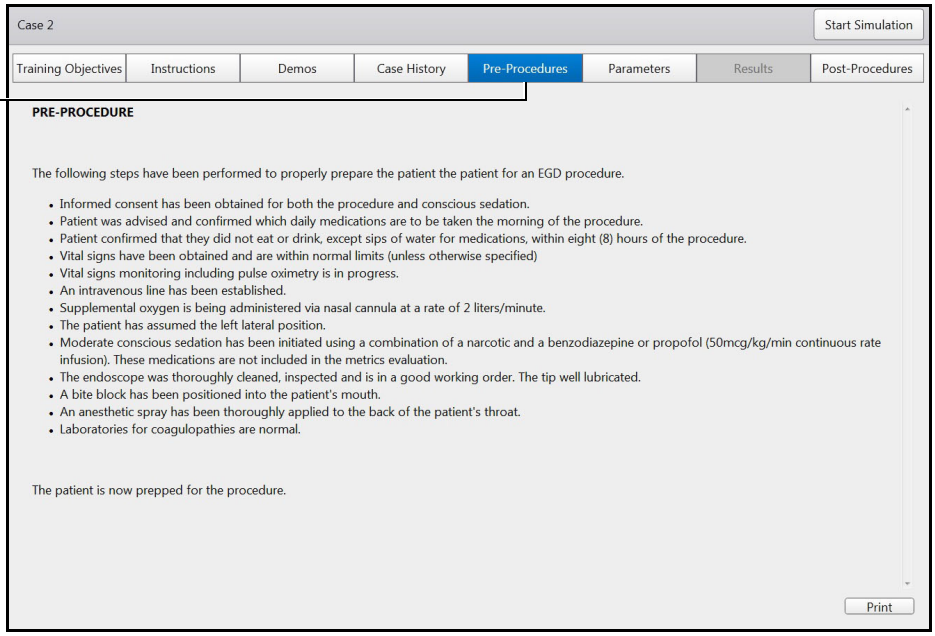


The Case History Screen

The Case History screen provides users with background information about the patient including symptoms, medical history and documentation of previous conditions and procedures.

Pre-Procedures

To access the Pre-Procedures screen, click the **Pre-Procedures** tab. When selected, the tab appears blue and the Pre-Procedures screen appears.

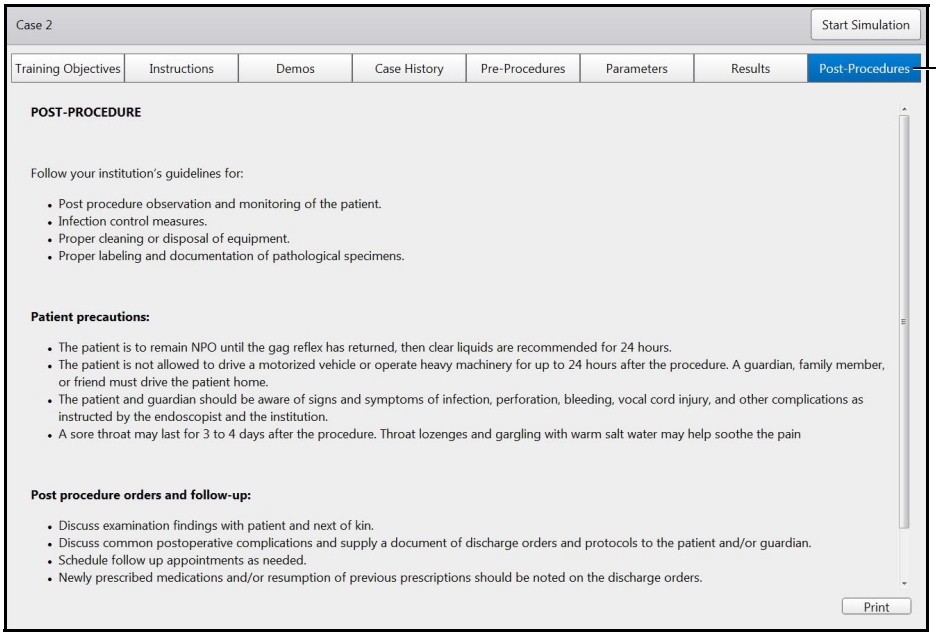


The Pre-Procedures Screen

The Pre-Procedures screen provides steps the user needs to complete prior to beginning the procedure.

Post-Procedures

To access the Post-Procedures screen, click the **Post-Procedures** tab. When selected, the tab appears blue and the Post-Procedures screen appears.



The Post-Procedures Screen

The Post-Procedures screen provides actions users should perform after the procedure is complete.

Changing User Parameters

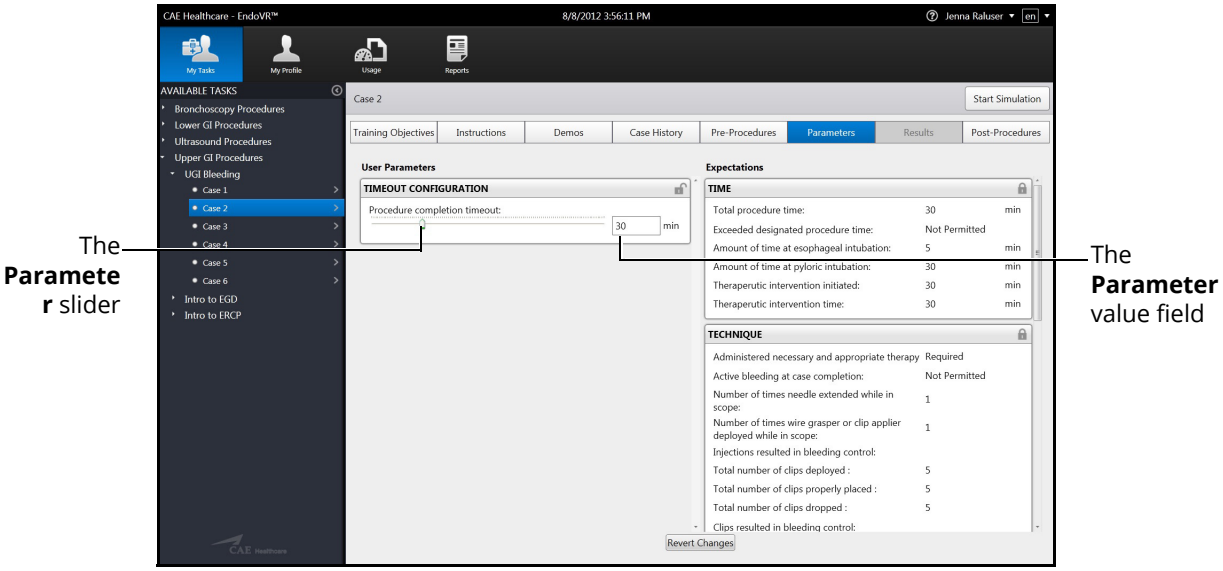
Every task available on the simulator contains parameters for determining if the learner performed a procedure successfully. For some procedures, the administrator can provide users with the ability to change certain parameters such as timeouts, bleeding, and virtual aids. However, some modules do not contain any adjustable user parameters.

From the Parameters screen, learners can change the parameters prior to beginning a simulation. After the simulation is complete, the parameters return to their default values.

Note: Only unlocked user parameters can be adjusted by the user.

To change user parameters:

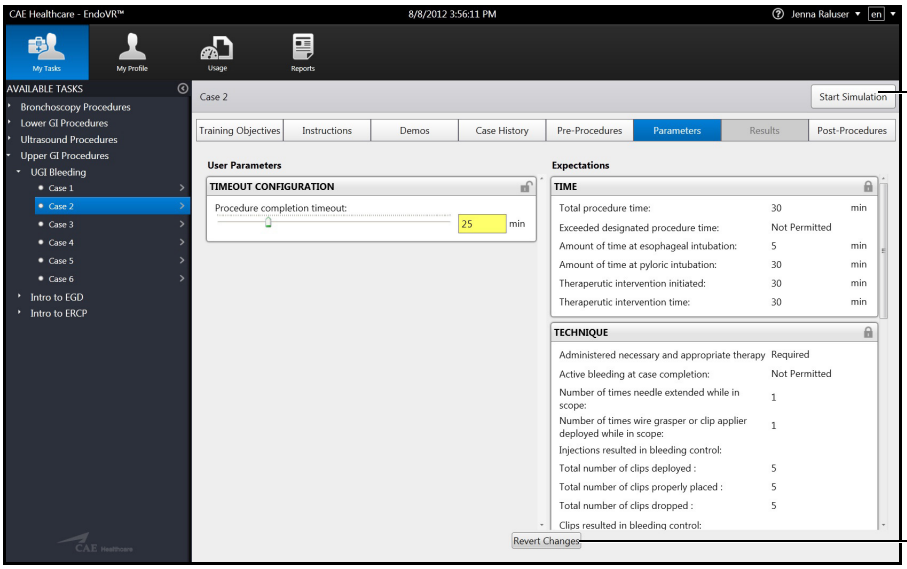
1. Select a task and click the **Parameters** tab



The Parameters Screen

2. Use the slider to adjust the parameter to the desired value

The adjusted parameter appears yellow and the changes are recognized until the user navigates to a different task or completes the simulation. Users can also cancel the parameter changes by clicking the **Revert Changes** button.



The Parameters Screen with Adjusted Parameter

Note: Parameters with a value field can also be adjusted by replacing the desired value in the value field. The new value must be within the parameters value range.

Running a Simulation

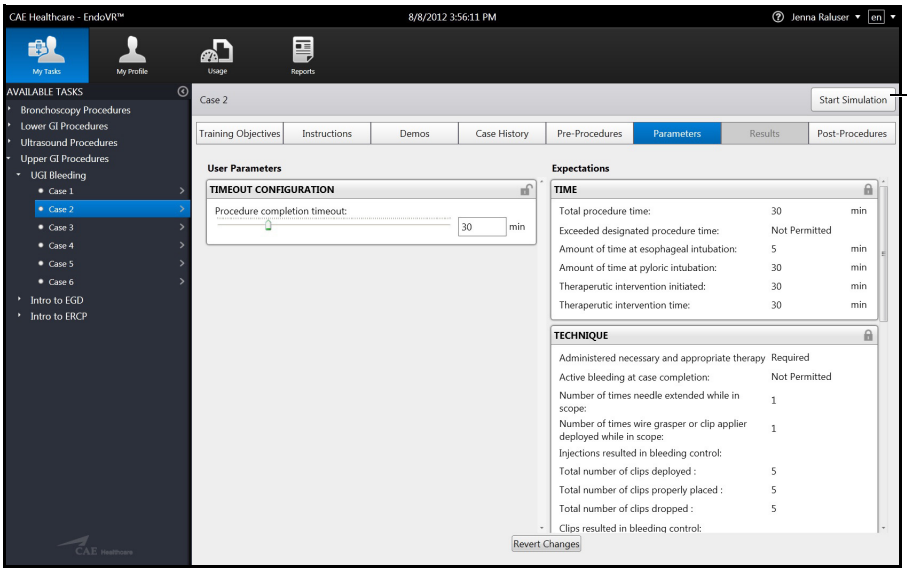
Prior to running a simulation, prepare for the simulation by completing the following steps:

1. Select the desired task
2. Review the associated didactic content
3. Complete any parameter adjustments, if applicable

After the preparation steps are complete, start the simulation

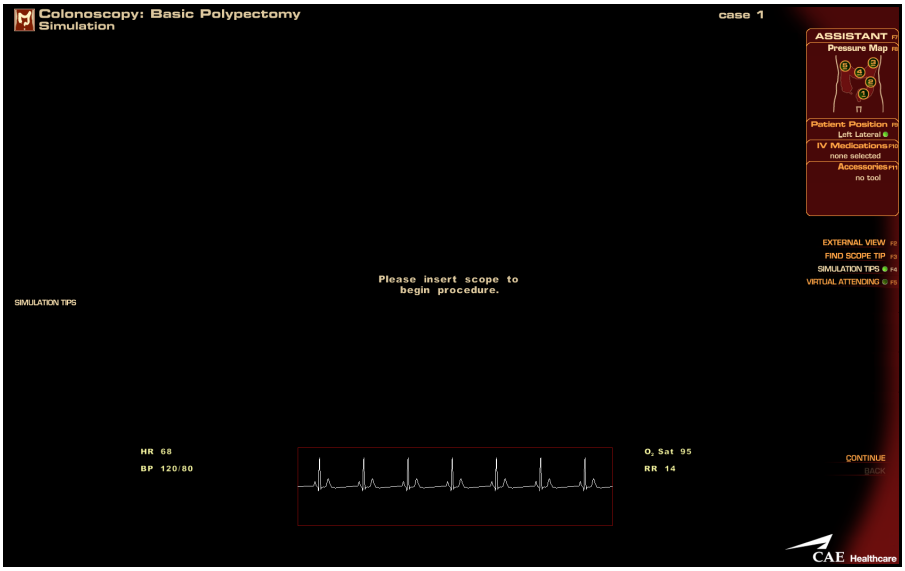
To start a simulation:

