

BME Design-Spring 2026 - Dan Altschuler Complete Notebook

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Team contact Information

Elle Thom - Apr 13, 2026, 5:12 PM CDT

Last Name	First Name	Role	E-mail	Phone	Office Room/Building
Campagnola	Paul	Advisor	pcampagnola@wisc.edu		ECB
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Altschuler	Daniel	Leader	daltschuler2@wisc.edu		
Sheridan	Matthew	Communicator	mjsheridan2@wisc.edu		
Johnson	Lance	BSAC	ltjohnson4@wisc.edu		
Thom	Elleana	BWIG	ejthom@wisc.edu	715-815-0626	
Kryzer	Cody	BPAG	ckryzer@wisc.edu		



Project description

Elle Thom - Apr 13, 2026, 5:27 PM CDT

Course Number: BME 402

Project Name: 3D Printing Airway Trainers

Short Name: airway_trainers

Project description/problem statement:

Description: Creating a method for 3D printing airways from CT scans or MRIs.

Statement: Airway management is an integral part of keeping a patient stable in many medical environments. While training medical practitioners with simple airway trainers has improved patient outcomes, this has not had the same effect on patients with abnormal airways. The use of 3D printing from existing patient imaging to create realistic and individualized airway manikins would assist medical professionals, allowing them to practice airway management skills on lifelike models.

About the client:

Dr. Kristopher Schroeder is a UW Health anesthesiologist and a professor in the Department of Anesthesiology at the University of Wisconsin School of Medicine and Public Health. He also serves as interim vice chair of education and vice chair of faculty development in the Department of Anesthesiology.



Client Meeting 2/3/26

Cody Kryzer - Feb 03, 2026, 7:13 PM CST

Title: Client Meeting

Date: 2/3/26

Content by: Cody

Present: Whole team and Dr. Schroeder

Goals: Discuss with the client last semesters progress and the goals for this semester

Content:

Airway does not show texture of vocal chords but oral cavity does have hard/soft pallet

Interesting to evaluate using the airway management techniques, bronchoscope, types of laryngoscopy etc. See if it aligns with what they see with their patients.

The team wants to have intubators of varying skill levels intubate on our manikin and give qualitative feedback based on their experiences

Touch base early march perhaps, testing can be done whenever but late afternoon people start to leave ORs and we can harass them for their time.

Retired folks could have more flexible schedules to meet with.

George Arndt - local inventor, he's looking for stuff to do

Schroeder is curious what the larynx looks like, important for fidelity. Should reflect physiology. Otherwise, focus on mouth opening, airway swelling, teeth (different materials), pathology or mass in the glottic opening.

Volunteers with tumors on their vocal chords? - Could we synthesize this using CAD.

Society for airway management that has an annual meeting in Boston. They might be interested by this project description. - They would like an abstract from our final article.

Conclusions/action items:

Schroeder will work on having faculty or residents available to test our prototype.



Advisor Meeting 1/30/26

Cody Kryzer - Jan 30, 2026, 12:49 PM CST

Title: Advisor meeting

Date: 1/30/26

Content by: Cody

Present: Everyone

Goals: Discuss the upcoming semester of BME 402

Content:

Split into two teams

Matt and lance will focus on the segmenting and creating a mold that combines airway and mouth

Dan Cody and Elle will focus on making a modular neck and tongue etc

Preliminary presentation either next week or in two weeks (up to us)

Conclusions/action items:

Decide as a team when we want to give Paul our presentation and let him know



Advisor Meeting 2/6/25

Dan Altschuler (daltschuler2@wisc.edu) - Feb 06, 2026, 12:53 PM CST

Title: Advisor Meeting

Date: 2/6/25

Content by: Dan

Present: Lance, Dan, Elle, Matt

Goals: Chat with Paul

Content:

- Paul liked the idea of us testing with medical residents or airway specialists
- Could look into the society for airway management as our journal
- Next Friday we will not be having a meeting, doing the presentation in two weeks instead now
- Let Paul know in advance, can do a touch base on Thursday night

Conclusions/action items:

We should start doing a bit more work on our presentation and also work on the actual manikin. Some research into what type of journal article we want to mimic would be a good place to go as well.



