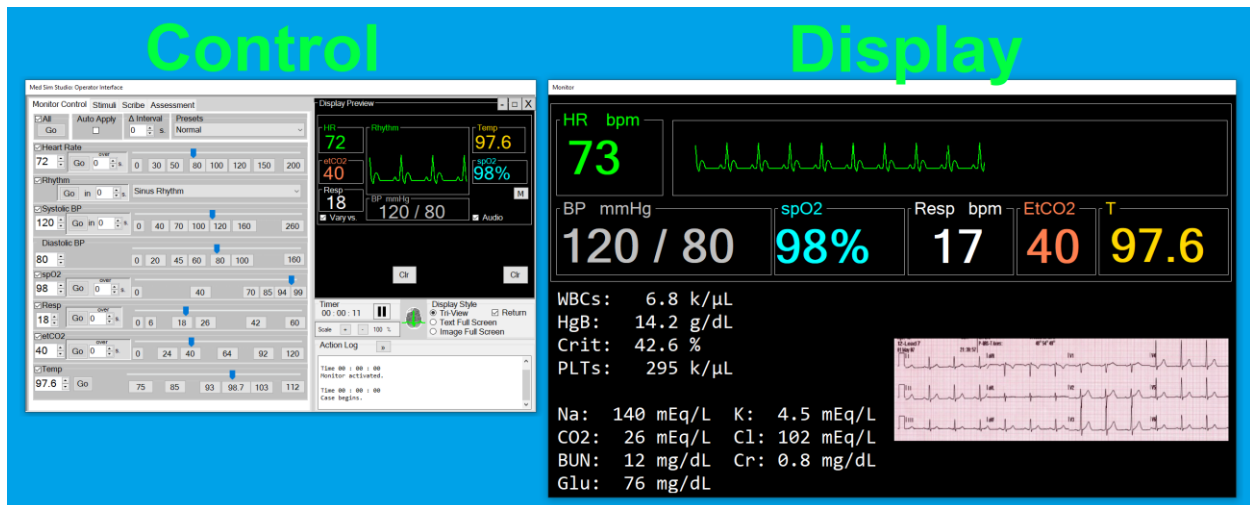


# 1) How to set up Med Sim Studio

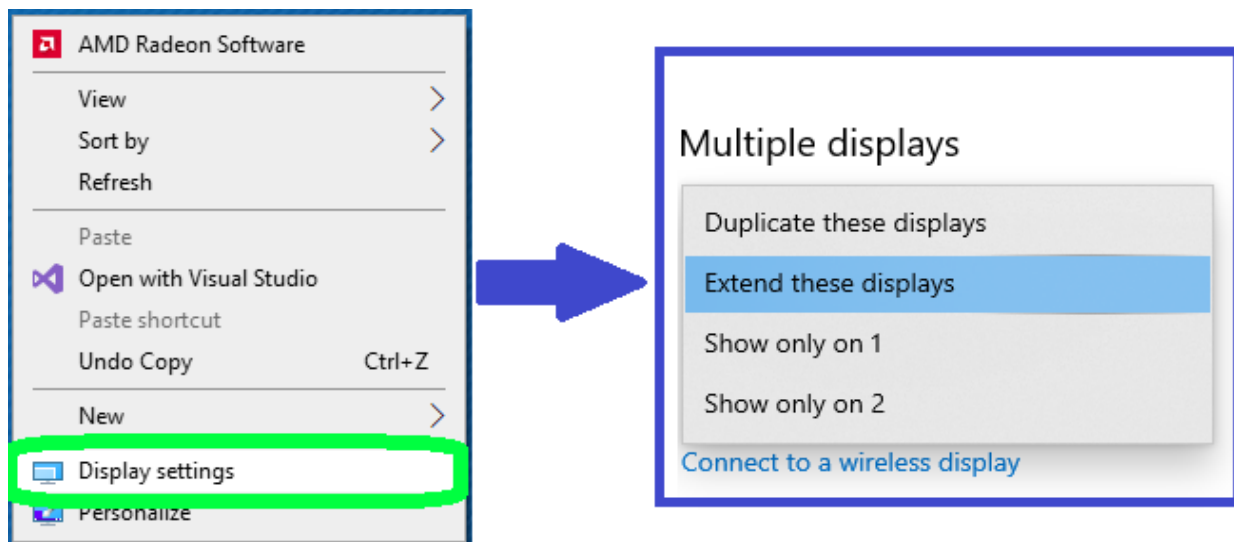


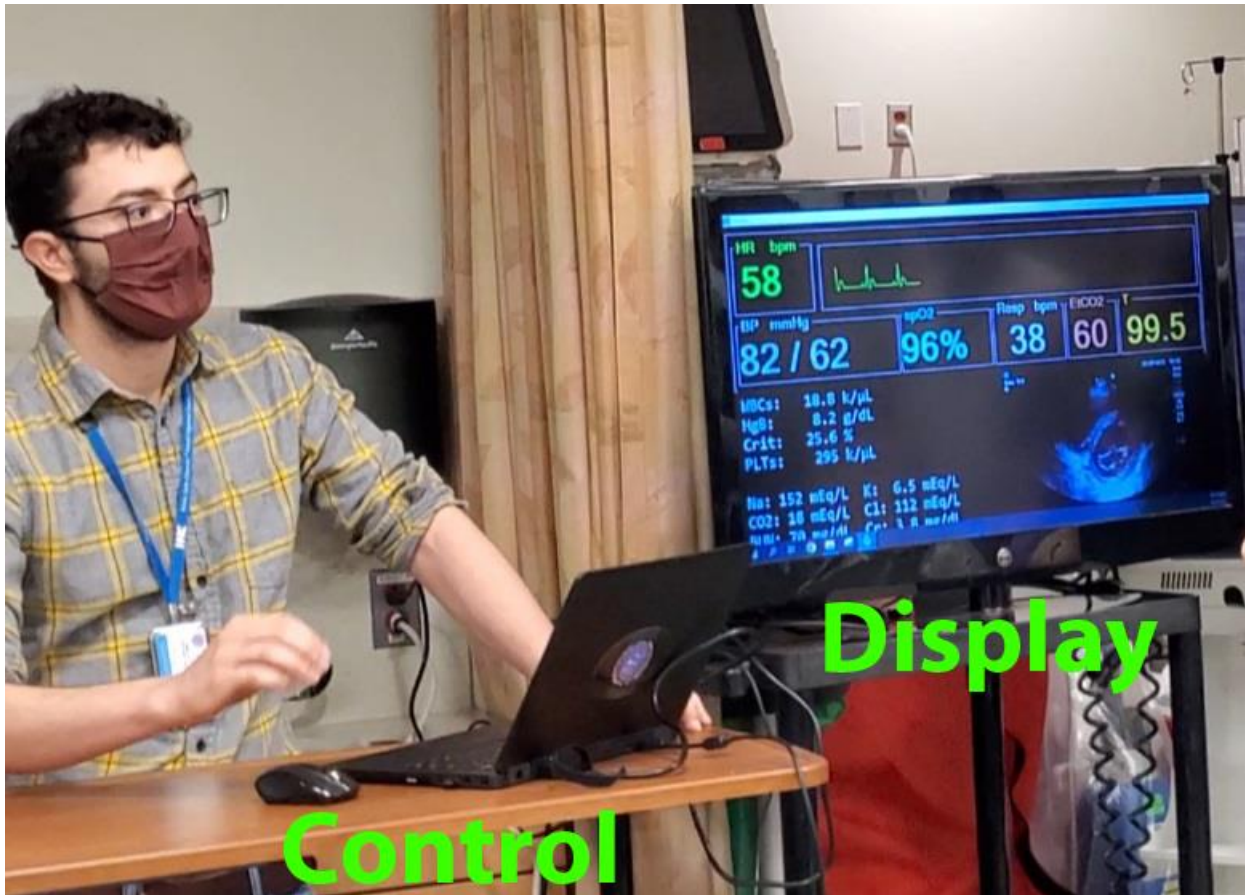
When you click “**Launch**” the software opens two windows, the **Control** and the **Display**. Your learners should only view the **Display** window – you will decide what is and is shown with the **Control**. You can use a **two-monitor** system for in-person teaching, or use **window share** for remote learning with programs such as Zoom/WebEx/Google Meet/Skype/Etc.