1. Click the **Start Simulation** button from any screen within the selected task



The **Start Simulation** button

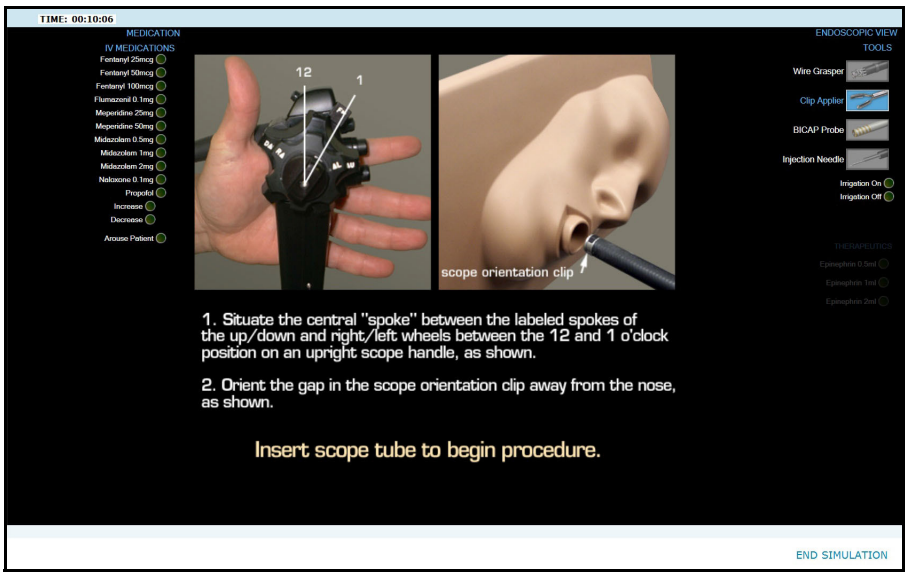
The Parameters Screen



The Simulation Start Screen

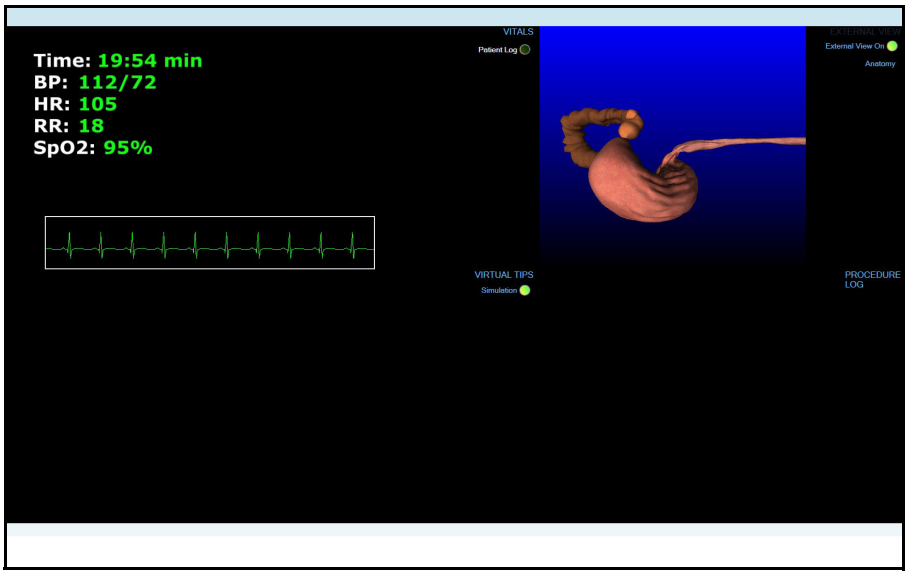
IMPORTANT: Some modules contain different content related to the simulation, which may display on both the left and right monitors.

When a task from the upper GI bleeding module is selected, the simulation start screen appears on the left monitor.



The Left Monitor Start Screen

The vitals and external view appear on the right monitor.



The Right Monitor Start Screen

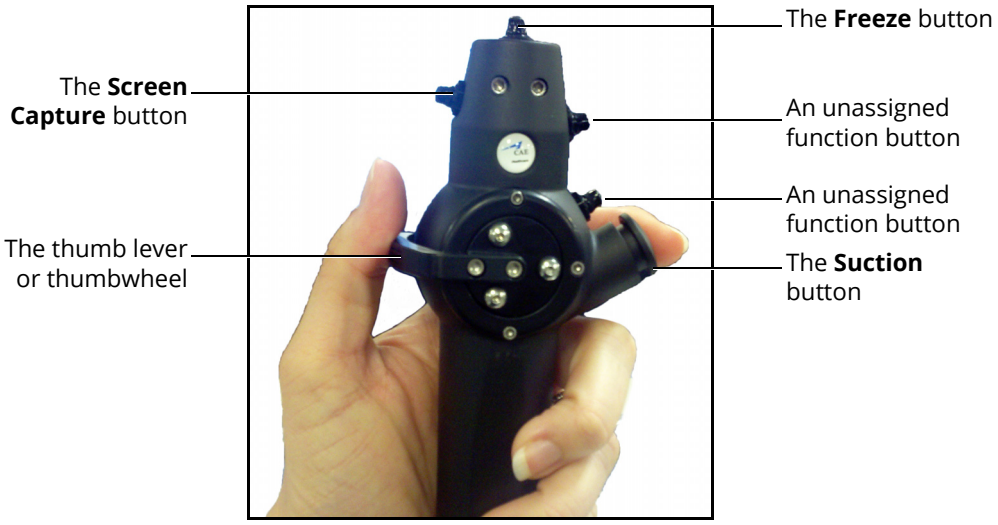
Note: Be sure to observe the content on both monitors while performing procedures.

Selecting a Scope

The corresponding scopes and scope tubes are provided for purchased modules. Different scopes are used for different procedures.

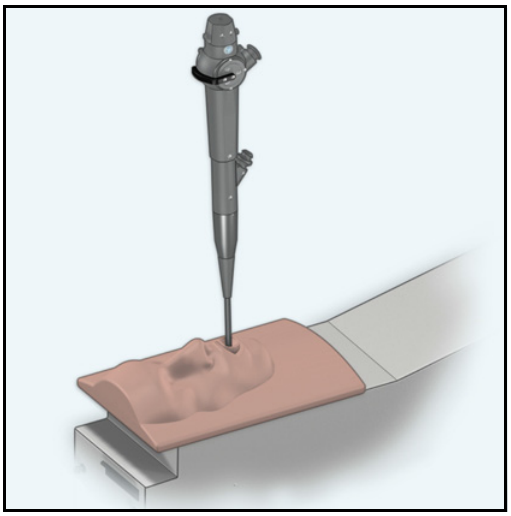
Bronchoscope

The bronchoscope is used in the Bronchoscopy modules including Pediatric Difficult Airway, Endobronchial Sampling and Transbronchial Needle Aspiration (TBNA).



The Bronchoscope Diagram

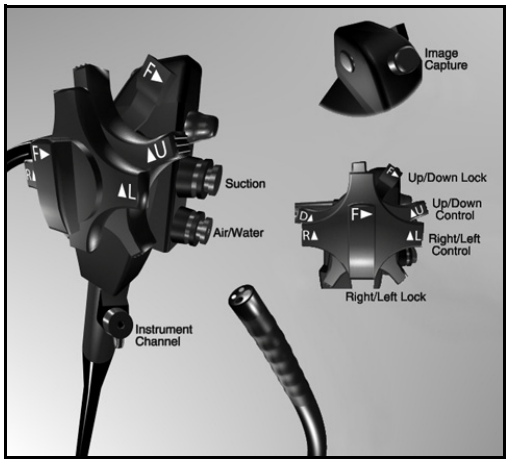
Stand to the left of the simulator when inserting the bronchoscope.



The Bronchoscopy Orientation

Endoscope

The endoscope is used for the Lower GI and Upper GI modules, including Introduction to Colonoscopy, Colonoscopy: Biopsy, Colonoscopy: Basic Polypectomy, Introduction to Flexible Sigmoidoscopy, Flexible Sigmoidoscopy: Supplementary Cases, Introduction to ERCP, Introduction to EGD and UGI Bleeding.



The Endoscope Diagram

Stand directly in front of the simulator when inserting the endoscope unless otherwise informed when reviewing the didactic content prior to beginning the module.

The Endoscope Hand Positioning

To select a scope:

1. From the scope holder located on the back of the monitor, select the desired scope
2. Ensure the selected scope is connected

   Note: The desired scope should be connected to the simulator by the administrator during the simulator setup. However, if a different scope is required for the selected module, the learner must change the scope.

Connect the Scope

When the chosen task requires a different scope from the scope that is currently connected, learners can disconnect the current scope and connect the new scope.

Note: Do not disconnect scope during a running simulation.

To disconnect a scope:

a. Twist the two fasteners on the scope connector counterclockwise

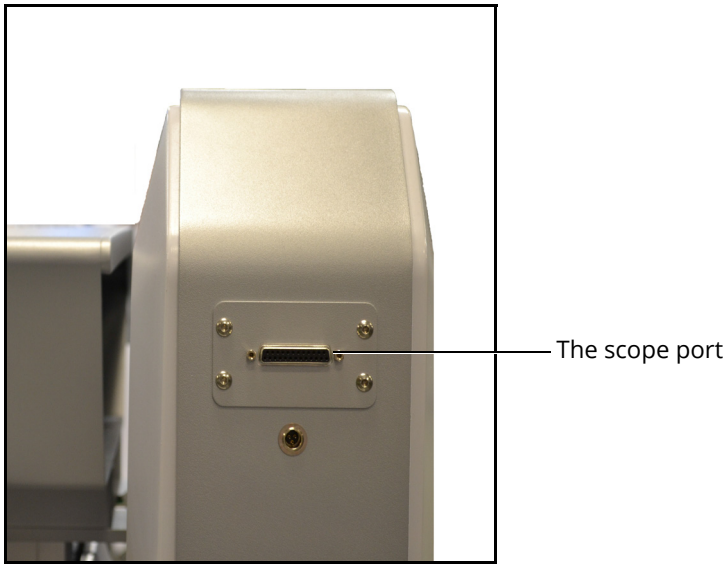
The Scope Connector and the Scope Port

b. Pull the connector away from the scope port

To connect a scope:

a. Choose the desired scope from the scope holder located on the back of the simulator

b. Align the prongs in the connector with the scope port located on the back left side of the simulator



The Back of the Simulator

c. Press the connector into the scope port and twist the two fasteners clockwise

The Scope Connector and the Scope Port

The scope is connected to the simulator.

Note: Only one scope can be connected to the simulator at a time.

Using the Scope

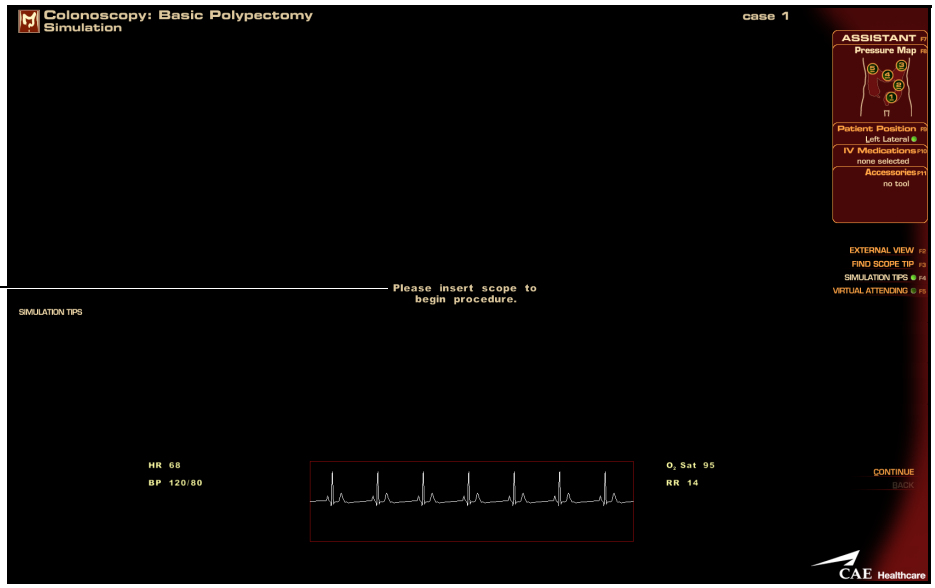
After selecting and connecting the appropriate scope, the scope is ready to be used.

To use the scope on the simulator:

1. Turn the anatomy plate to the correct anatomical part for the procedure, if applicable
2. Stand to the left or directly in front of the EndoVR device (depending on the appropriate orientation for the chosen procedure)
3. Select the desired task, review the didactic content and click **Start Simulation** to begin the simulation

WARNING: DO NOT insert the scope tube until the insertion message appears on the simulation screen.

4. When the **Please Insert Scope to Begin Procedure** message appears on the Simulation Screen, carefully insert the scope tube into the simulator



The **Please Insert Scope to Begin Procedure** message

The Simulation Start Screen

5. Navigate the scope insertion by observing the insertion on the monitor and using the appropriate controls on the scope

Troubleshooting Guide

Table 1:

Problem	Resolution
The simulator is unable to detect the endoscope during simulation.	Select the **Reset Endoscope** button in the **RESET** menu on the right screen and wait to be prompted to insert the scope a depth of 40 cm in the simulator.

Selecting an Accessory Tool

Some tasks in the modules require the use of an accessory such as a snare or needle to assist the learner during a procedure.

The EBUS-TBNA accessory tool is a single hardware component that is used with the bronchoscope to simulate several different tools and functions during EBUS-TBNA module tasks in the software.

The EBUS-TBNA Accessory Tool

The Upper GI/Lower GI accessory tool is a single hardware component that is used with the endoscope to simulate several different tools and functions during Upper GI and Lower GI module tasks in the software.