Advisor Meeting 2/27/2026

Cody Kryzer - Feb 27, 2026, 12:59 PM CST

Title: Advisor Meeting

Date: 2/27

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Report due Wednesday
 - Don't worry about how it looks, just include the standard information and background
- Lance got the scan files editable
- Order silicone asap so we can have it on hand for molding, get the big pack this time
- Print next week for the mold
- Reach out to Schroeder for testing at somepoint
- Design the new base

Conclusions/action items:

Work on the report. Tong lecture next week so email Paul if we want to schedule a meeting

Paul is gone either April 9 or 10 but that's it



Advisor Meeting 3/05/2026

Elle Thom - Apr 13, 2026, 5:43 PM CDT

Title: Advisor Meeting

Date: 3/05

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Make sure to attend Tong Lecture
- Start prints for facial features
- Model airway negative

Conclusions/action items:

Start modeling and 3D printing



Advisor Meeting 3/13/2026

Elle Thom - Apr 13, 2026, 5:47 PM CDT

Title: Advisor Meeting

Date: 3/13

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Preliminary report looks good
- Team continued modeling obstructions for airways
- Team peer reviews looked good
- Tong lecture went well

Conclusions/action items:

Continue modeling facial features



Advisor Meeting 3/20/2026

Elle Thom - Apr 13, 2026, 5:51 PM CDT

Title: Advisor Meeting

Date: 3/20

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- The team modeled manikin face on solid works
- Printed the manikin face at Makerspace
- Continuing to look into facial variability

Conclusions/action items:

Executive summary draft is due soon start on airway silicone mold



Advisor Meeting 3/27/2026

Elle Thom - Apr 13, 2026, 5:54 PM CDT

Title: Advisor Meeting

Date: 3/27

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Had to reprint manikin face
- Started the executive summary have to Paul sooner than due date
- Starting silicone mold this week

Conclusions/action items:

Continue work on executive summary. Turn in Tuesday after Spring Break.



Advisor Meeting 4/03/2026

Elle Thom - Apr 13, 2026, 6:02 PM CDT

Title: Advisor Meeting

Date: 4/03

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Executive summary looks good and is ready for final draft to submit
- silicone mold is done
- reprint needs to be done of manikin face

Conclusions/action items:

Fabricate base

Turn in outreach documents

reprint manikin base



Advisor Meeting 4/10/2026

Elle Thom - Apr 13, 2026, 6:00 PM CDT

Title: Advisor Meeting

Date: 4/10

Content by: Cody Kryzer

Present: Whole team

Goals: Discuss semester plans

Content:

- Continued work on Executive summary
- Chose Design Excellence award compete for
- Worked on silicone model for the silicone mold

Conclusions/action items:

Start fabricating base

write testing protocols

Contact client to set up time for testing



Preliminary Journal Article 3/2/2026

Cody Kryzer - Mar 02, 2026, 3:50 PM CST

Title: Preliminary Report - Journal Article

Date: 3/2/2026

Content by: Cody

Present: Whole team

Goals: Write a draft of our journal article report

Content:

This is an example article from the journal Anesthesiology Society of America

Mode of Anesthesia for Patients with Placenta Accreta Spectrum Undergoing Cesarean Hysterectomy: A Report from the Multicenter Perioperative Outcomes

Group Database

Andrew Padilla, M.D., Jessica Stockinger, M.D.,

Nicole C. Zanolli, M.D., Rachel Hurwitz, M.Sc.,

Holly B. Ende, M.D., Alexander J. Butwick, M.B.B.S.,

Christine M. Warrick, M.D., Philip E. Hess, M.D.,

Michael Mathis, M.D., Matthew Fuller, M.S.,

Ashraf S. Habib, M.B.B.Ch., M.Sc., M.H.Sc.,

for the Multicenter Perioperative Outcomes

Group Investigators

Anesthesiology 2026; 144:535–45

Conclusions/action items:

Submit before our next meeting with Paul, ideally on Wednesday



Manikin Face Print First Attempt 3/23/26

Dan Altschuler (daltschuler2@wisc.edu) - Apr 13, 2026, 5:58 PM CDT

Title: Manikin Print #1

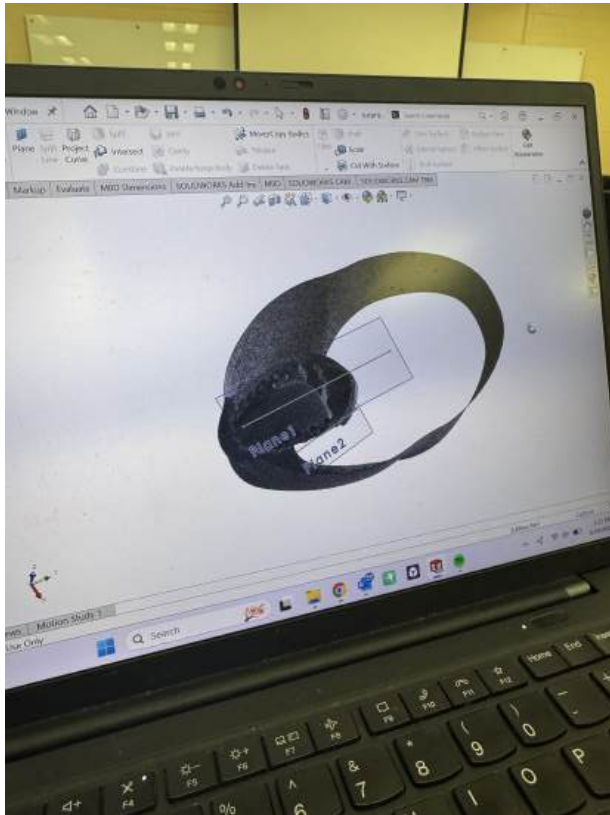
Date: 3/23/26

Content by: Dan

Present: Cody

Content:

Cody and I worked on making the surprised.obj file we got from the internet usable for our project. We used SolidWorks to make cuts from the full face and hollowed it out. We have differentiated between the jaw and the upper part of the face, but the problem we are running into is that the mesh seems to have no thickness. We are going to try a print to see what comes out and then make changes after.





Conclusions/action items:

There seems to be an issue with the file as the sides of the face had no thickness and did not print. We need to add some thickness to the sides in order to make this usable for our project.



Manikin Face Print with Thickness 3/26/26

Dan Altschuler (daltschuler2@wisc.edu) - Apr 13, 2026, 6:03 PM CDT

Title: Manikin Print #2

Date: 3/26/26

Content by: Dan

Content:

After using Blender to add thickness to the walls of the print it is time to see how they come out. I feel confident that there will be enough thickness on the walls because the 3mf file on the computer at the Makerspace showed some amount of thickness during the print length. In fabrication you can find the thickening protocol.



Conclusions/action items:

After adding thickness we now have files we can use for different iterations. These prints will likely be need to made larger.



Manikin Face Thickening Protocol

Dan Altschuler (daltschuler2@wisc.edu) - Apr 08, 2026, 2:50 PM CDT

Title: Manikin Thickening Protocol

Date: 4/8/26

Content by: Dan

Content:

1. Download the file from SolidWorks as an STL so it can be appropriately modified using Blender
2. Launch Blender and drag the STL file into Blender
3. Select facet normals and validate mesh, do not change the axes nor scale the mesh
4. Enter modeling mode on the top of the screen and select the modifiers tool on the right hand side of the screen
5. Once in modifiers, select generate and then solidify
6. Modify the thickness to 1.1 m and change the offset to -.25 while ensuring in simple mode
7. Select fill for the rim and make sure only rim and even thickness are not selected
8. View the model to ensure even thickness across the base
9. Select file and then export as an STL

Conclusions/action items:

This is the protocol used to thicken the facial structure we used for our manikin. Using Blender allowed us to thicken the sides so we could make a full final print.