## Setting up a two-monitor system:

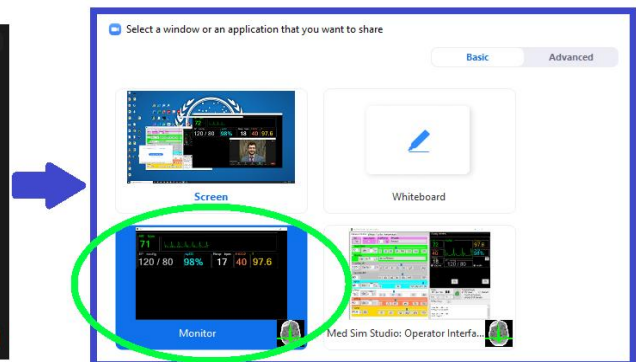
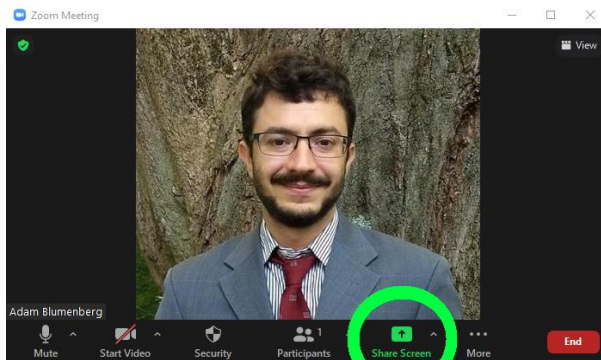
- 1) Plug a second monitor (or projector) into your computer.
  - a. Press “Win + P” and click **Extend**
  - or**
  - b. Right-click on your desktop and click “**Display Settings.**”
  - c. Under “Multiple displays,” click **Extend these displays.**
- 2) Drag the **Display** window to the second monitor and MAXIMIZE it.





## Setting up for remote learning:

- 1) Open the remote learning software.
- 2) Invite your learners to the same online meeting.
- 3) Use the "Screen Share" option and share the **Display** window.





## 2) How to use Med Sim Studio

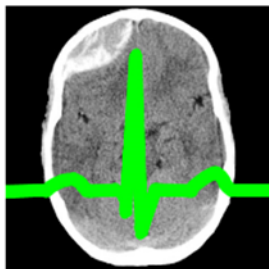
You may use this software as a vital sign monitor, medical image library, scribe, and evaluation tool. You may run through pre-scripted cases, or author and share your own simulation cases.

You can use Med Sim Studio for **In-Situ simulation** in the clinical environment, **simulation laboratory** education, **small group** tabletop simulation, or **remote learning**. Select the corresponding tabs to view examples.

If you are using Med Sim Studio for the first time, try it on “**Keep It Simple**” mode and work your way up until you are comfortable with the different features.

When you are ready to try out a pre-scripted case, select the “**Case Runner**” tab then run the “**Med Sim Studio introduction case**” first. It will give you an interactive demonstration.

Let’s get started:



# Med Sim Studio

[www.MedSimStudio.com](http://www.MedSimStudio.com)

Beta 0.89

Developed by Adam Blumenberg MD MA

**Complete**

Monitor, full image library,  
scribe, evaluation.

**Streamlined**

Monitor + basic images.

**Monitor Only**

Customizable vitals monitor.

**Keep It Simple**

Monitor with presets.

**Launch!**

### Keep It Simple

- Click “**Keep It Simple**” then “**Launch!**”
- Make sure you can face the gray **Control** window and your learners are facing the black **Display** window.

- Adjust the preset vital sign patterns. The vital signs and rhythm will be displayed for your learners.

### Monitor Only

- Click "**Monitor Only**" then "**Launch!**"
- Click either the upper left "**All**" checkbox on the Monitor Control, or the "**M**" button on the display preview to turn on the monitor. Alternatively, you can click individual vital sign checkboxes (e.g., Heart Rate, Rhythm, etc.) to only display individual vital signs.
- Toggle "**Auto Apply**" to determine whether vital sign changes should be immediate, or only after clicking the corresponding "**Go**" button. If "**Auto Apply**" is not checked, the vital sign will not change for your learner until after you have clicked "**Go**."
- Change the vital signs by typing them into the left-most box, or by moving the slider, or by clicking the numbers beneath the slider. The vital sign will change on the **Monitor** window facing your learners, and simultaneously on **Display Preview** that faces you.
- You can change the Rhythm through the dropdown menu.
- If you would like the vital sign to change over time (for example, go to heart rate of 40 beats per minute over 15 seconds), input the time interval into "**Δ Interval**" for all vital signs, or into the box adjacent to "**Go**" for an individual vital sign.

### Streamlined

- Click "**Streamlined**" then "**Launch!**"
- Click on the "**Stimuli**" tab to access an abbreviated stimulus library.
- Click on different stimulus buttons. These will be displayed on the **Monitor** window for your learners.
- Select different options from the "**Display Style**" box. You can keep a text or image stimulus maximized indefinitely. By default, after a short duration the view will return to "**Tri-View**" to display the monitor and stimuli. If you would like to change the duration, go to "**Settings**."
- To clear a stimulus from view click on the corresponding "**X**" or "**Clr**" button.
- The "**Favorites**" can be changed from "**Settings**" as well.