The Upper GI/Lower Accessory Tool

Connect the Accessory Tool (Optional)

To connect the accessory tool for specific procedures:

1. Select the desired accessory tool for the procedure

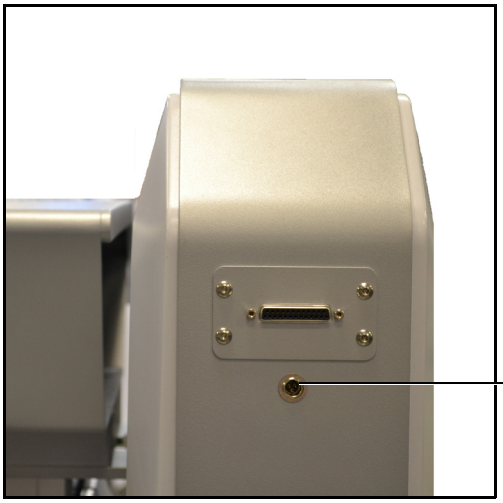
   The EBUS-TBNA accessory tool is used for EBUS-TBNA module tasks.

The EBUS-TBNA Accessory Tool

The Upper GI/Lower GI accessory tool is used for certain Upper GI and Lower GI module tasks.

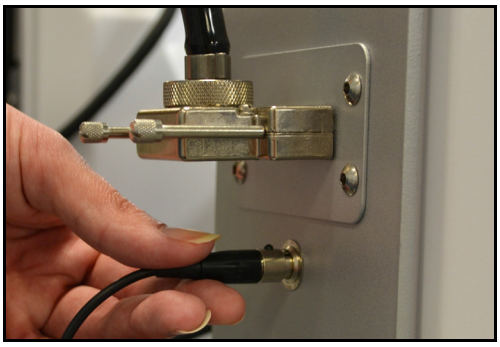
The Upper GI/Lower Accessory Tool

2. Locate the accessory tool port on the back of the simulator



The Back of the Simulator

3. Press the accessory tool connector into the accessory tool port



The Accessory Port

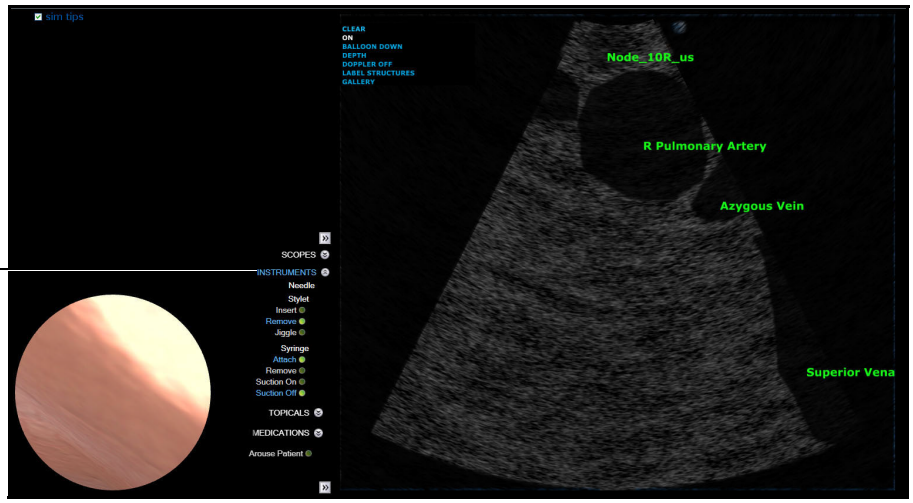
Using the EBUS-TBNA Accessory Tool

After the desired task is selected, the simulation is started and the accessory tool is connected, the EBUS-TBNA accessory tool is ready to be used.

To use the EBUS-TBNA accessory tool:

1. From the **Instruments** menu, located on the left monitor in the EBUS-TBNA module, select the appropriate tool designation in the software

The **Instruments** menu



The Left Monitor Simulation Screen

2. On the EBUS-TBNA accessory tool, ensure the needle is fully retracted by pulling up the hub until it clicks
3. Click **OK**
4. Set the catheter adjustment screw to the appropriate depth
5. Set the needle depth lock to an appropriate depth for needle penetration
6. Using the EBUS-TBNA accessory tool, insert the needle into the node while simultaneously observing the depth of the needle on the simulation screen
7. Click **Jiggle** to jiggle the stylet, if desired

   Note: When a menu item is selected, the green circle next the to item appears bright green and the menu item text appears blue.
8. From the Stylet, menu, select **Remove**
9. From the Syringe menu, select **Attach**
10. From the Syringe menu, select **Suction On**
11. Agitate the needle within the node to obtain the sample
12. From the Syringe menu, select **Suction Off** or **Remove Syringe**
13. Retract needle fully by pulling up on the hub until it clicks into place
14. Lock the hub in place with the needle depth lock
15. Remove the accessory tool from the working channel and repeat the process as required

Using the Upper GI and Lower GI Accessory Tool

After the desired task is selected, the simulation started and the accessory tool is connected, the Upper GI and Lower GI accessory tool is ready to be used.

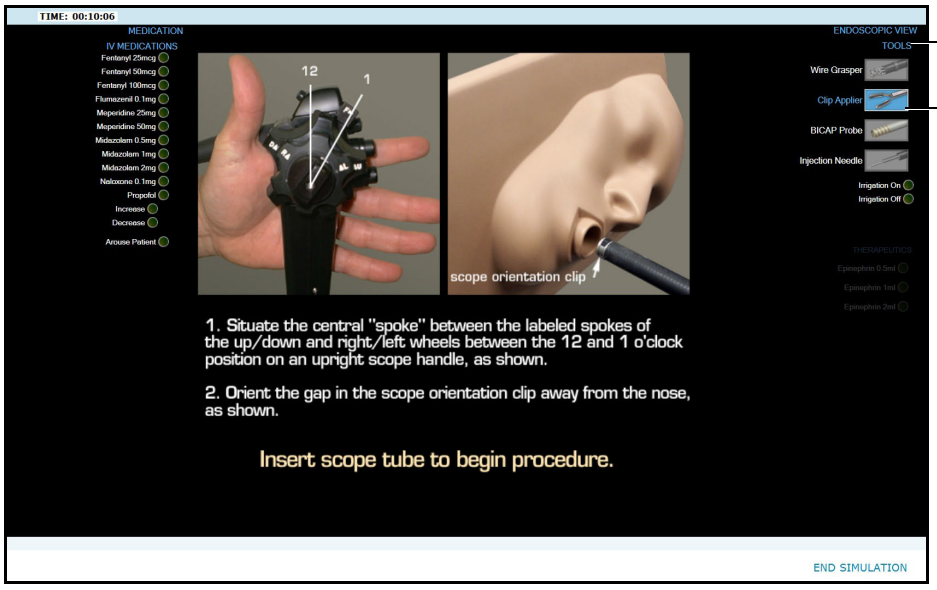
To use the Upper GI and Lower GI accessory tool:

1. Ensure the finger loops of the handle are pressed together

   The tool must be in the retracted (closed) position prior to using the tool.

The Accessory Tool in the Retracted Position

2. From the **Tools** menu, located on the left monitor during the UGI Bleeding module, select the appropriate tool designation in the software. When the menu item is selected, the menu item graphic and the menu item text appears blue.



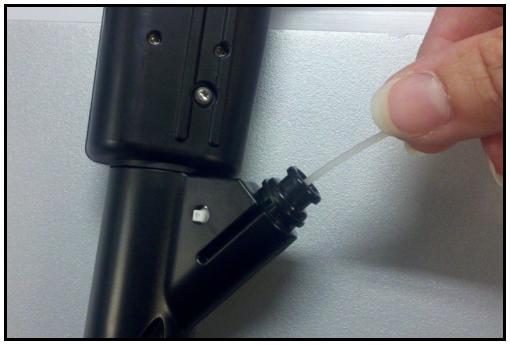
The **Tools** menu

The selected tool

The Left Monitor Simulation Screen

Note: The location of the tool selection options on the screen and the appearance of the available tools will vary depending on the selected module.

3. Insert the plastic filament from the accessory tool into the working channel of the scope



The Insertion of the Accessory Tool Filament

4. Pull the single finger loop away to deploy the selected tool. This position is known as the deployed (open) position

The Accessory Tool in the Deployed Position

Note: If an accessory tool is unavailable, learners may use the virtual substitutes in the software. Click the **Close <** button or use the left arrow key on the keyboard to retract the tool. Click the **Open >** button on the simulation screen or use the right arrow key on the keyboard to insert the tool. Always retract the tool before insertion.

Using the Pedals

The pedals provide energy for electro-cautery instruments and are only available for use in certain modules.

To use the pedals:

1. Remove the pedals from the storage tray located underneath the simulator
2. Place the pedals directly in front of the simulator

The Simulation Pedals

3. Select the desired procedure, review the didactic content and click **Start Simulation** to start the simulation
4. Press down on the foot pedal gradually to power the selected instrument during the simulation

   Note: During the ERCP Module, the left pedal allows learners to access the fluroscopic view of the simulation.

Ending a Simulation

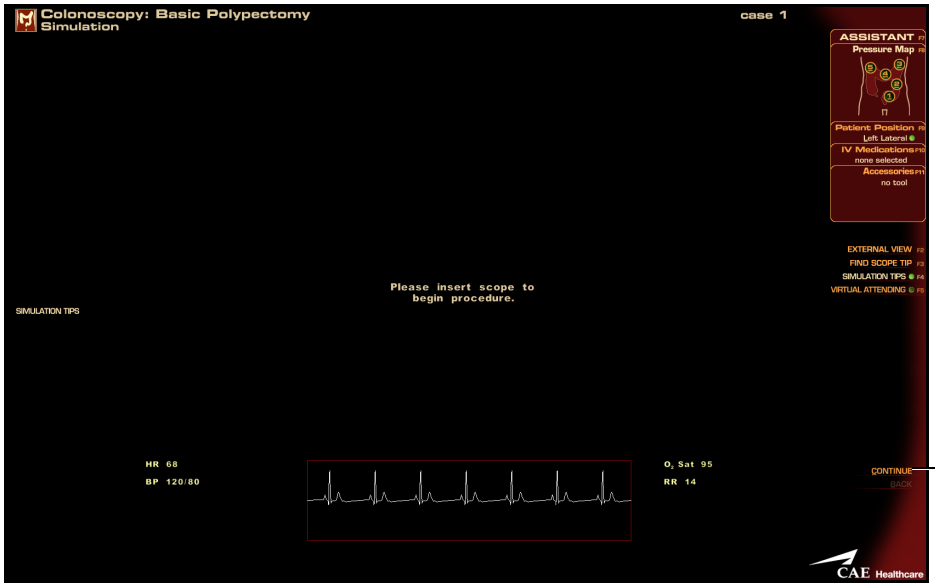
The EndoVR simulator has multiple ways in which a simulation can end.

In some cases, the learner makes a procedural error and is unable to correct the error within the allotted time for the simulation. Certain task parameters affect what types of injuries or errors are acceptable and correctable within a simulation. If a learner performs a fatal error, the simulation will end before the time expires.

In other cases, the learner completes the procedure before the allotted time has expired and the simulation ends.

Learners also have the option to stop a simulation at any time during the procedure.

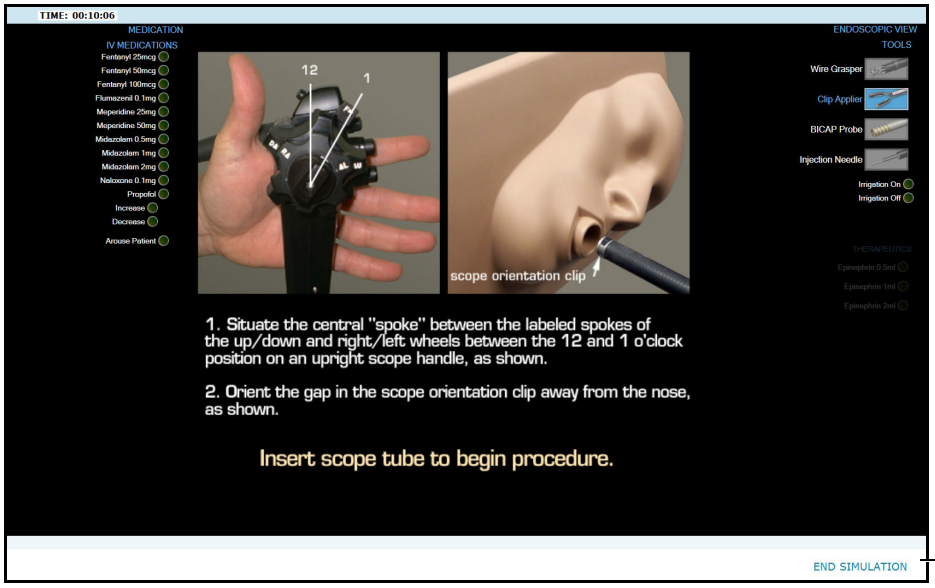
To end a simulation manually, from the simulation screen, click the **Continue** button.



The Simulation Screen

Note: Some modules do not contain a **Continue** button.

To end the simulation manually in modules without a **Continue** button, click the **End Simulation** button.