Manikin Face Printing

Dan Altschuler (daltschuler2@wisc.edu) - Apr 13, 2026, 5:30 PM CDT

Title: Manikin face printing

Date: 4/14/26

Content by: Dan

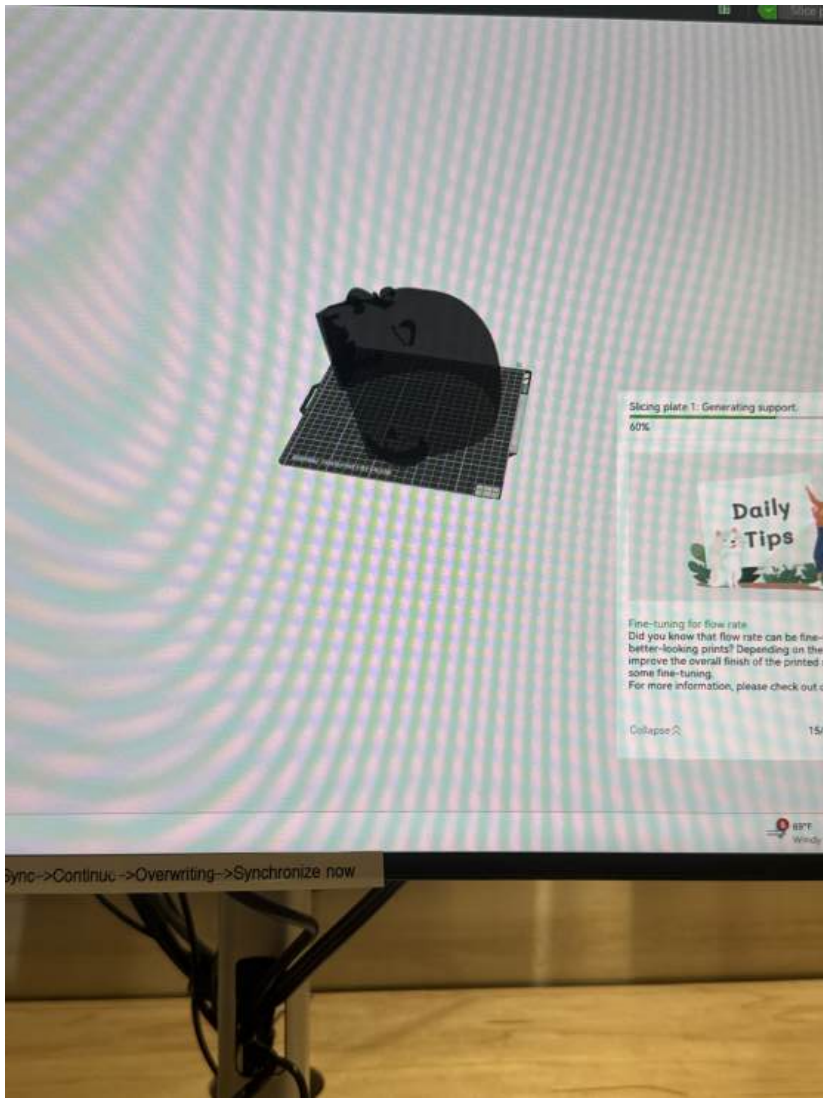
Present: Team

Content:

This is the combination of all the work that went into printing the facial features. This occurred across a few weeks.







Conclusions/action items:

Based on this we have our prints for the face.

Title: Vocal Chord Inserts

Date: 3/20/2026

Content by: Lance

Present: Whole team

Goals: Design printable slides that can be inserted into the silicone airway in order to replicate various vocal chord afflictions that may make intubation more difficult

Content:

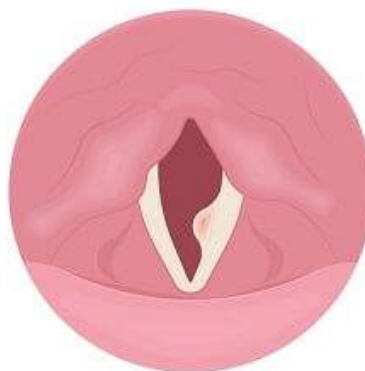
Below is a photo of various vocal chord diseases that an anesthesiologist may encounter which would cause difficulty during intubation.

We have designed our silicone airway to have a hole where the vocal chords are (also pictured below) .We want to create slides that can be inserted and removed by the user to alter their intubation experience.

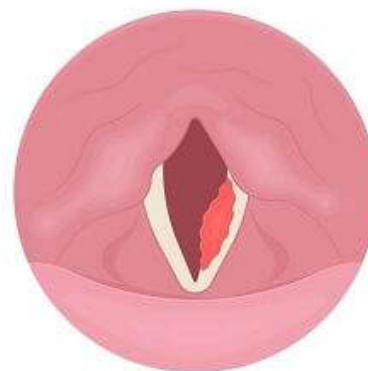
I have attached an example STL file below of our design, and more information and images can be found in Lance's vocal cord inserts entry.