## Complete

- Click "**Complete**" then "**Launch!**"
- Click on the "**Stimuli**" tab, then on the various stimuli category tabs. You may display an image or text stimulus either by clicking the corresponding button, or by selecting it from a dropdown list and clicking the "**Go**" button.
- You may use a custom stimulus by selecting the "**Custom**" tab, then either type text into the **white text box** or click the **black image box** to load an image. Once the stimulus is read, click the corresponding "**Go**" button.
- You may record actions via the "**Scribe**" tab. Either click the corresponding action button (e.g., "**Oxi-Mask**" or "**Tourniquet**") or enter a custom scribe line and click the "**Log**" button. These will be timestamped and added to the "**Action Log**" in the lower right area of the screen.
- Select the "**Assessment**" tab and fill out the fields for the assessment tool. The **assessment tool** and **action log** will be saved into the Med Sim Studio directory. Alternatively, you may access the assessment tool and action log output by selecting the "**Output**" tab and copy & pasting the text into a word processor.

## Settings

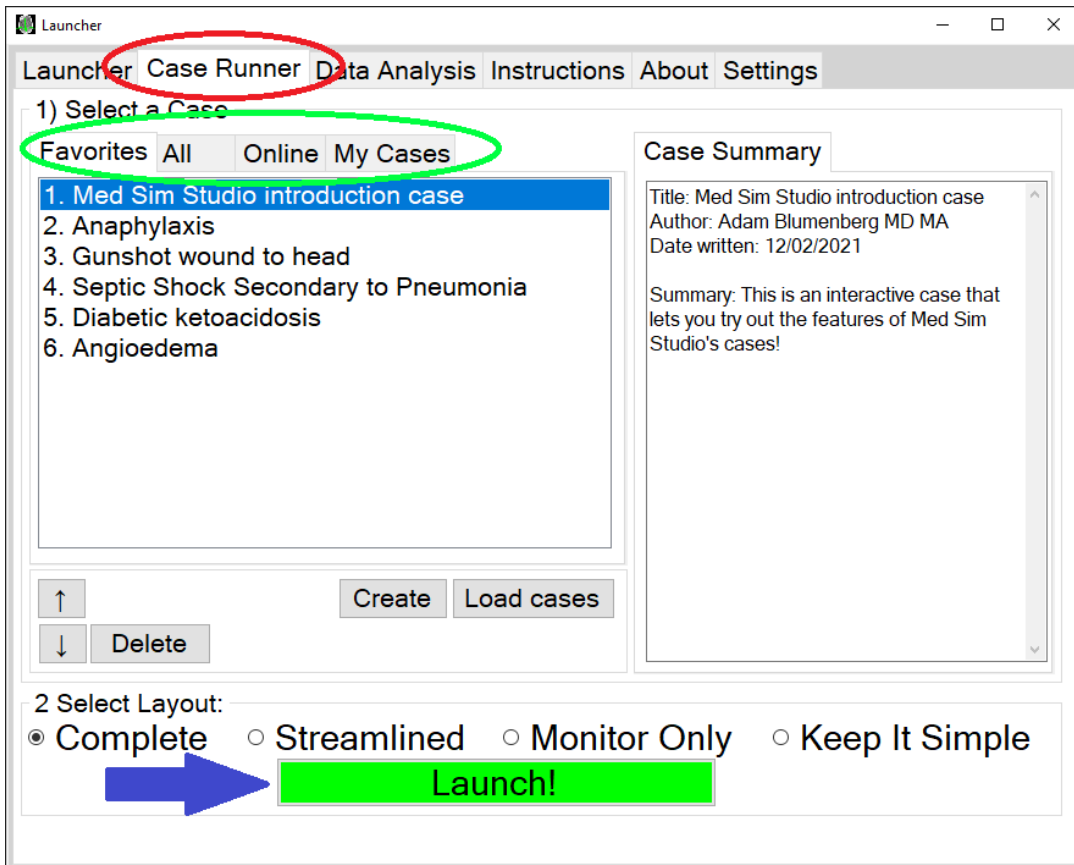
- **Splash Screen** sets a default display image. This can be a QR code that leads to a survey, your institution's logo, pre-brief instructions, etc. The Splash Screen can be activated by clicking the **Med Sim Studio** icon adjacent to the timer on the monitor controller.
- **Favorites** adds specific stimuli to the "**common**" tab in Complete and Streamlined modes.
- **Accessibility** allows for changing the font size on text blocks in a case.

### 3) How to run pre-scripted cases

Med Sim Studio allows you to run pre-scripted cases that contain all the computer resources you need to teach with medical simulation. Cases provide all the labs, ECGs, radiographs, and vital sign pattern changes with a single click. They also contain the medical background information and debrief plan to make sure your simulation session is a success!

#### Opening a case:

On the main page select the “**Case Runner**” tab, then select the case you want to run, then “**Launch.**”



Once you click “Launch,” the operator screen will be available.



## Running a case:

Cases open onto the **Control** window. Here, you will have access to **Action Buttons (1 & 2)**, **Stimuli (3)**, and **additional information about the case (4)**.

Clicking an **(1, 2) Action** button will log the action, and carry out pre-scripted vital sign changes. For example, clicking “Resp worse” may lower the oxygen saturation, increase the end-tidal CO<sub>2</sub>, and increase the respiratory rate while clicking “Resp Better” may improve those vital signs. Hovering your mouse over an action button will give you a **preview**.

Clicking a **(2) Critical Action** button will perform the action, ~~strike it out~~ and log it. All **Critical Actions** are logged at the end of the case.

Clicking a **(3) Stimulus** button such as “ECG” will display the case-specific stimulus to your learners. Hovering your mouse over it will give you a **preview**.

Selecting an **(4) Information Tab** will give you additional information about the case. You can use this before running the case to familiarize yourself with the **Background Medicine, Play-of-Case, History, Physical Exam, and Debrief Plan**.

Med Sim Studio: Operator Interface

Case Monitor Control Stimuli

Control Background Play-of-Case Buttons History Physical Debrief

Triage Note/EMS Report: Nurse: "Hi doc, this is Mr. Smith. We just brought him over from triage - he was upstairs for a clinic appointment and started having lip swelling about twenty minutes ago". I do not have vital signs for him, I was concerned and brought him straight back.