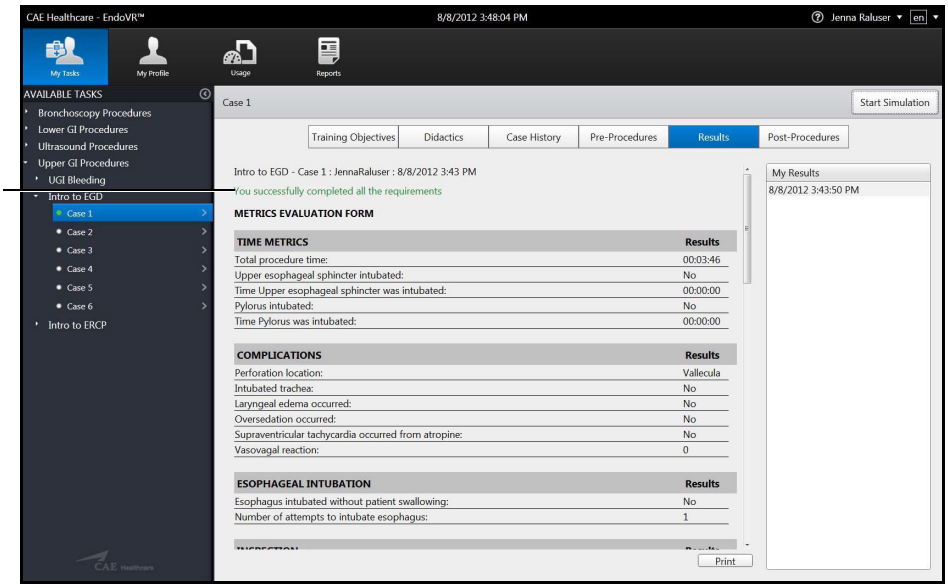
The Simulation Screen

Viewing Results

Once the simulation is complete, the Results screen appears.

If the learner meets all of the parameters for the simulation, the **Successful Completion** message displays.

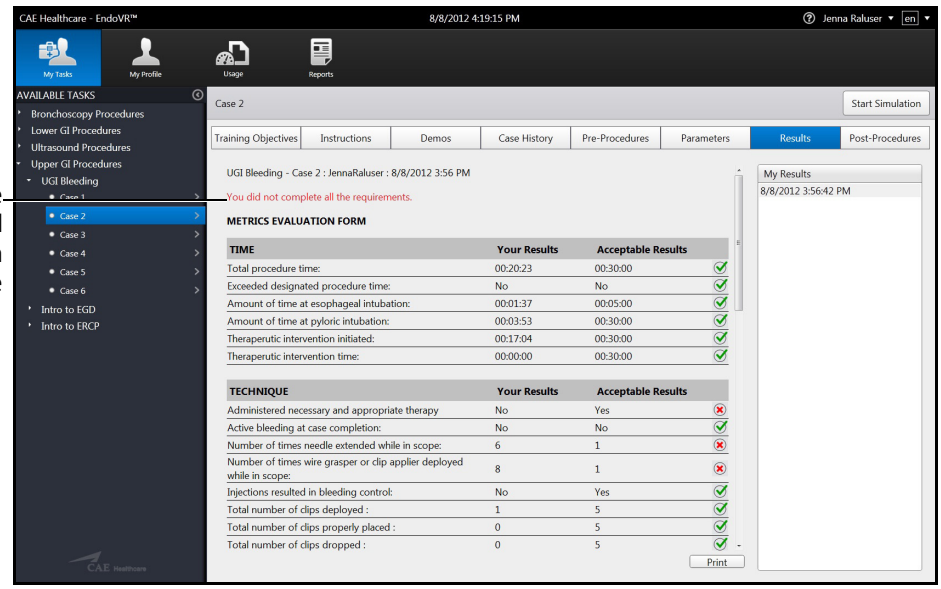
The **Successful Completion** message



The Results Screen

If the learner did not meet all of the parameters for the simulation, the **Unsuccessful Completion** message displays.

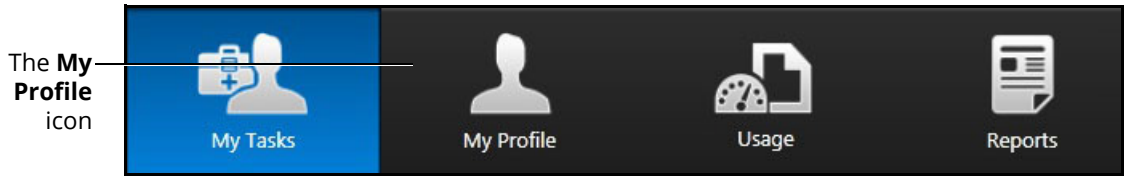
The **Unsuccessful Completion** message



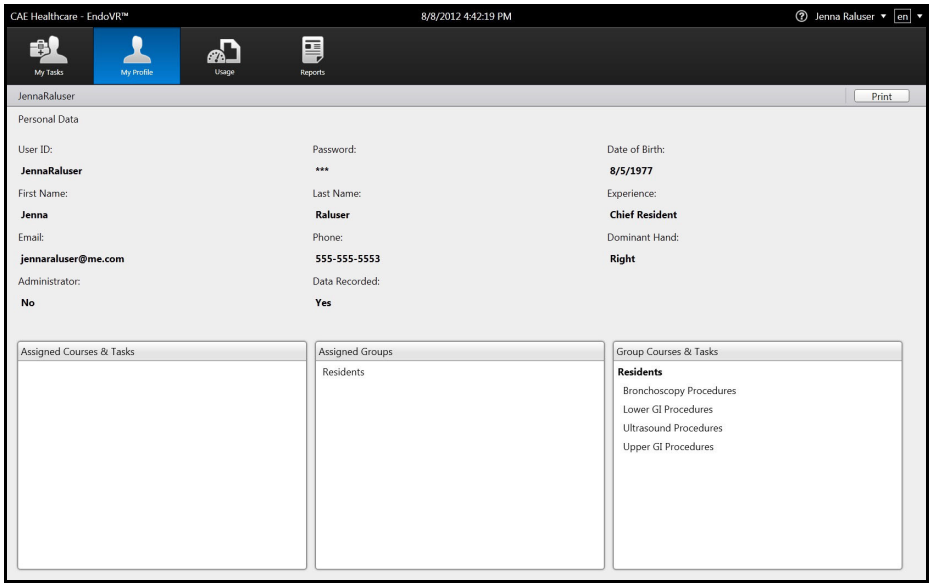
The Results Screen

Viewing Personal Data

To view personal data, click the **My Profile** icon.



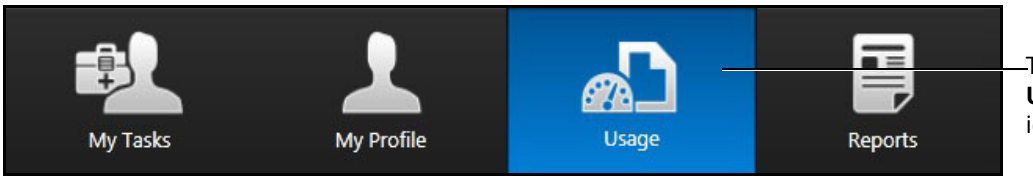
The Icon Dashboard



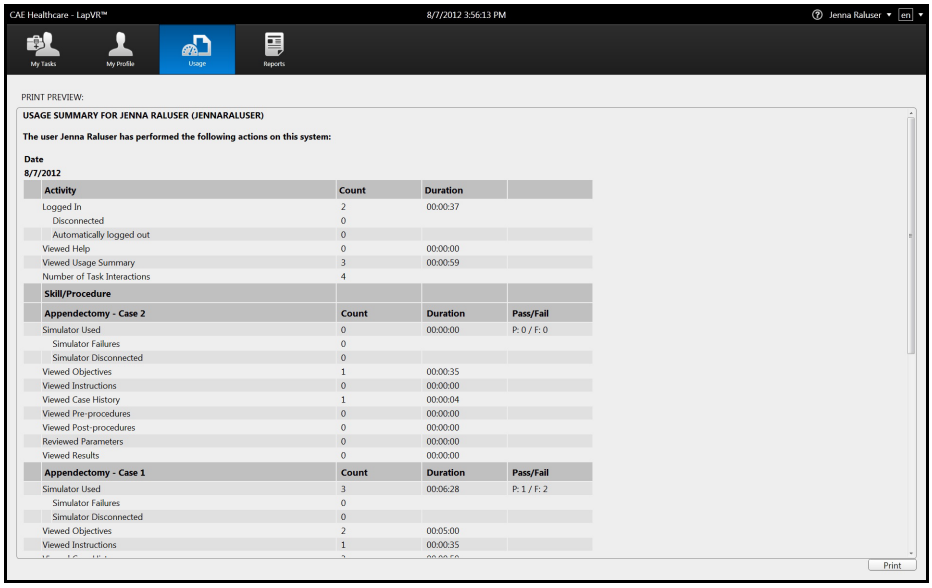
The Personal Data Screen

Viewing Usage Summaries

To view usage summaries, click the **Usage** icon.



The Icon Dashboard



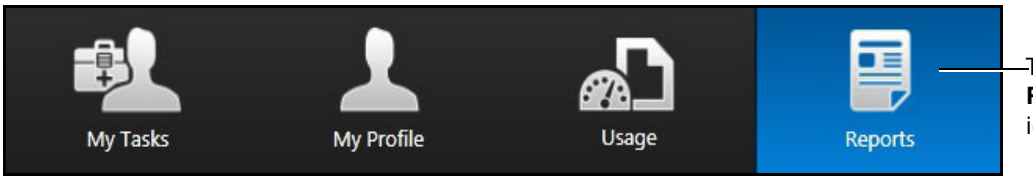
The Usage Summary Screen

Viewing Reports

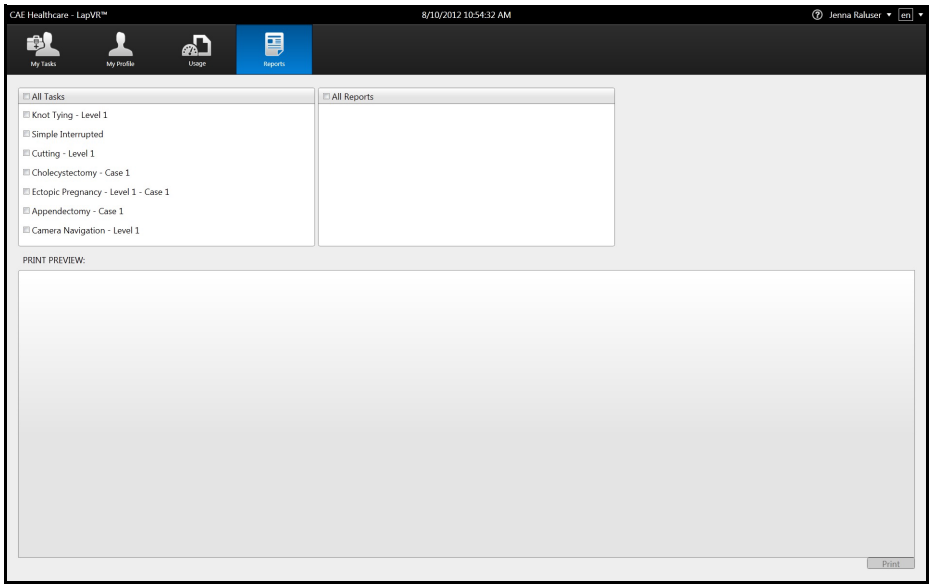
Learners can view customized reports from the Reports screen.

To view reports:

1. Click the **Reports** icon

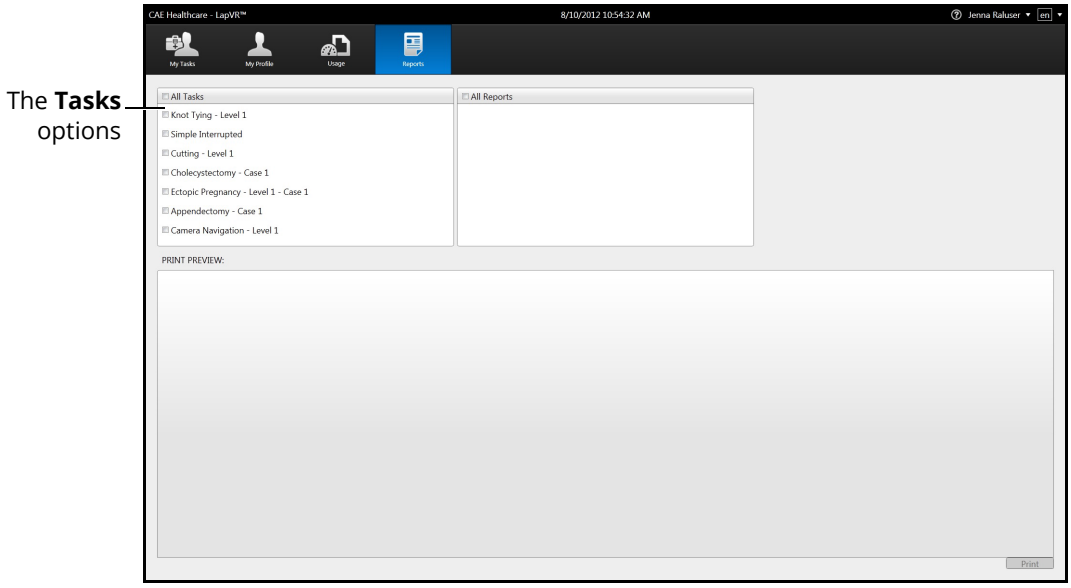


The Icon Dashboard



The Reports Screen

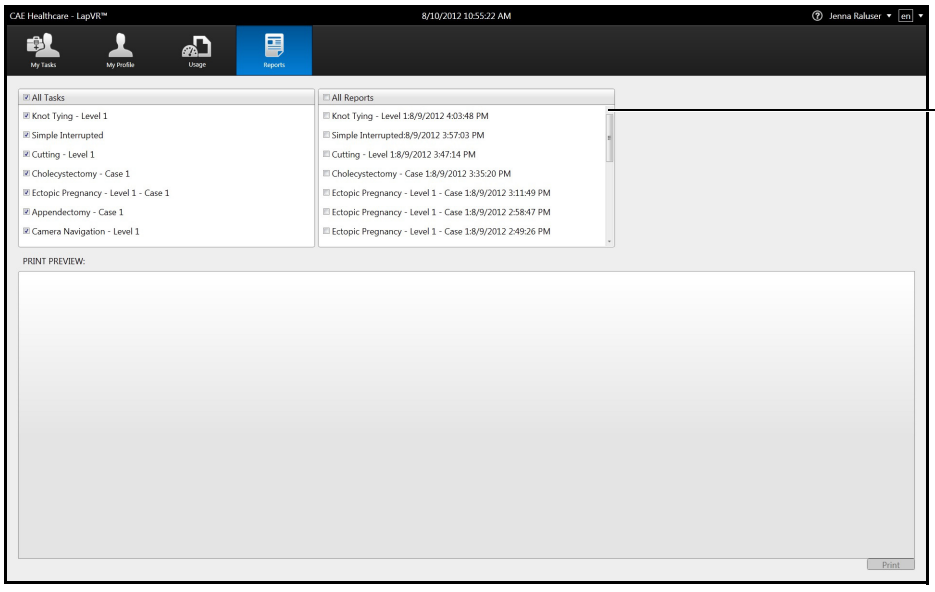
2. From the **Tasks** options, select the desired tasks to include in the report or select **All Tasks**