LARYNGITIS



POLYP



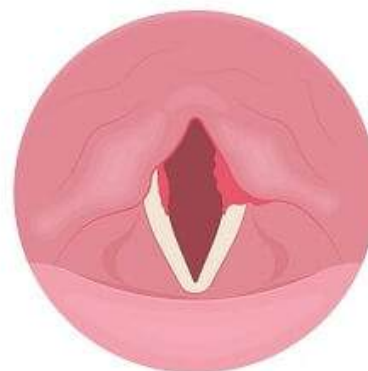
CANCER



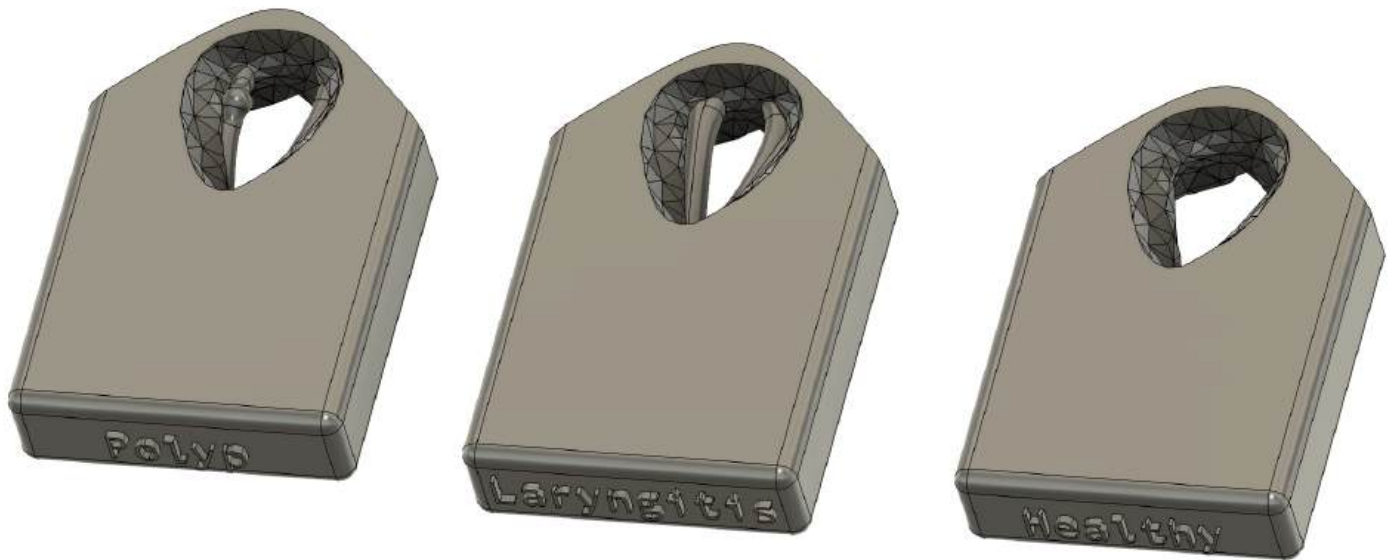
NODULE



PARALYSIS



CONTACT ULCERS

**Conclusions/action items:**

We will 3D print these files later in the semester out of materials that reflect the hardness of vocal chords. The goal is to have at least a healthy slide, a laryngitis slide, and slides containing tumors or polyps



Title: Final Prototype

Date: 5/1/26

Content by: Dan

Present: team

Content:

The team used all of the different pieces of the trainer to fabricate our final prototype which is pictured below.





Conclusions/action items:

This is our final prototype for the semester.

 **Airway Blocks**

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:03 PM CDT

Title: Airway Blocks

Date: 5/1/26

Content by: Dan

Present: team

Content:

The team used airway blocks to add variability to the neck angle of the manikin. We did this by using wood blocks from the makerspace and cutting them at representative heights and angles to add levels of modularity.



Conclusions/action items:

These are the airway blocks lined up in a row. We used this to add modularity to the airway.



Final Intubation Testing Protocol

Cody Kryzer - Apr 13, 2026, 5:27 PM CDT

Title: Final Intubation Testing Protocol

Date: 4/13

Content by: Cody

Present: Everyone

Goals: Create a plan for our testing on 4/20/26

Content:

The testing we want to perform involves people of varying intubation skill levels using our manikin. This will allow us to gather qualitative feedback from industry professionals as well as analyze the variance in time to intubate between skill levels.

The plan is to have 3 people intubate on the manikin, an inexperienced undergrad, a medical student with some degree of experience, and Dr. Chris Schroeder himself - a professional anesthesiologist.

We also want to test out the vocal inserts that each have specific afflictions and observe how those affect the intubation process.

We will lay out all the materials necessary, but not give any specific tips or instruction so we can observe how they would approach our specific manikin. We will ask each person to perform the full intubation process 5 times to gather enough data.

Conclusions/action items:

Using this protocol we will conduct our final testing with airway professionals to see how our trainer compares to those on the market. From this information we can make changes to our future work to see what else needs to be changed.