**Vital Sign Control** 1

Resp worse Resp Better

Resp Crash VitalsNormal

**Critical Actions** 2

Oxygen Given Prep-Intubat CallENT/Anes

Call RT Cric

Call ICU

**Stimuli** 3

Angioedema CXR-No Tube CXR-ET Tube

VBG CBC\_BMP ECG

US-LungSlide FAST (Neg)

Display Preview

HR 101 Rhythm Temp 98.6

etCO2 48 spO2 98%

Resp 21 BP mmHg 160 / 90

Clr Clr

Timer 00 : 00 : 04

Display Style

Tri-View  Return

Text Full Screen

Image Full Screen

Scale + - 80 %

Action Log

Time 00 : 00 : 00

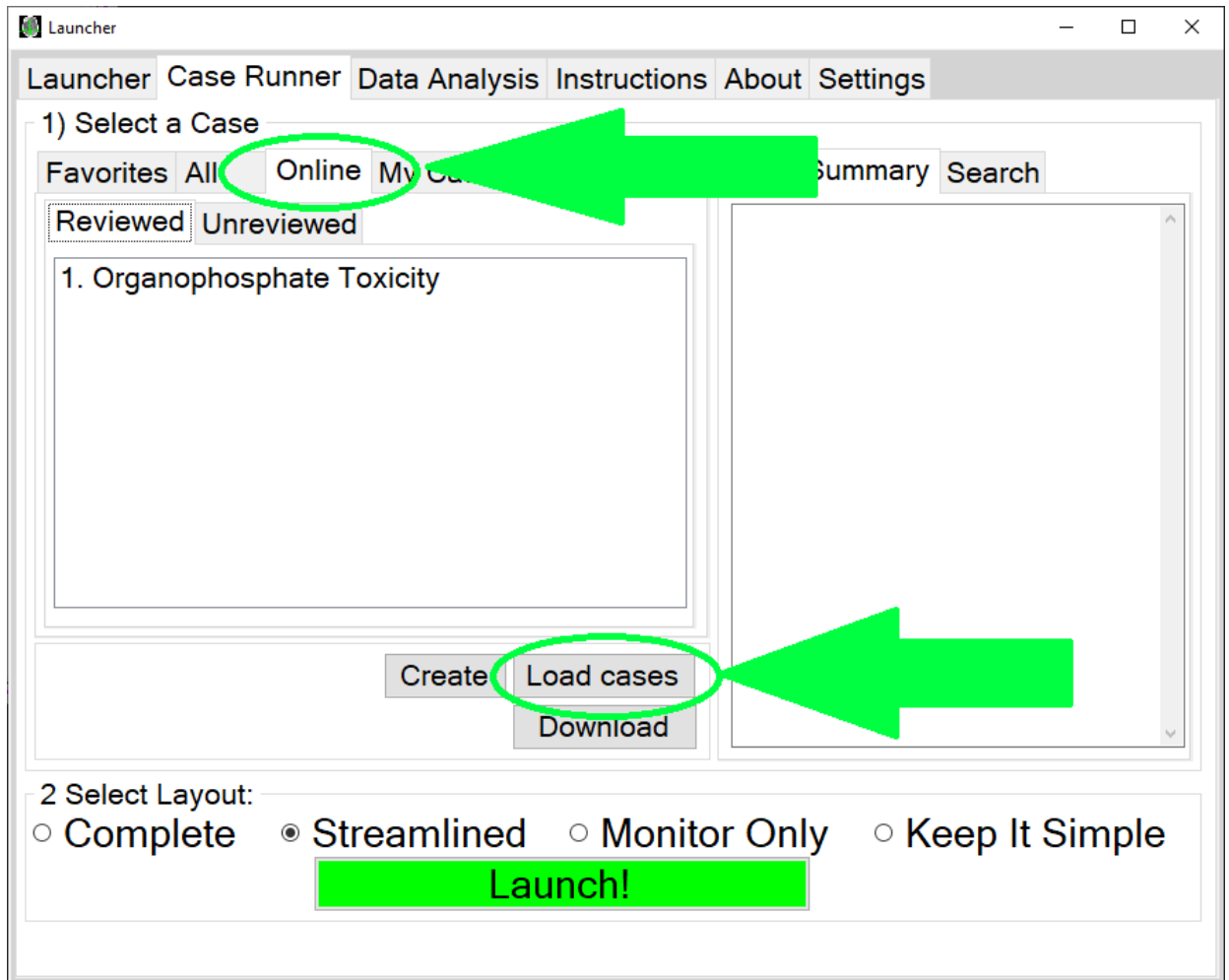
HR: 101 bpm, BP: 160/90 mmHg, RR: 21 bpm, spO2: 98%, etCO2: 48, Temperature: 98.6 F, Rhythm: Sinus Rhythm.

Time 00 : 00 : 00

Case begins.

## Getting new cases:

Med Sim Studio allows users to author and share cases. You can add new cases by **downloading** them from the **online tab**, or by clicking "**Load cases**" and manually adding a **".mssBundle"** file.



Downloadable cases may be **Reviewed**, where I (Adam Blumenberg MD) reviewed and edited the case. **Unreviewed** cases are uploaded by other users and may or may not be high quality. Click the “**Search**” tab if you’re looking for something specific.

If you prefer to use Med Sim Studio offline you can share cases with colleagues via email, USB drive, CD/DVD, etc. as “**.mssBundle**” files. Your cases are saved in “C:\Users\[YOURCOMPUTER]\Documents\MedSimStudio\MyCases”

## 4) How to author and share cases

An important benefit of using Med Sim Studio is that you can author and share your own customized cases. Case authoring lets you put everything you need in one place – medical images, lab values, ECGs, pre-scripted changes in vital signs, background information, a debrief plan, etc. Cases are made up of three elements:

**Background information boxes:** These contain all the information an educator needs to prepare for and run a sim case. For example, the **Debrief** tab contains the learning points, topics, and structure to debrief the case.

**Action buttons:** These are pre-scripted vital sign changes and scribe entries. For example, a single button click simultaneously decreases SPO2 by 5% over 5 seconds and increases heart rate by 10 bmp over 15 seconds.

**Stimulus buttons:** These are pre-selected words or images. For example, a single button click displays a complete blood count and metabolic panel, or an ECG showing an inferior STEMI.

You can save and use cases that are works in progress (pieces are missing or incomplete) but only completed cases can be **uploaded** and shared with other users.

### Creating a case:

In the **Case Runner** tab click the **Create** button. You can either use a **template** or create your case from scratch. Templates include some structure and pre-scripted actions. I recommend using templates (at least at first).