The Reports Screen

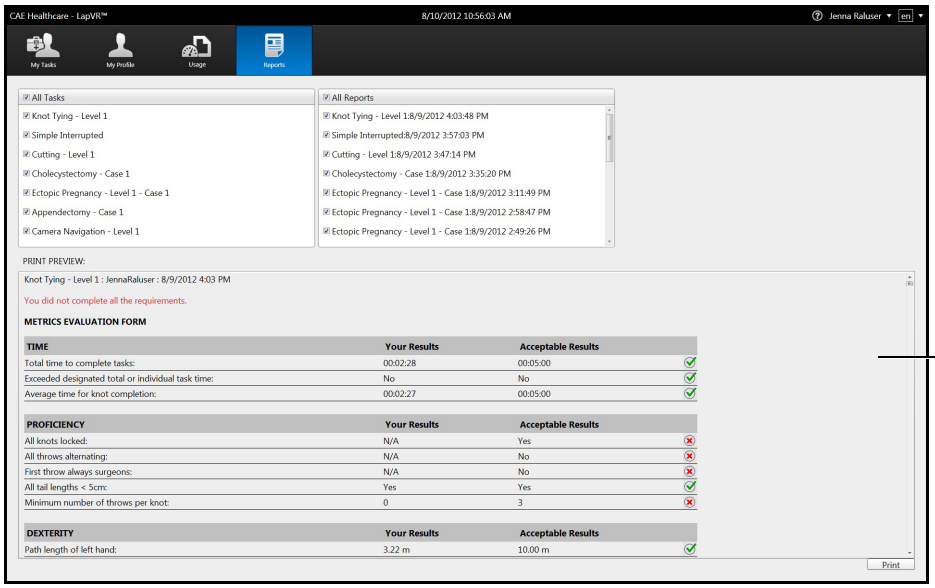
The **Reports** options appear.

3. From the **Reports** options, select the desired reports to include in the report or select **All Reports**



The Reports Screen

The report appears in the **Print Preview** panel.



The **Print Preview** panel

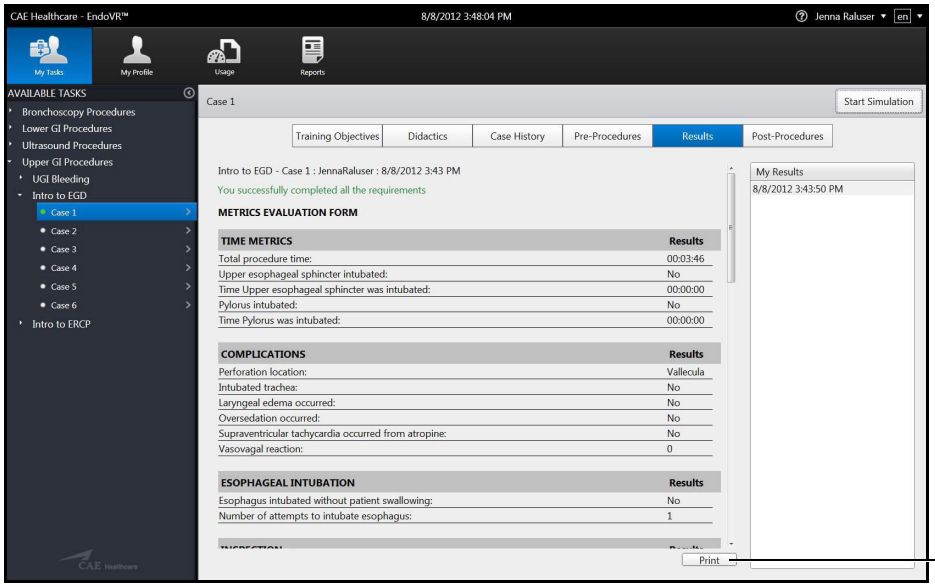
The Reports Screen

Printing Data to a Network Printer

A network connection is required for printing to a network printer. Contact your administrator for further assistance.

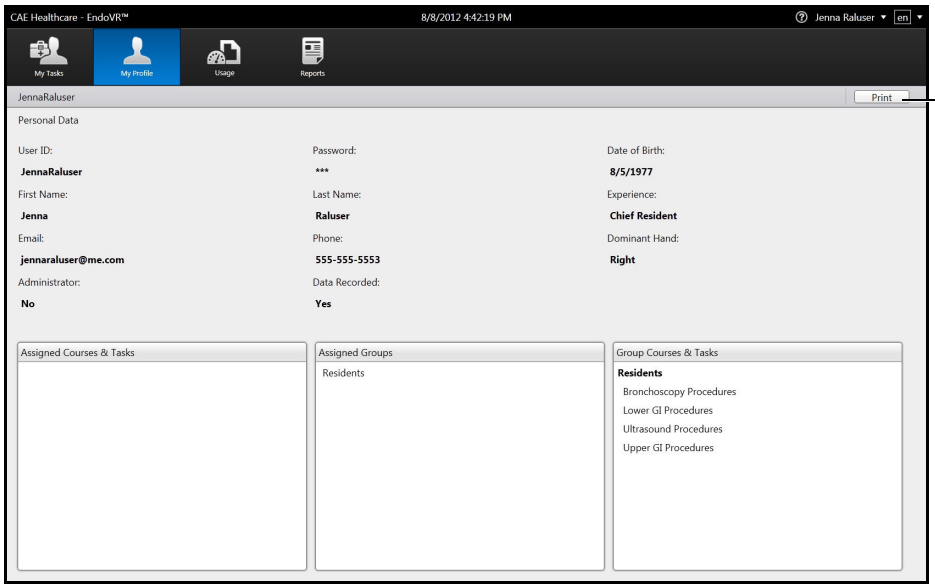
To print data to a network printer:

1. From the selected screen, click the **Print** button located near the bottom right corner of the screen

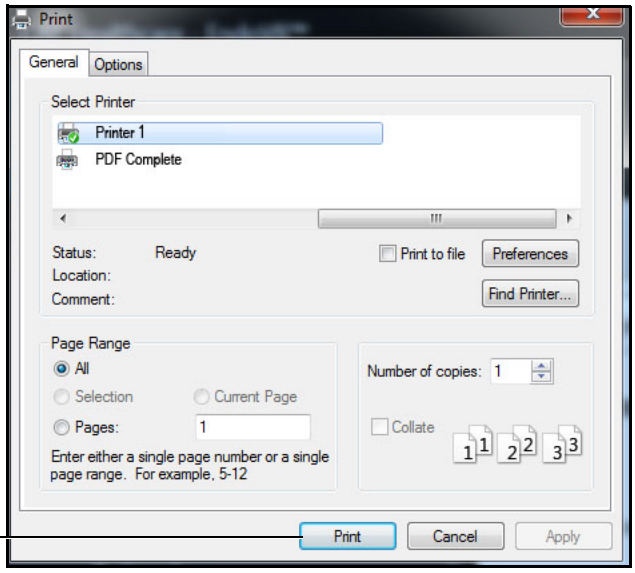


The Results Screen

Note: The **Print** button on the Personal Data screen is located near the top right corner of the screen.



The Personal Data Screen



The Print Window

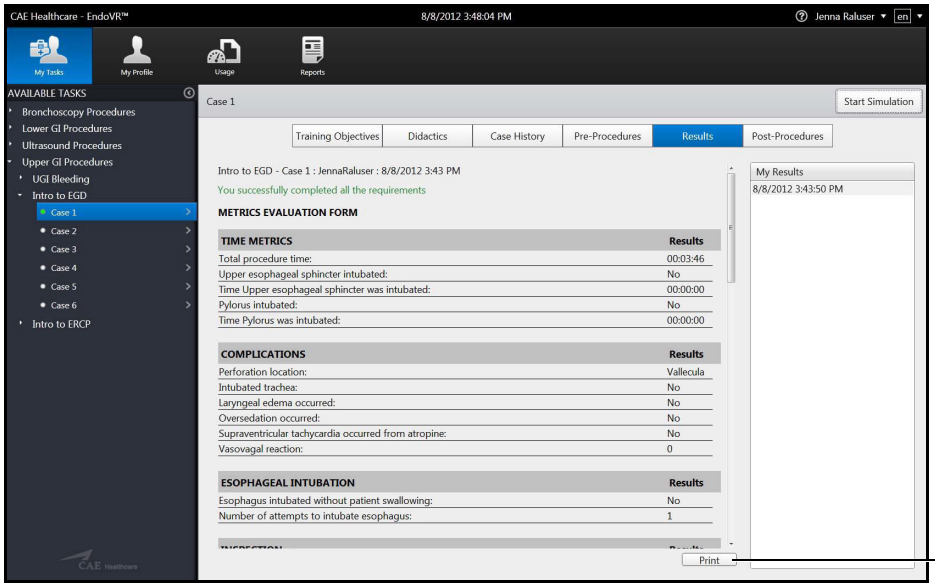
2. Select the desired network printer
3. Click **Print**

Printing Data to a PDF File

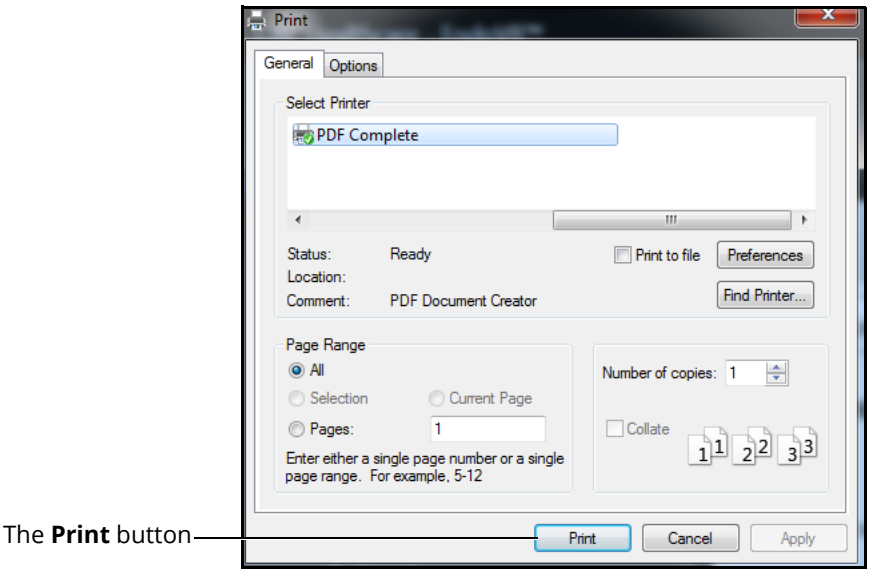
If network connection is not available or no network printers are available, users can print data to a PDF file and save the file to an external device to print on a computer with a network printer connection.

To print the data to a PDF file:

1. From the selected screen, click the **Print** button located near the bottom right corner of the screen



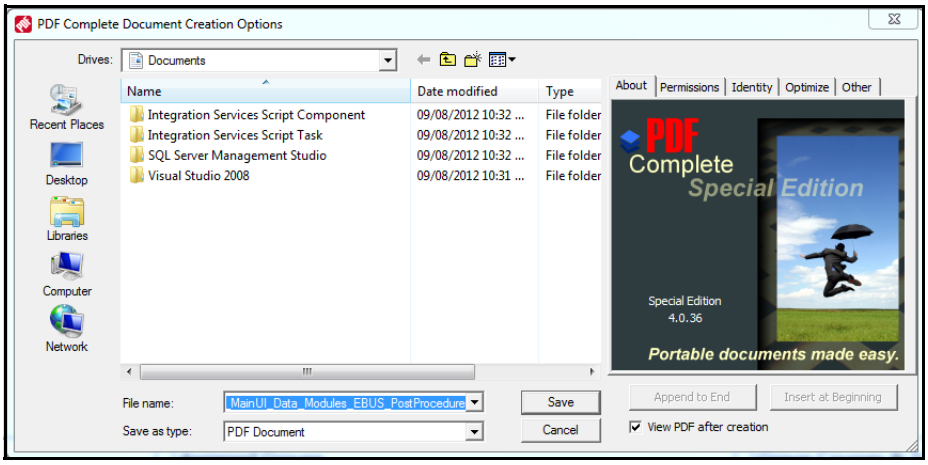
The Results Screen



The Print Window

2. Select the **PDF Complete** program

3. Click **Print**



The PDF Complete Document Creation Options Window

4. Select the desired folder where the file will be saved

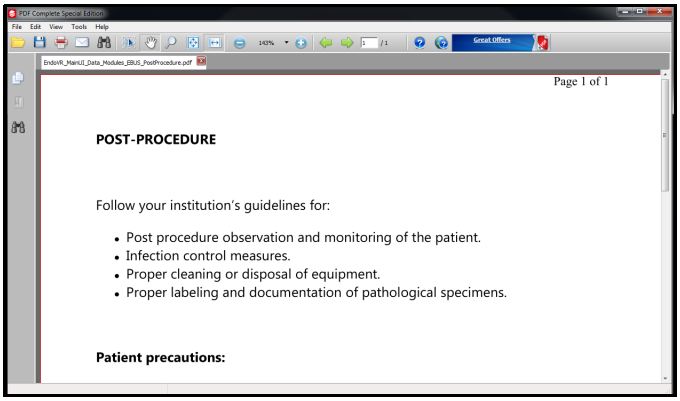
   Notre: If the location is on an external device, use the USB port located on the back of the simulator to connect the external device to the simulator.