2025/12/15-3D Slicer Segmentation Protocol

Elle Thom - Dec 15, 2025, 5:55 PM CST

Title: 3D Slicer Segmentation Protocol

Date: 12/15/2025

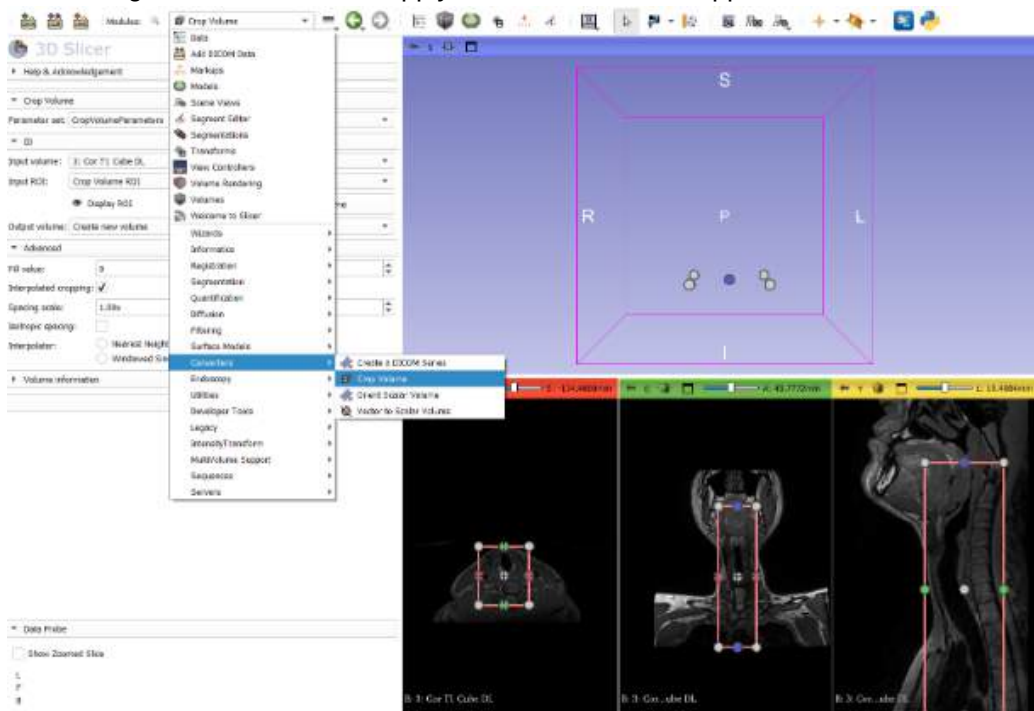
Content by: Whole Team

Goals: Create a detailed protocol showing the steps to create a 3D model of the airway on the computer.

Content:

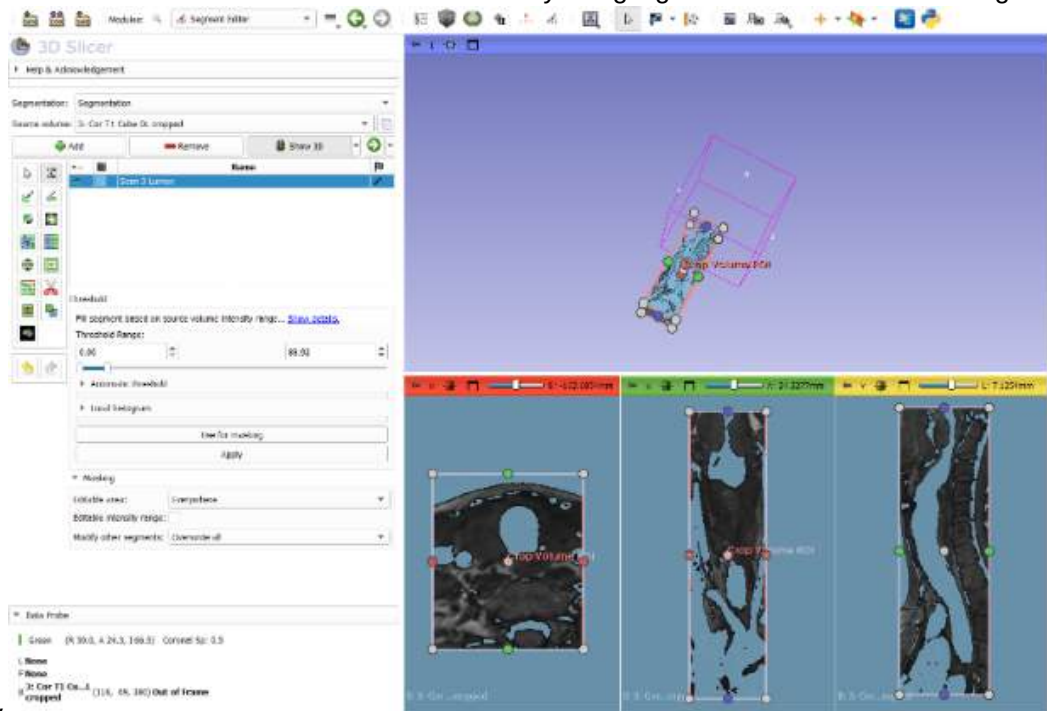
3D Slicer Segmentation Protocol

1. Upload DICOM files from MR scans by selecting add DICOM data, and select desired scan by double clicking
2. Look through the three views (coronal, sagittal, and transverse) to ensure that the scan looks good, and use the crop volume module to crop the scan to only include the airway from just superior to the epiglottis to just inferior to the carina (split in the trachea). In this module you will need to select "Create New ROI", choose the desired region, and then select apply to create the new cropped volume.



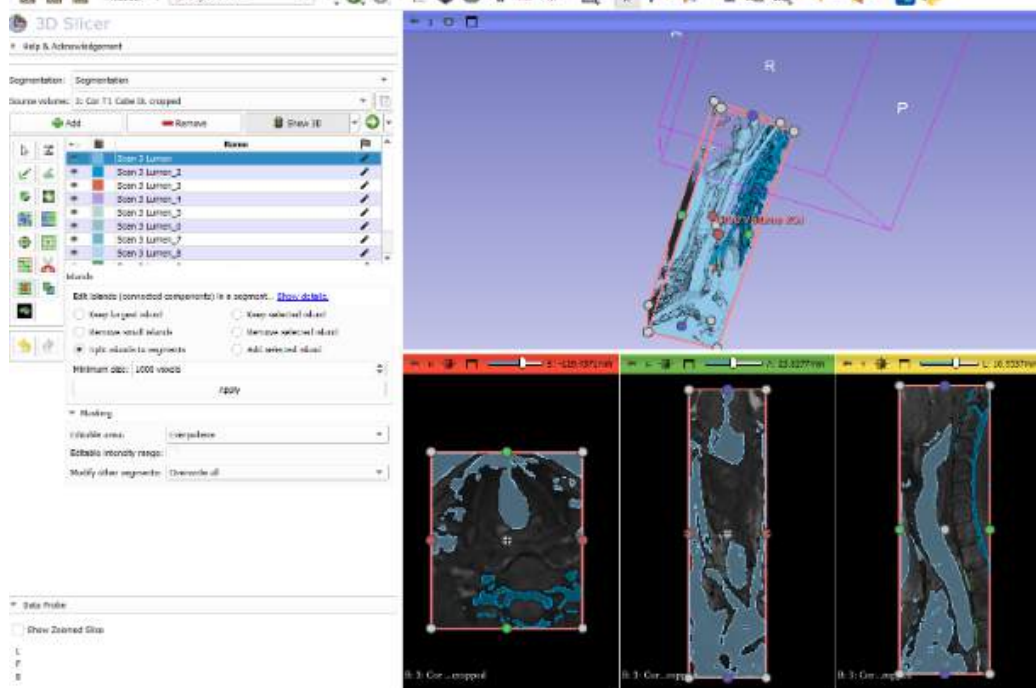
3. Under the segment editor module, select the source volume that you just created (should say the scan name and then cropped), and select Add to create a new segmentation. Rename this segment to something you will remember represents the air (I used Scan 3 Lumen). Then select Threshold from the options on the left side and change the low end of the range to 0, and the high end to something around 90. This will depend on the

scan, so look through each view to ensure that all air within the airway is highlighted. When the thresholding