### Filling out background information boxes:

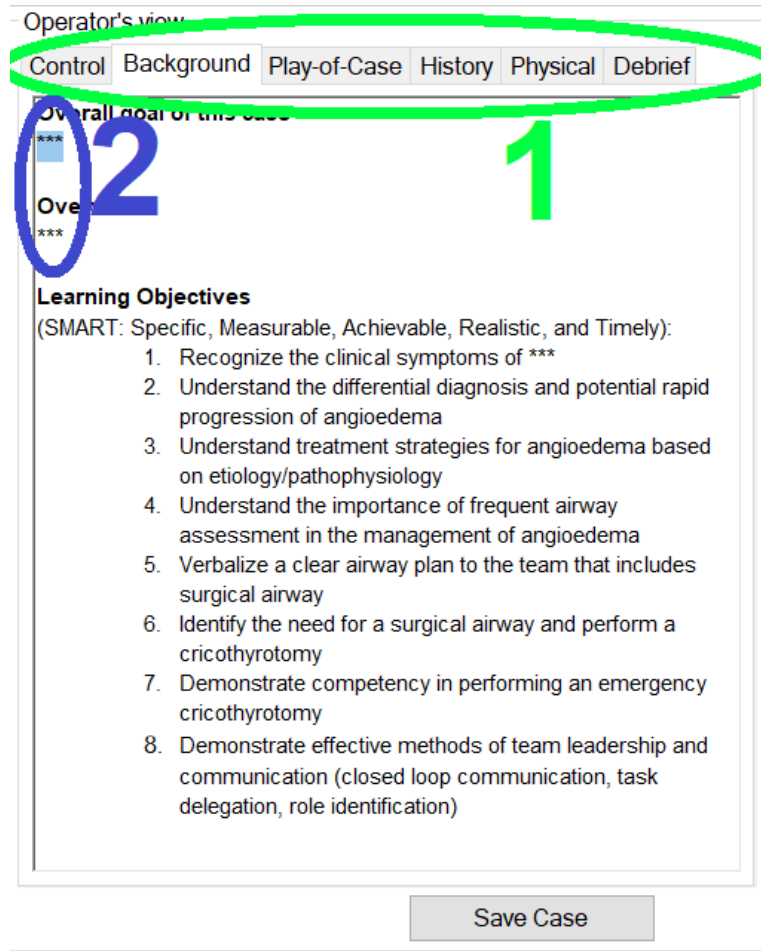
- 1) Fill out the **Case title**, **Brief case summary**, and **Author's name**.  
Optionally, you can include your **email address** and a **website** related to the case. The website can be a survey so that you can collect reviews from people who use your case.

- 2) Fill out the **initial vital signs**; these are the first vitals that show up in the case.
- 3) Fill out information about the intended **learners** (e.g., junior and senior residents), and **topics** (e.g., Emergency Medicine and Trauma).
- 4) Fill out the case prompt that starts the case, e.g., “A 35 year old woman develops shortness of breath after being stung by a bee.”

The screenshot shows the CaseWriter software interface. The 'Case Information' tab is active. The 'Case title' field contains 'E.g., "Anaphylaxis"'. The 'Brief case summary' field contains 'E.g., "A case of anaphylaxis. The learners must identify anaphylaxis, assess the airway, and provide epinephrine."'. The 'Author Name' field contains 'E.g., "Lucille the Cat MD"'. The 'Author's email (Optional)' field contains 'E.g., "Lucille@HidingUnderTheSofa.com"'. The 'Case Website for data collection or reading (Optional)' field contains 'E.g., "www.SurveyAboutThisCaseThatGivesYouData.com"'. The 'Initial Vitals' section shows: Heart Rate: 72, Blood Pressure: 120 / 80, spO2: 99, Resp.: 18, pCO2: 40. The 'Learners' section has checkboxes for Junior Residents, Senior Residents, Medical Students, Attending, Physician Assistants, Nurses, and EMS. The 'Topics' section has checkboxes for Pediatrics, Emergency Medicine, Toxicology, Shock, Trauma, GU, Cardiology, Pulmonary, GI, Renal, ENT, OB/GYN, Environmental, Endocrine, Heme/Onc, Neurology, Skin, Ortho, Psych, and Infectious Disease. The 'Operator's view' tab is also visible, showing a case prompt: 'E.g., "A 35 year old woman develops shortness of breath after being stung by a bee."'. The 'Save Case' button is at the bottom right.

You can then fill out the **background information** to help guide educators who use your case.

- 1) Click through the different tabs (Background, Play-of-Case, History, Physical, Debrief). I recommend writing the material with a word processor then **copy and paste** into the text fields. You can use formatting such as **Bold**, *Italics*, Underline.
- 2) If you want to mark an incomplete section enter three asterisks in a row (“\*\*\*”).



## Creating an ACTION:

To create an **action**, select the **Action Creator** tab. Here you can pre-script vital sign changes, designate **critical actions** and **branch points**, and automate scribe entries.

Vital sign changes can be **absolute** or **relative**, for example you can change the heart rate to 80 beats per minute or increase it by 8 beats per minute. I recommend using **absolute** vital sign changes to represent definitive actions, for example after intubation set HR, SPO2, ETCO2, BP, and RR to specific values. I recommend using **relative** vital sign changes to nudge the learners in one direction or another, for example a button labelled “Desat and RR Up” may change the SPO2 and RR by a fixed amount every time it is clicked, so it can be clicked more than once if there is an excessive delay to stabilizing the patient’s breathing.

To create an **Action**:

- 1) Input the vital sign changes. Use the “**Go to**” for **absolute** changes and “**Change by**” for **relative** changes. If you want the change to be instant set the **time** to 0 seconds, otherwise they will change over the inputted number of seconds.
- 2) Enter the **button name** with a maximum of 15 characters (use abbreviations as needed). Include a **scribe description** which may be longer than 15 characters.
- 3) Once you are satisfied with your action click **Create Action** which will add it to the **actions list**.
- 4) Select your **action** from the **action list** and review it. If you wish you make changes click the **edit** button.
- 5) Assign your action to be a **Critical Action** or a **branch point action** by clicking the corresponding **blank button**.

The screenshot displays the CaseWriter software interface, divided into two main sections: the Action Creator and the Operator's view.