5. Enter the desired file name in the **File name** field
6. Click **Save**

The PDF Complete Window

7. Click **Done**

The PDF Complete Special Edition window appears with the completed PDF.



The PDF Complete Window

Modifying Language Preferences

Learners can change the language settings for their personal account using the language preferences menu in the top right corner of the screen.

To modify the language preferences:

1. Click the **Language Preferences** menu

The Home Screen

2. Select the preferred language from the drop-down menu

   A checkmark appears next to the selected language and the language is applied to the software.

Note: Since the EndoVR software is currently only available in English, no other options are available to set as the default language.

Adjusting the Volume

Learners can adjust the volume of the simulator sounds by using the hotkeys on the simulator keyboard.

To increase the volume, press the **Ctrl** key and the **Up** arrow on the simulator keyboard simultaneously until the desired volume is achieved.

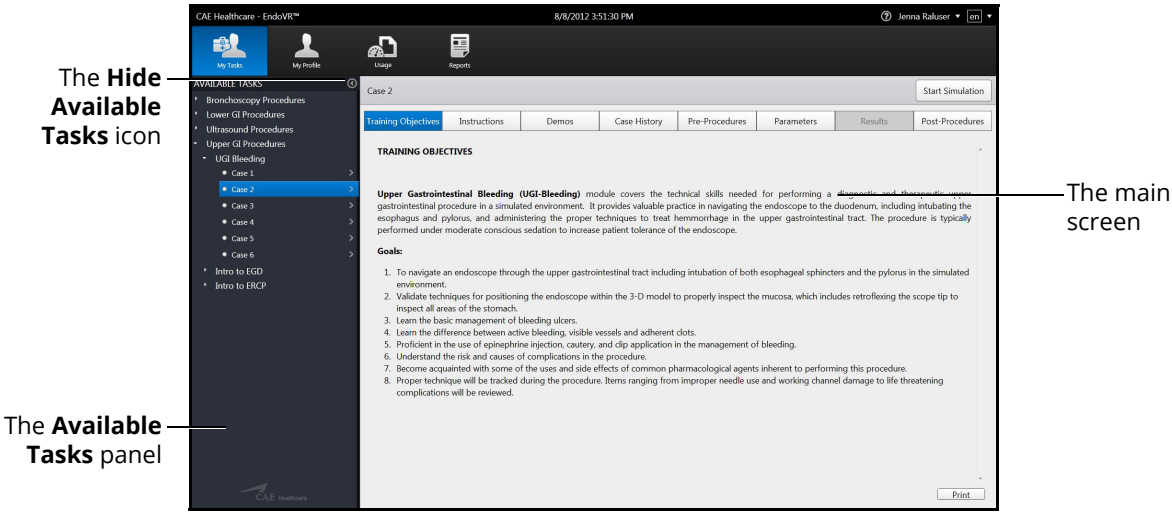
To decrease, press the **Ctrl** key and the **Down** arrow on the simulator keyboard simultaneously until the desired volume is achieved.

Hiding the Available Tasks Panel

Learners can hide the Available Tasks panel to view the didactic content in full screen mode.

To hide the Available Tasks panel:

1. From the icon dashboard, click the **My Tasks** icon
2. From the **Available Tasks** panel, select the desired task



The Home Screen

3. Click the **Hide Available Tasks** arrow

Exiting the Software

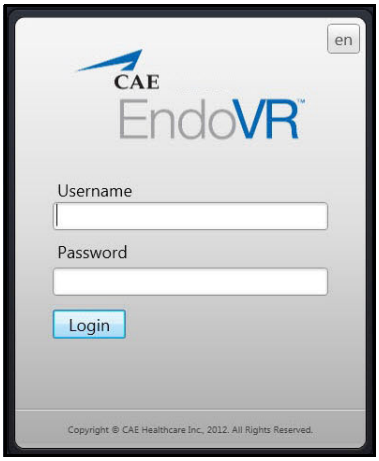
Learners should log out of the software once they are completed with their training session.

To exit the software:

1. Click on the username in the top right corner of the screen

The Home Screen with Logout Drop-Down Menu

2. Select **Logout** from the drop-down menu



The Login Screen

Starting an Endoscopic Submucosal Dissection Simulation

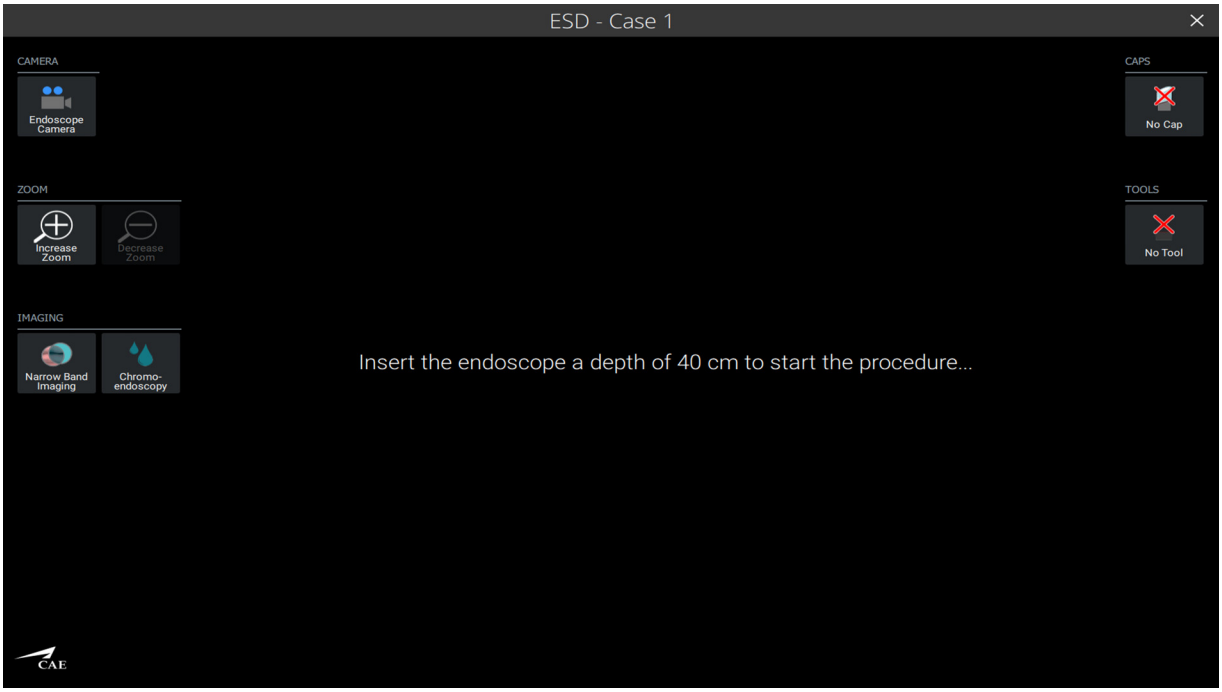
CAUTION: DO NOT TRY TO INSERT THE SCOPE BEFORE YOU SEE THE INDICATION ON THE SCREEN. ATTEMPTS TO INSERT THE SCOPE PRIOR TO THIS INDICATION CAN SEVERELY DAMAGE THE EQUIPMENT.

Prior to starting the simulation, you should ensure that the large oral anatomy plate is mounted on the front of the simulator with the chin pointed right.

You can adjust the height of the anatomy plate with the help of the arrow keys on the desktop cover.

The Anatomy Plate Height Adjustment Arrows

When the desired case is selected and the simulation is started, a message on the left LCD touchscreen monitor will prompt you to insert the endoscope a depth of 40 centimeters in order to start the procedure.

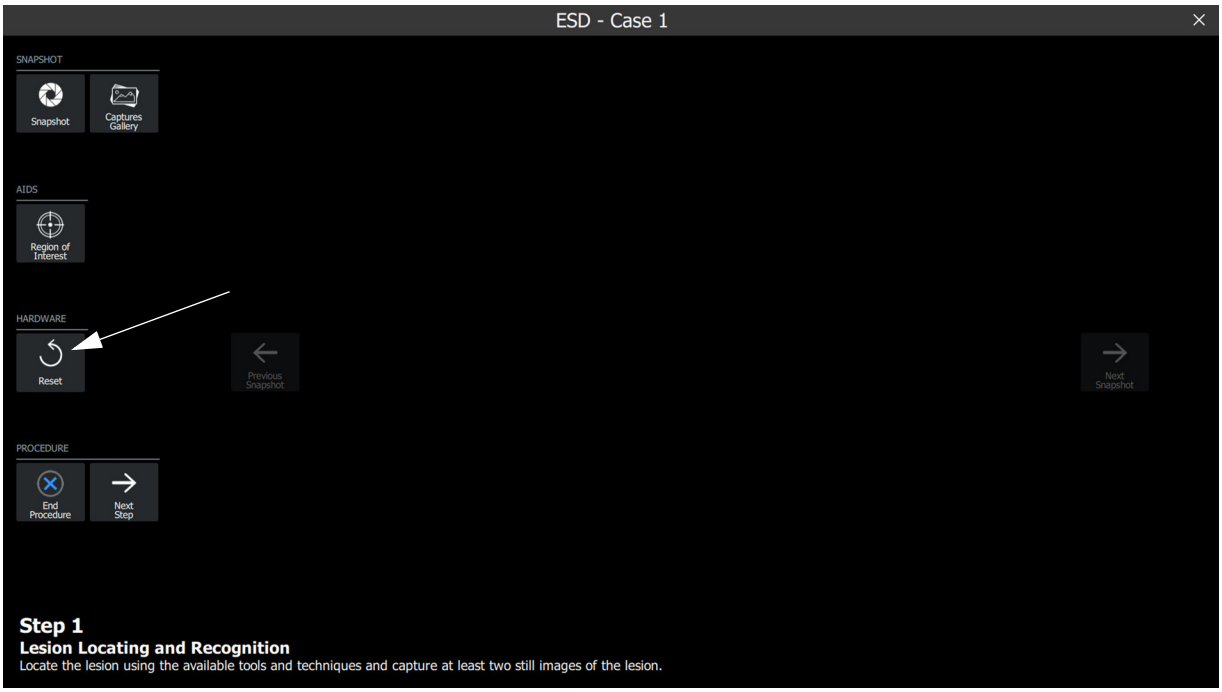


The Left Monitor at Start of a Simulation

Note: This message will reappear if the endoscope is removed from the simulator at any point during the simulation.

While standing at the head of the anatomy plate and facing the monitors directly, insert the upper GI endoscope (120 cm) 40 cm into the anatomy plate. The scope orientation clip must be pointed to the left (at the 9 o'clock position) for the simulator to recognize the proper orientation of the scope tip upon insertion into the simulator manikin.

Note: If you are not properly oriented to the simulator manikin when inserting the scope, it will not catch correctly and the simulation will not respond appropriately to scope manipulation. If this occurs, solve the problem by pressing the Reset button (Below)



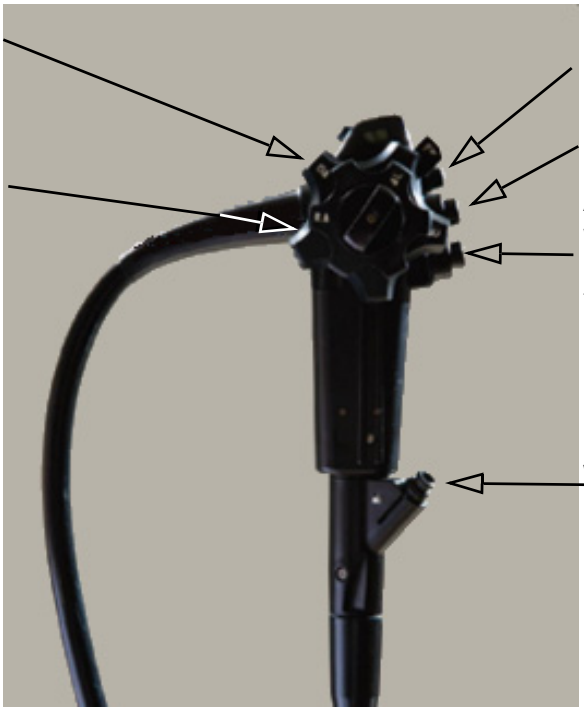
The Reset Button

You can navigate the simulator with both LCD touchscreen monitors. You can also use the simulator's built-in mouse and keyboard, or connect and use an external mouse and keyboard at your own discretion.

You will view the simulation using the left monitor while the both monitors contain the touchscreen controls used during the simulation.

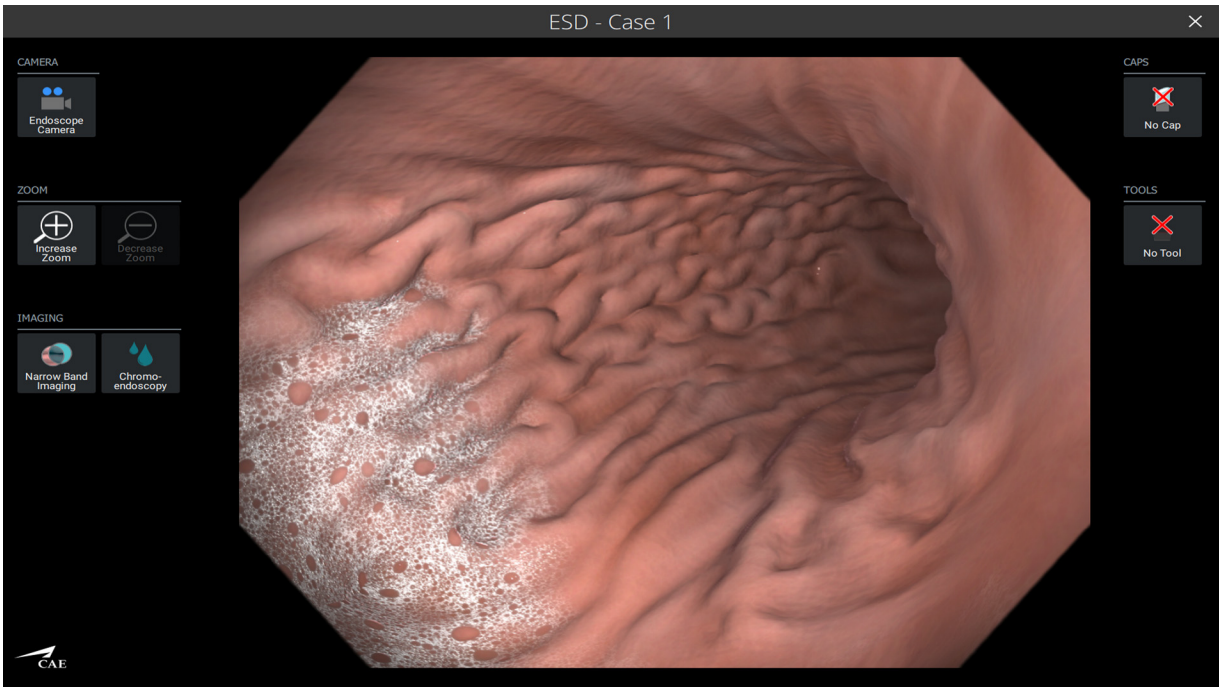
Scope Controls

The scope has five controls composed of three buttons and two deflection knobs. It also has a working channel to insert the filament of the snare tool (refer to Using the Snare Tool section).



The Scope Controls

Left LCD Touchscreen Monitor



The Left Screen Simulation Configuration

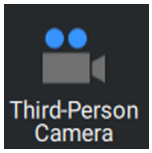
The left LCD touchscreen monitor displays different views depending on the selected camera mode. The left LCD touchscreen monitor has three menus along the left side of the screen: depending on the camera mode selected.

- CAMERA
- ZOOM
- IMAGING

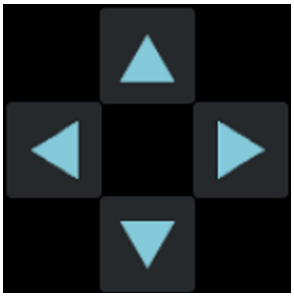
The left LCD touchscreen monitor has two menus along the right side of the screen:

- CAPS
- TOOLS

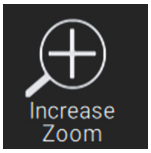
The **CAMERA** button allows you to toggle between the different view modes which impacts the view that is presented on the left-hand-side monitor.



When you select the **Third-Person Camera** button, arrow controls will appear to the right of the **Third-Person Camera** button. You can adjust **EXTERNAL VIEW** perspective by moving the camera angle up, down, in a clockwise direction or in a counterclockwise direction with the help of the arrow controls.



The **ZOOM** menu has the simulation software buttons:



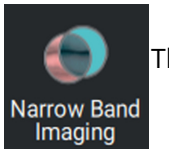
The **Increase Zoom** button allows you to increase the total magnification of the **ENDOSCOPIC VIEW**. You can increase the total magnification to 2X, 5X or 10X.

Note: The default magnification is 1X.

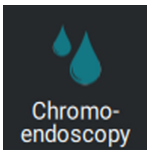
The **Decrease Zoom** button allows you to decrease the total magnification of the **ENDOSCOPIC VIEW**. You can decrease the total magnification to 1X, 2X or 5X.

Note: The **Decrease Zoom** button is disabled at the start of the simulation since the default magnification is 1X.

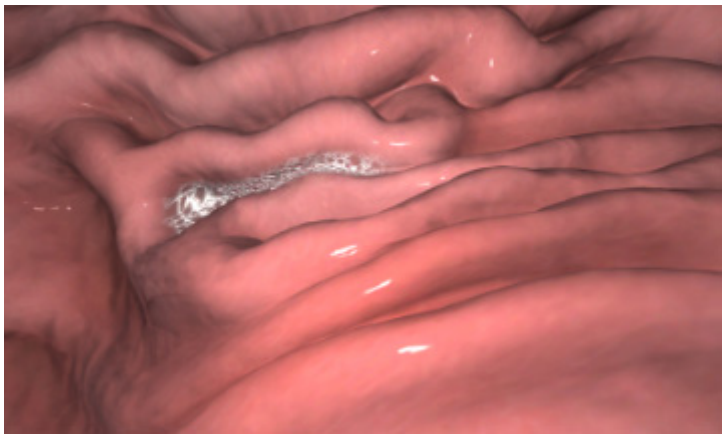
The **IMAGING** menu has the following simulation software buttons:



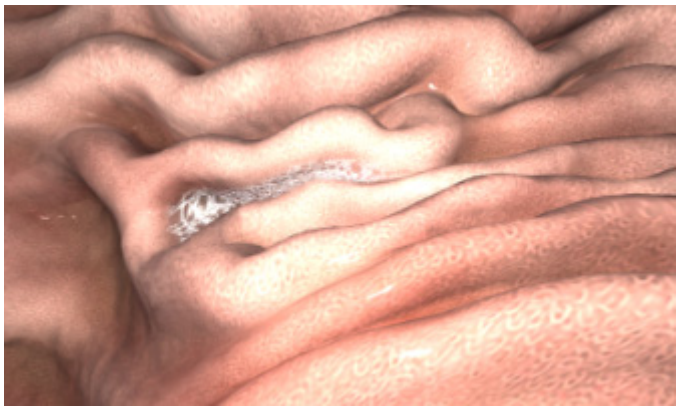
The **Narrow Band Imaging** button enables narrow band imaging modality.



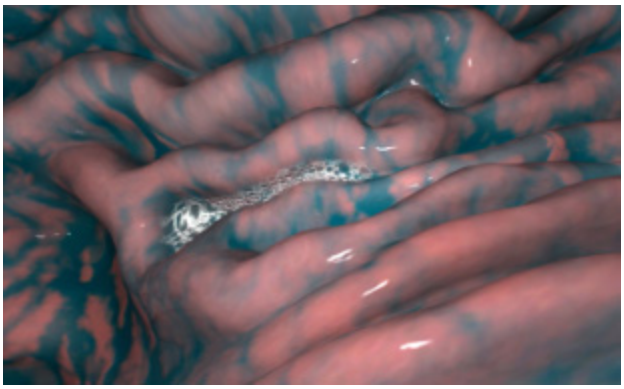
The **Chromoendoscopy** button applies indigo carmine contrast stain to the surface of the mucosa layer.



Sample Anatomy With Narrow Band Imaging Off

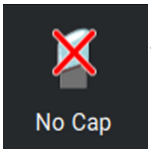


Sample Anatomy With Narrow Band Imaging On

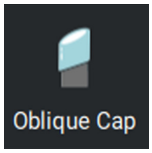


Sample Anatomy With Chromoendoscopy On

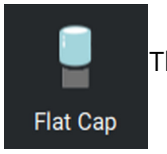
The **CAPS** menu has the following ESD cap options:



The **No Cap** option removes the selected ESD cap on the distal end of the scope in simulation.

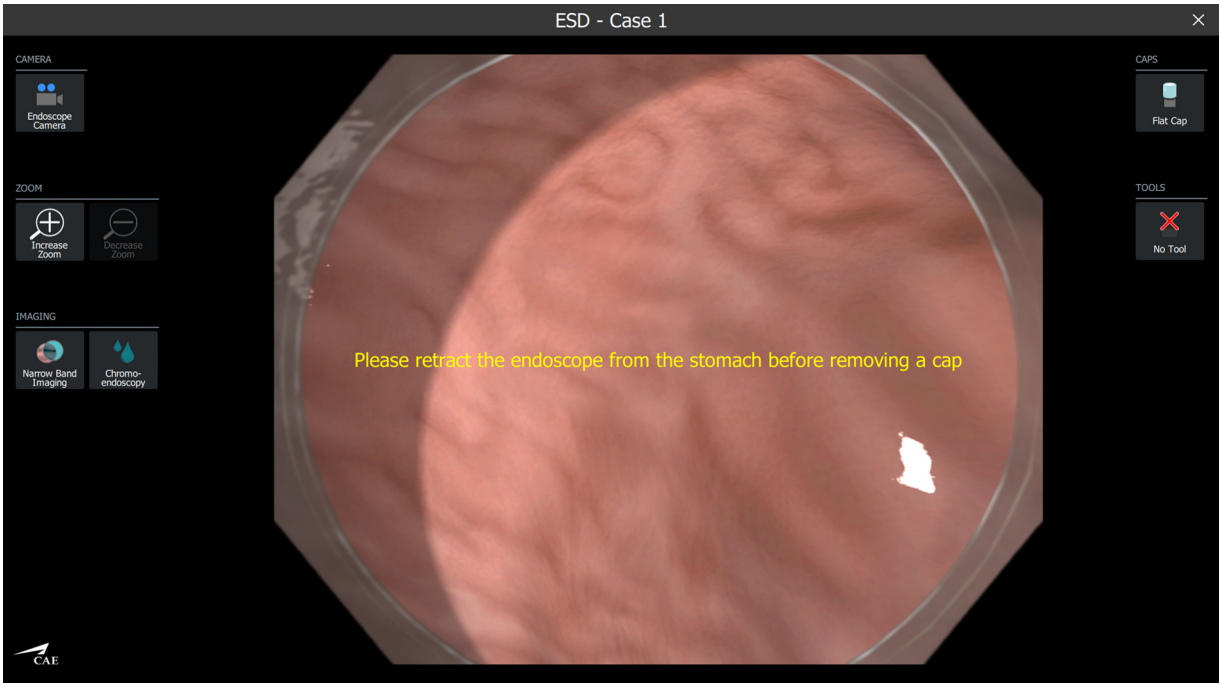


The **Oblique Cap** option adds the oblique ESD cap on the distal end of the scope in simulation.



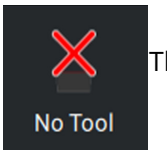
The **Flat Cap** option adds the flat ESD cap on the distal end of the scope in simulation.

You must retract the scope until the **ENDOSCOPIC VIEW** is no longer visible prior to selecting one of the ESD cap options above. A message will appear on both the left and right screens if this sequence of steps is not followed.



Example Of Selecting Oblique Or Flat Cap Without Retracting The Scope Beforehand

The **TOOLS** menu has the following ESD tool options:



The **No Tool** option removes the selected ESD tool from the scope in simulation.

Refer to the Using the Snare Tool section for the remaining **TOOLS** menu options.

The **PEDALS** menu will only appear when a tool (except for the endo clips) is selected from the **TOOLS** menu. When a tool is selected, the tool's default configuration of the left and right pedals will be visible. The user can view the other available pedal configurations associated to that tool by clicking on the default pedal configuration.

Depending on the active tool, the **PEDALS** menu can contain the following available pedal configurations:

The **Cut/Coag** configuration assigns the cutting functionality to the left pedal and the coagulation functionality to the right pedal.

The **Cut/Inject** configuration assigns the cutting functionality to the left pedal and the injecting saline solution functionality to the right pedal.

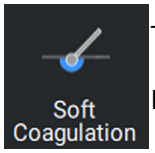
The **Inject/Coag** configuration assigns the injecting saline solution functionality to the left pedal and the coagulation functionality to the right pedal.

The **Inject/None** configuration assigns the injecting saline solution functionality to the left pedal and no functionality to the right pedal.

The **None/Coag** configuration assigns no functionality to the left pedal and the coagulation functionality to the right pedal.

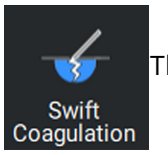
Note: only one pedal can be physically pressed and take effect in simulation at a time.

The **ENERGY** menu will appear when a tool (except for the endo clips and the injection needle) is selected from the **TOOLS** menu. The **ENERGY** menu contains the following available coagulation energy options:



The **Soft Coagulation** option sets the tool's coagulation energy to soft coagulation.

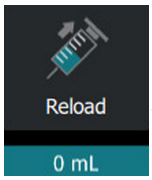
Note: the **Soft Coagulation** option is the default coagulation energy option



The **Swift Coagulation** option sets the tool's coagulation energy to swift coagulation.

The **INJECTION** menu will appear when the needle or the dual knife (with injection available) is selected. It displays the quantity of liquid that has been injected to this point of the simulation. If pressed, that quantity is reset to 0 ml.

The **Injection Needle** indicates that an injection tool has been selected.