**Action Creator Panel:**

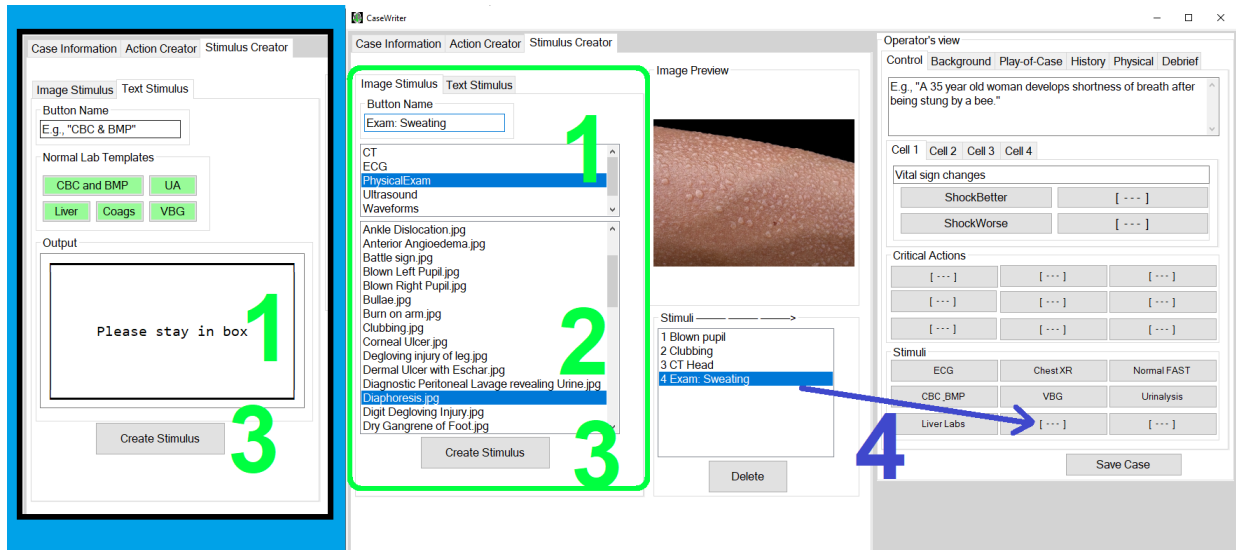
- Case Information:** Includes checkboxes for "Activate Monitor" and radio buttons for "All at once" (selected) and "One by one".
- Vital Signs:** Lists various vital signs with "Go to" and "Change by" options, and "over" time settings. A green box labeled "1" highlights the "Heart Rate" section, and another green box labeled "2" highlights the "Button Name" and "Scribe description" fields.
- Buttons:** A "Create Action" button is highlighted with a green box labeled "3".
- Actions List:** A list of actions is shown, with "3. 'Desat and RR Up'" selected and highlighted with a blue box labeled "4".
- Bottom Panel:** A detailed view of the selected action "Button: 'Desat and RR Up'" is shown, including its steps: "1) Add to action log: 'Desat and RR Up'", "2) Change respiratory rate by +6 over 6 sec.", and "3) Change spO2 by -5 over 5 sec.". A blue asterisk is placed over the "Reset" button.

**Operator's view Panel:**

- Control:** Includes tabs for "Control", "Background", "Play-of-Case", "History", "Physical", and "Debrief".
- Scenario:** A text area for the scenario description, e.g., "A 35 year old woman develops shortness of breath after being stung by a bee.".
- Cells:** A grid of cells for scenario development, with a blue box labeled "5" highlighting a cell.
- Critical Actions:** A grid of buttons for assigning actions to critical points.
- Stimuli:** A grid of buttons for assigning stimuli.
- Buttons:** "Edit", "Duplicate", "Delete", and "Reset" buttons are located at the bottom.

## Creating a STIMULUS:

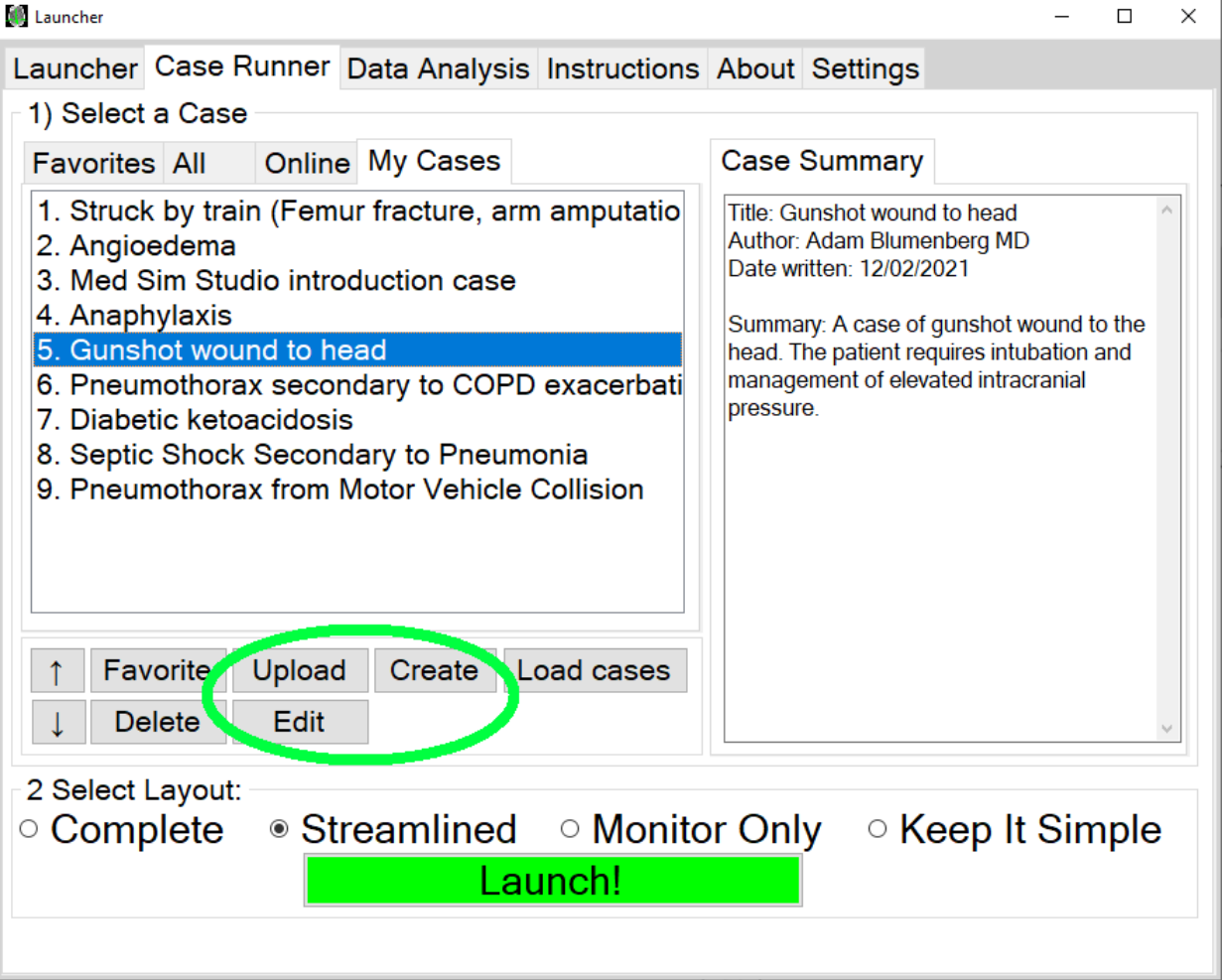
- 1) Enter the **Button name**.
  - a. If creating an **IMAGE stimulus**, select the appropriate tab and select the image category (e.g., CT, ECG, Ultrasound, etc.).
  - b. If creating a **TEXT stimulus**, select the appropriate tab and type the text in the **Output box**; you may use normal lab templates by clicking the appropriate buttons.
- 2) For an **IMAGE stimulus**, select the specific image. It will be displayed as a preview.
- 3) Click **Create Stimulus**
- 4) Select your stimulus from the list, and assign it by clicking a **blank button**.



## Sharing a case:

Once you have completed your case, please share the benefit of your knowledge and experience with others! Click the **Upload** button to make it available to other simulation educators.





## 5) How to Collect and analyze data

You may use Med Sim Studio to more easily collect data during your simulation sessions. You can collect **Attendance, learner survey feedback, Sim location/modality, time-stamped action logs of cases, and performance reviews.** You can also create customized surveys for cases you've written.

### Analyzing Data:

You can analyze some data via the Med Sim Studio application by selecting the **Data Analysis** tab. Here you can use select the **Search** tab and tailor a list of simulation education sessions to analyze. Selecting an **Individual Scenario** will give you details about that particular session, and selecting the **Totals** tab will give you information about all the cases on your tailored list.

Launcher

Launcher Case Runner **Data Analysis** Instructions About Settings

Scenario List

Jan 8, 2022 11:46:02 AM  
Jan 8, 2022 11:46:02 AM  
Jan 8, 2022 11:45:48 AM  
Jan 8, 2022 11:45:48 AM  
Jan 8, 2022 11:45:32 AM  
Jan 8, 2022 11:45:32 AM

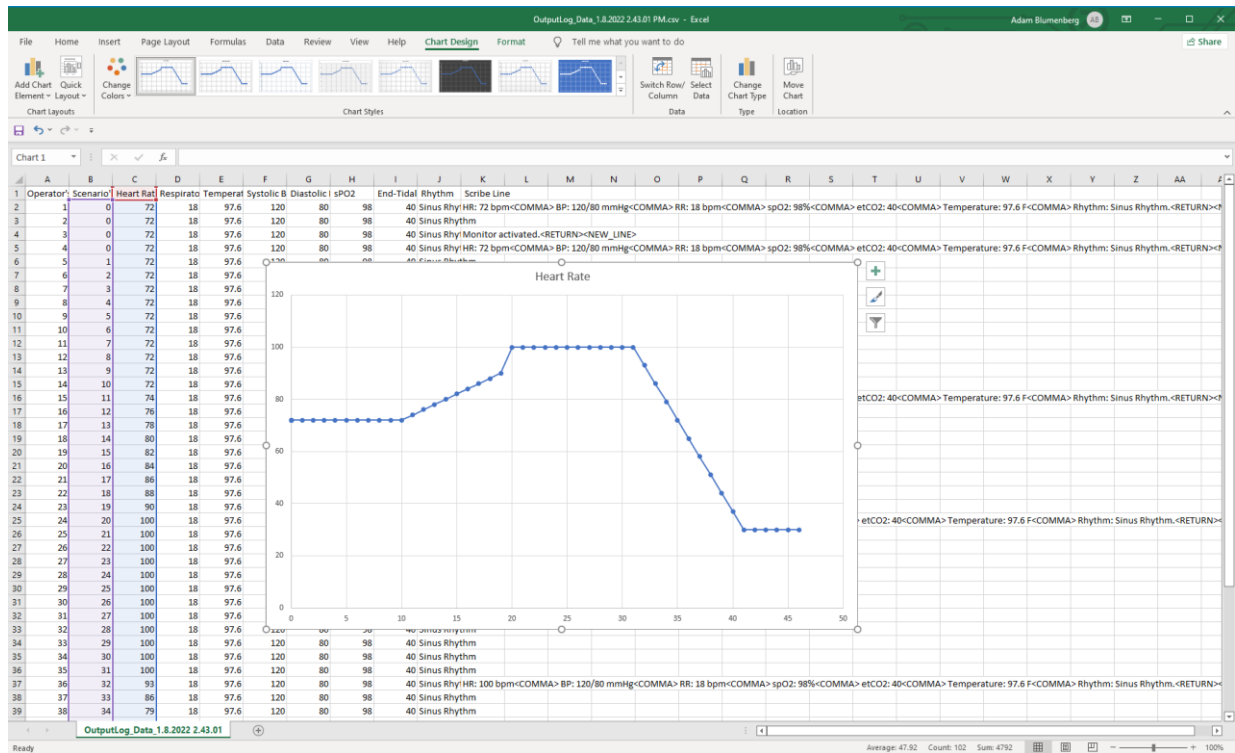
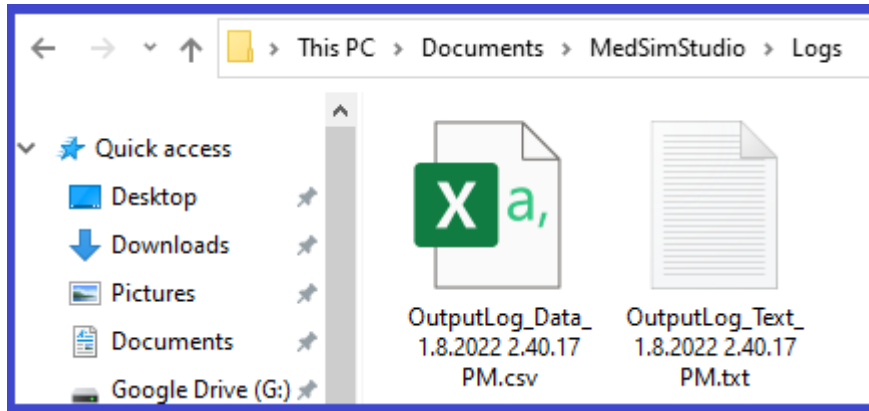
Total: 6

Totals Individual scenario Search

Case start: Jan 8, 2022 11:46:02 AM  
Launcher mode: Complete  
Clock ran for: 00:00:01  
Monitor ran for: 00:00:08