Press the **Injection** icon to reset the amount of liquid that has been injected. The green counter below the Injection icon indicates the amount of fluid that has been injected thus far in the simulation exercise.

Right LCD Touchscreen Monitor

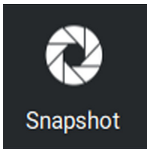
The Right Screen Simulation Configuration

The right LCD touchscreen monitor displays control functions available during the simulation.

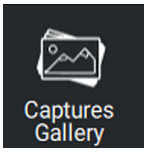
The right LCD touchscreen monitor has three menus along the left side of the screen:

1. SNAPSHOT
2. AIDS
3. PROCEDURE

The **SNAPSHOT** menu has the following simulation software buttons:



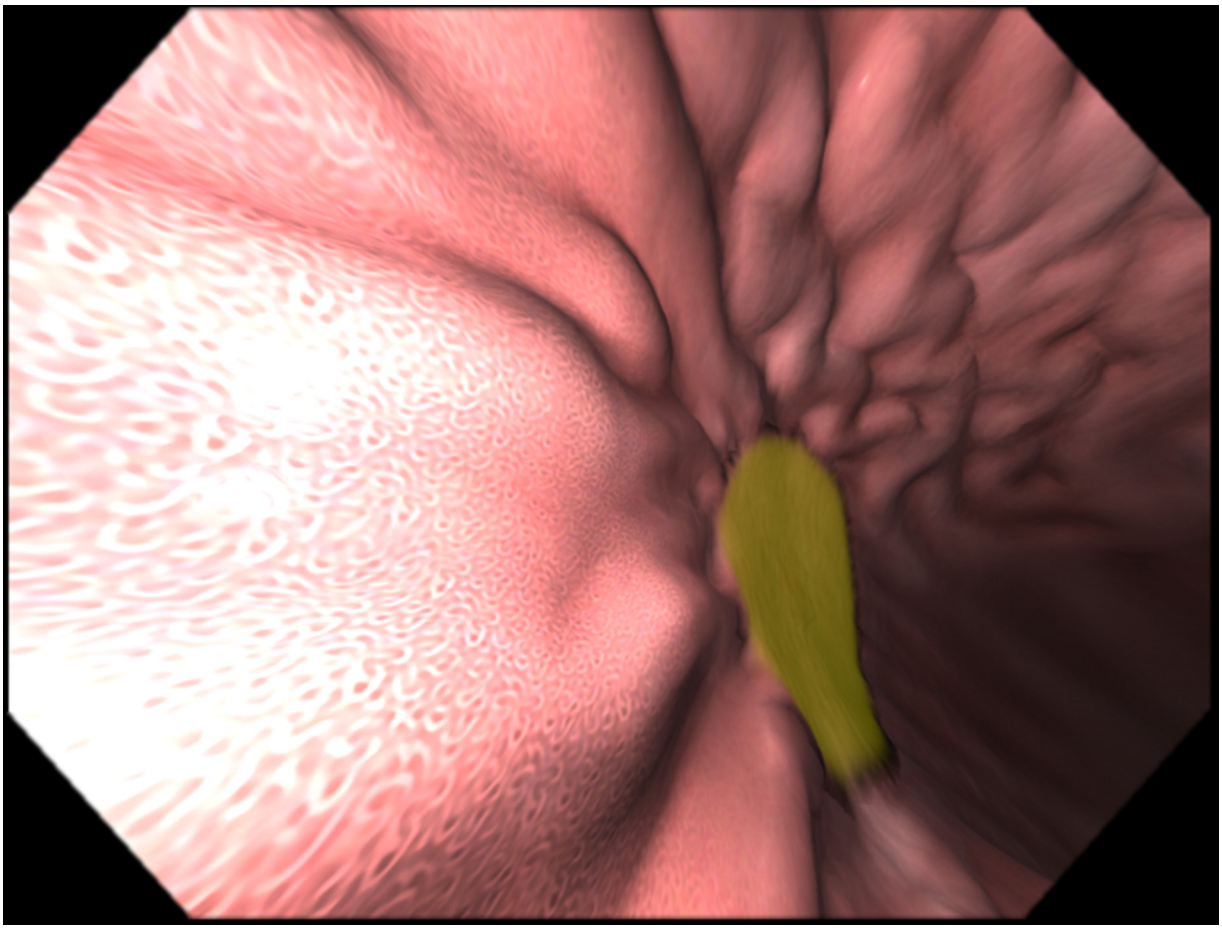
The **Snapshot** button takes a snapshot of the **ENDOSCOPIC VIEW** and saves the image in the default directory C:\Users\UniVR\Pictures\ESDSnapshots. Taking a snapshot adds the most recent snapshot to the right-hand-side monitor. There are also arrows on the right-hand-side monitor that allow you to navigate between the captured snapshots.



The **Captures Galler**y button opens the default directory in which all snapshots taken by the **Snapshot** button are saved and allows you to view these snapshots during the simulation.

The **AIDS** menu has the following simulation software button:

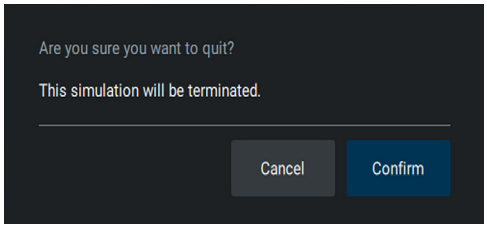
The **Region of Interest** button turns a highlight of the operative region of interest around the lesion on or off.



The Region of Operative Interest In The Endoscopic View

The **PROCEDURE** menu has the following simulation software buttons:

The **End Procedure** button displays the following warning message on the **LEFT** screen before ending the simulation:



You can choose to either end the simulation by selecting 'OK' or continue the simulation by selecting 'Cancel'.

The **Next Procedure Step** button allows you to proceed to the next procedural step. The name of the current procedural step will be displayed along the bottom of the right screen along with any applicable instructions.

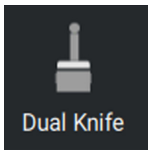
Note: You cannot return to a previous procedure steps. When you reach the last step, the **Next Procedure Step** button will disappear.

Note: For the procedure step based metrics to make sense, it is important to indicate when moving to the next procedure step.

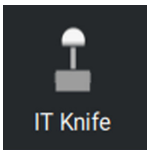
Using the Snare Tool

The Snare tool is used to simulate a variety of ESD tools that can be used during the simulated cases. The following tools can be selected from the Tools menu on the left screen and they can only interact with the region of operative interest (ROI):

Coagrasper



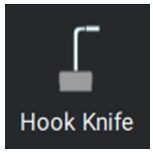
Dual Knife



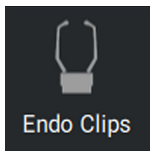
IT Knife

Injection Needle

Triangle Knife



Hook Knife



Endo Clips

The Snare Tool

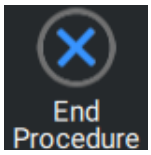
There is a sequence of steps required to use the tools:

1. Select the desired tool in the **TOOLS** menu on the left screen
2. Insert the plastic filament in the working channel of the endoscope until the tool appears in the **ENDOSCOPIC VIEW** or **EXTERNAL VIEW**
3. Insert the filament further in the working channel to advance the tool
4. Pull the filament to retract the tool into the scope
5. Push the finger loops of the snare tool to open the coagrasper, extend and open the endoclip or to retract the other tools
6. Pull the finger loops of the snare tool to close the coagrasper, close and retract the endoclip or to extend the other tools

Note: : Endosclips are automatically reloaded by removing and re-inserting the snare tool filament.

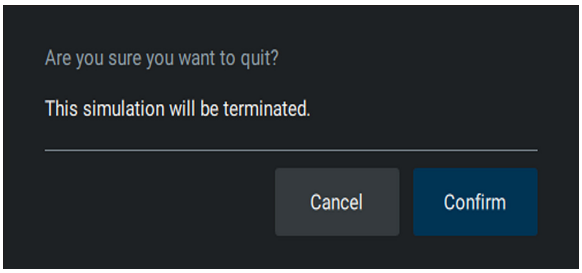
Ending the Procedure

At any time during the simulation, you can choose to end the procedure by clicking the End Procedure button.



The Stop Procedure Button

The following warning message will appear on the left screen before ending the simulation with the **End Procedure** button:



Warning message that is displayed on left screen before ending the simulation

You can choose to either end the simulation by selecting 'OK' or continue the simulation by selecting 'Cancel'.

The simulation will also end if any of the following complications occur:

- There is a major perforation complication
- The bleeding volume has reached the threshold set by the administrator

When the simulation is ended, the **Results** screen will appear on the left LCD screen.

Appendix A - Module Descriptions

The EndoVR simulator contains several modules for learners to practice performing endoscopic and bronchoscopic procedures using different techniques and tools. Modules are bundled in three packages: Bronchoscopy, Lower GI and Upper GI.

The following table outlines the various modules offered for the EndoVR simulator.

Package	Module	Description
Bronchoscopy	EBUS-TBNA	Complete an Endobronchial Ultrasound with Transbronchial Needle Aspiration.
	Intro to BAL	Complete common tasks performed during a bronchoalveolar lavage.
	Intro to Bronch	Complete common tasks performed during a bronchoscopic procedure.
	Ped Diff Airways	Perform bronchoscopic procedure tasks involving a pediatric difficult airways.
	Bronch Sampling	Complete common tasks performed during a bronchial sampling
	Bronch TBNA	Complete common tasks performed during a transbronchial needle aspiration.
Lower GI	Biopsy	Complete common tasks involved in a lower gastrointestinal biopsy.
	Intro to Colonoscopy	Complete common tasks involved in a colonoscopy.
	Intro to Flex Sig	Complete common tasks involved in viewing the pathologies using a flexible sigmoidoscopy.
	Polypectomy	Complete common tasks involved in a lower gastrointestinal polypectomy.
Upper GI	Bleeding	Complete common tasks involved in treating upper gastrointestinal bleeding.
	Endoscopic Submucosal Dissection	Perform the procedure steps associated with removing a gastric lesion via submucosal dissection including: locating and recognition, marking, injection for elevation, circumferential cutting and dissection.
	Intro to EGD	Complete common tasks involved in an esophagogastroduodenoscopy.
	Intro to ERCP	Complete common tasks involved in an endoscopic retrograde cholangiopancreatography.

Module Instruments and Required Equipment

In each of the modules, different instruments, medication and equipment are used to complete the selected task.

Bronchoscopy

The Bronchoscopy modules present the learners with different scenarios and cases to complete using the bronchoscope and related tools

Module	Available Instruments	Medications	Required Equipment
EBUS-TBNA	• Needle • Stylet • Syringe	**Topicals:** • Saline • Lidocaine **IV Medications:** • Fentanyl • Meperidine • Midazolam • Naloxone	• EBUS-TBNA accessory tool • Bronchoscope
Intro to BAL	• Needle	• Saline • Lidocaine • BAL	• Bronchoscope • Foot pedal
Intro to Bronch	• Needle • Suction	• Saline • Lidocaine	• Bronchoscope • Foot pedal
Ped Diff Airways	• Jaw Thrust • Suction	• Saline • Lidocaine • Ketamine • Halothane	• Bronchoscope • ET tube • Foot pedal
Bronch Sampling	• Brush • Needle • Forceps • Suction	• Saline • Lidocaine • EPI	• Bronchoscope • Foot pedal
Bronch TBNA	• Needle • Suction • CT scan	• Saline • Lidocaine • EPI	• Bronchoscope • Foot pedal

Lower GI

The Lower GI modules present the learners with different scenarios and cases related to the lower GI tract. Learners use an endoscope and related tools to complete the procedures.

Module	Available Instruments	Medications	Required Equipment
Biopsy	• Needle • Forceps • Syringe • Suction • Air/Water	**Topicals:** • Saline • Lidocaine **IV Medications:** • Fentanyl • Meperidine • Midazolam • Naloxone	• Upper/Lower GI accessory tool • Endoscope
Intro to Colonoscopy	• Suction • Air/Water	**IV Medications:** • Sedation	• Endoscope
Intro to Flexible Sigmoidoscopy	• Suction • Air/Water	**None**	• Endoscope
Polypectomy	• Needle • Forceps • Syringe • Suction • Air/Water	**IV Medications:** • Sedation • Counter Sedative	• Upper/Lower GI accessory tool • Endoscope

Upper GI

The Upper GI modules present the learners with different scenarios and cases related to the upper GI tract. Learners use an endoscope and related tools to complete the procedures.

Module	Available Instruments	Medications	Required Equipment
Endoscopic Submucosal Dissection	• Coagrasper • IT Knife • Triangle Knife • Endo Clips • Dual Knife • Injection Needle • Hook Knife	**NONE**	• Upper/Lower GI accessory tool • Endoscope • Foot pedal
UGI Bleeding	• Wire Grasper • Clip Applier • BICAP Probe • Injection Needles • Irrigation • Suction • Air/Water	**IV Medications:** • Fentanyl • Flumazenil • Meperidine • Midazolam • Naloxone	• Upper/Lower GI accessory tool • Endoscope
Intro to EGD	• Cytology brush • Forceps • Suction • Air/Water	**IV Medications:** • Sedation • Counter Sedative • Atropine Sulfate	• Upper/Lower GI accessory tool • Endoscope
Intro to ERCP	• Suction • Air/Water • Single lumen cannula • Thin tapered cannula • Sphincterotome • Spiked forceps • Hydrophilic guidewire • Instill contrast	**IV Medications:** • Sedation • Counter Sedative • Glucagon • Atropine Sulfate	• Upper/Lower GI accessory tool • Endoscope • Foot pedal

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