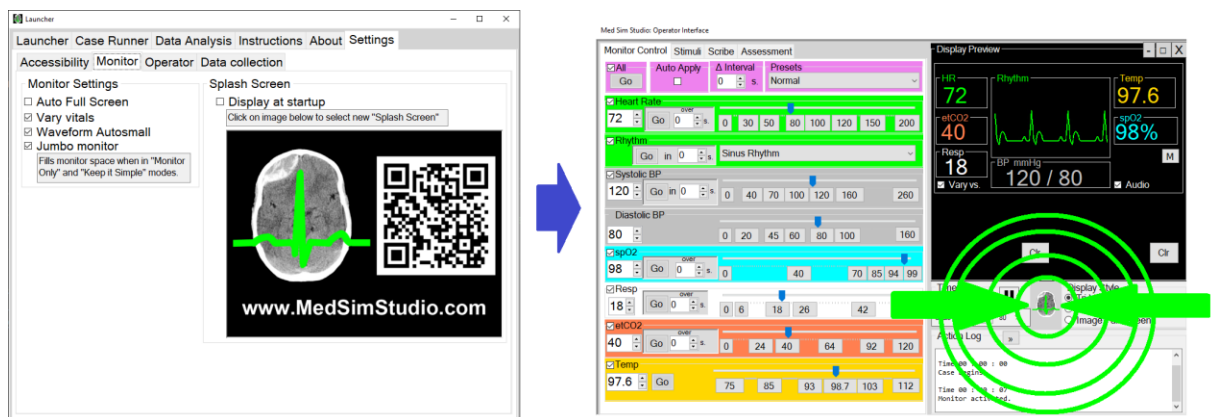
Attendance:  
Simulation educator:  
Simulation location: In-Situ (Emergency Department)  
Attendings: 0  
Senior residents: 0  
Junior residents: 0  
Medical students: 0  
Physician assistants: 0  
Medics: 3  
Nurses: 0  
Technicians: 0  
Nursing students: 0  
Other observers: 0  
Total learners: 3

You may also access automatically saved logs from your simulation sessions. Med Sim Studio automatically saves a log for every session: one file is **plain text** and one file can be read with a **spreadsheet** program such as Microsoft Excel. The log files are available in the directory “C:\Users\[YOURCOMPUTER]\Documents\MedSimStudio\Logs”



## Collecting Data:

- 1) You can capture data from your learner groups by displaying a **QR code** on the **Display** monitor. Create a **QR code image** to your own survey (e.g., SurveyMonkey.com, or Qualtrics.com). Load your **QR code image** by clicking on the **Splash Screen** graphic in settings. This will replace the default splash screen with your image. At the end of your sim case click the **Med sim Studio Logo** on the **Control** window to toggle the splash screen.



- 2) You can capture **attendance** and **location/modality** data in the **Control** by selecting the **Assessment**→**Attendance** tab and filling it out during or after a simulation session. This will be saved and can be analyzed later
- 3) You can log learner performance reviews by selecting the **Assessment** tab.

## Anonymous user data collection:

You may disable Med Sim Studio from sending me data about how you use it. No personally identifiable data is sent, and data packets are actively scrubbed of anything that could be personally identifiable. I will use data for quality improvement, case feedback, and to better understand how Med Sim Studio is used by medical educators.

**Usage Data Reporting**

- Enable anonymous usage data sharing**

Data such as duration of cases, which cases, and attendance is uploaded to a remote database. Personal information such as names are removed.

**Reminder**

- Attendance reminder**

Enables the "reminder" messagebox to fill out attendance form in "Complete" mode.

**Case website**

- Allow cases to launch a website**

Some cases have an associated website such as a survey.

## Med Sim Studio

Developed by Adam Blumenberg, MD MA

2020 - 2021

Free to use and distribute.

I developed Med Sim Studio as a software platform that provides medical simulation educators a free and high-quality resource for in-situ sim (in hospital environment), remote learning (Zoom, WebEx, Skype, etc.), small groups (classroom), and sim laboratory education.

Med Sim Studio is free, so all you need is a windows computer with a second monitor.

Medical education is expensive, particularly to learners who are in training, practicing in developing countries, and students. Med Sim Studio is intended to be a free option for high quality medical education. Reducing cost-barriers in education will hopefully improve access, and lead to better physician performance and ultimately patient outcomes. In the spirit of the humanistic practice of medicine, I hope Med Sim Studio serves you well.

Sincerely,

Adam Blumenberg MD MA

Thanks to my wife Krista and son Leo, my parents Miki and Jelena, my sister Lili and brother-in-law Andrew and to my friends.

Thanks to Florian Schwander for developing the excellent software "Vital Sign Simulator v1.4.3" which inspired this project.

Thanks to Jessica Stetz MD and Sigrid Wolfram MD who taught me medical simulation.

Thanks to David Kessler MD for support and mentorship.

Thanks to Mark Silverberg MD for providing over a hundred stimulus images and mentorship.

Thanks to Matt Riscinti and The POCUS Atlas for providing ultrasound images.

Thanks to Wikipedia Commons and radiopaedia for providing additional images.

Thanks to Columbia University Medical Center Department of Emergency Medicine for providing support.

Thanks to the Columbia University Simulation Technicians Branden Ford and Shenelle Alleyne for contributing to medical education.

Additional stimuli are anonymized images from my clinical practice.

Thanks to SUNY Downstate College of Medicine and the Downstate / Kings County Hospital Departments of Emergency Medicine for education and training.

Thanks to my colleagues, nurses, technicians, and patients.

Thanks to Drs. Elizabeth Sanseau and Marc Aurbach for suggestions and support.

Thanks to my Simulation colleagues, Drs. Janice Shin-Kim, Delna John, and Humaira Ali.

Thanks to Shawn Bruce for technical suggestions and beta testing.

Thanks to Beta testers who provided suggestions for software improvements including Drs. Paul Hein, Thomas Ihmann (additional thanks for assisting with the German translation), and Guilherme Resener.

Thanks to the following organizations for allowing reprints of simulation cases:

- American College of Emergency Physicians (ACEP)
- Emergency Medicine Resident Simulation Curriculum for Pediatrics (EM ReSCu Peds)
- Journal of Education and Teaching in Emergency Medicine (JETeM)

Additional thanks to my medical mentors: Drs. Rob G Hendrickson, Zane Horowitz, Sage Weiner, Rana Biary, Joel Gernsheimer, Kelly Maurellus, Allison Regan, Teresa Smith, Joshua Schechter, Marcus Little, Richart Sinert, Ian DeSouza, James Willis, Jane Kim, Antonia Quinn, Jason Chu, Mert Erogul, Samuel Marquez, Shirley Eisner.

The following additional radiological stimuli used with permission from [www.radiopaedia.org](http://www.radiopaedia.org)

- Gunshot wound to head (Frontal): Case courtesy of Dr Bruno Di Muzio, Radiopaedia.org, rID: 30487
- Cervical vertebral body burst fracture with retropulsed fragment: Case courtesy of Dr Jeremy Jones, Radiopaedia.org, rID: 6150
- Cervical fracture dislocation C5-C6: Case courtesy of Dr Samir Benoudina, Radiopaedia.org, rID: 47581
- Fracture dislocation C6-C7.jpg: Case courtesy of Assoc Prof Frank Gaillard, Radiopaedia.org, rID: 4021
- Odontoid fracture type 2: Case courtesy of Dr Hani Makky Al Salam, Radiopaedia.org, rID: 9137
- Dense MCA sign (Left): Case courtesy of Dr Jeremy Jones, Radiopaedia.org, rID: 13190
- Dense MCA sign (Right): Case courtesy of Assoc Prof Frank Gaillard, Radiopaedia.org, rID: 17958