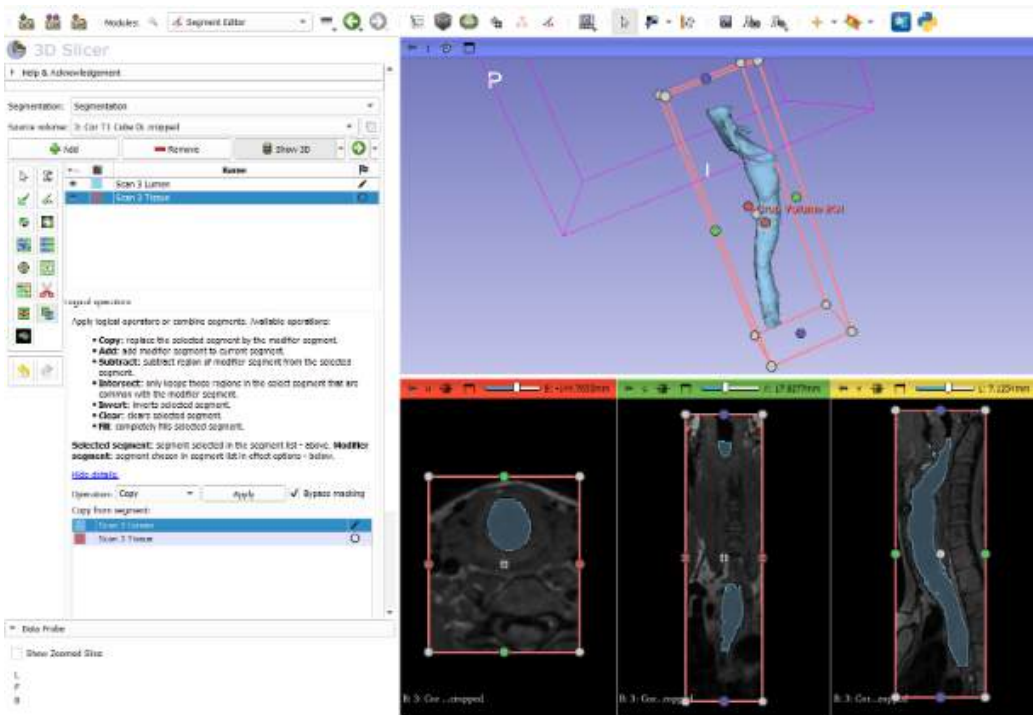


looks good, press Apply.

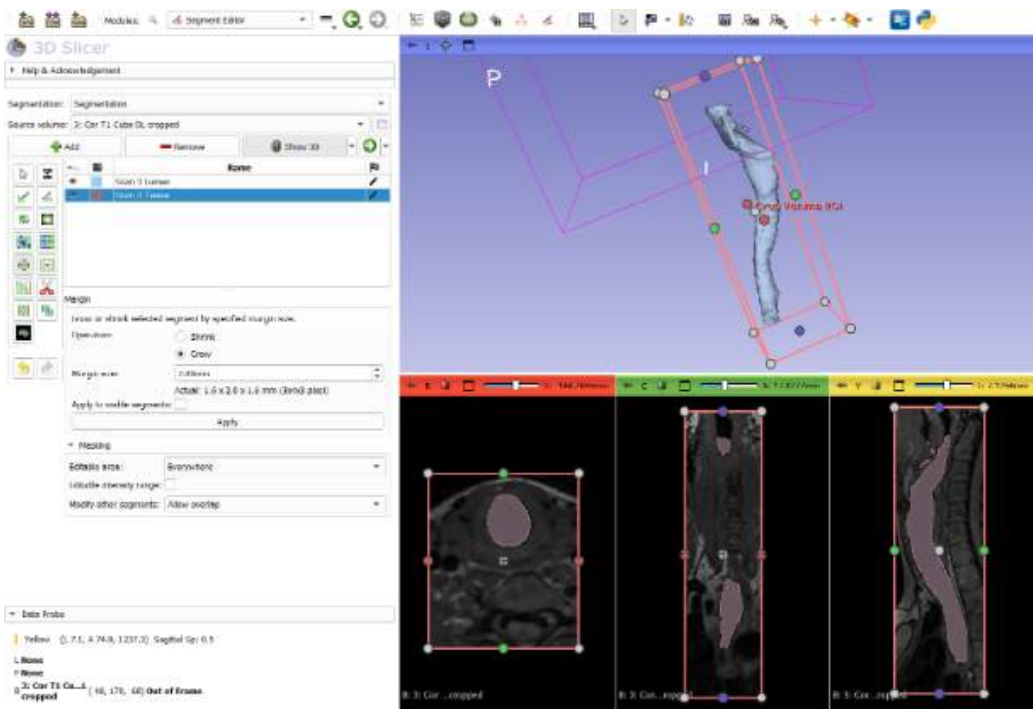
- To begin cleaning up the segment, select Islands from the left side, and then Split islands to segments. You can adjust the minimum voxel size to include more islands. Once you split it into segments, you can remove any segments that are not part of the main airway.



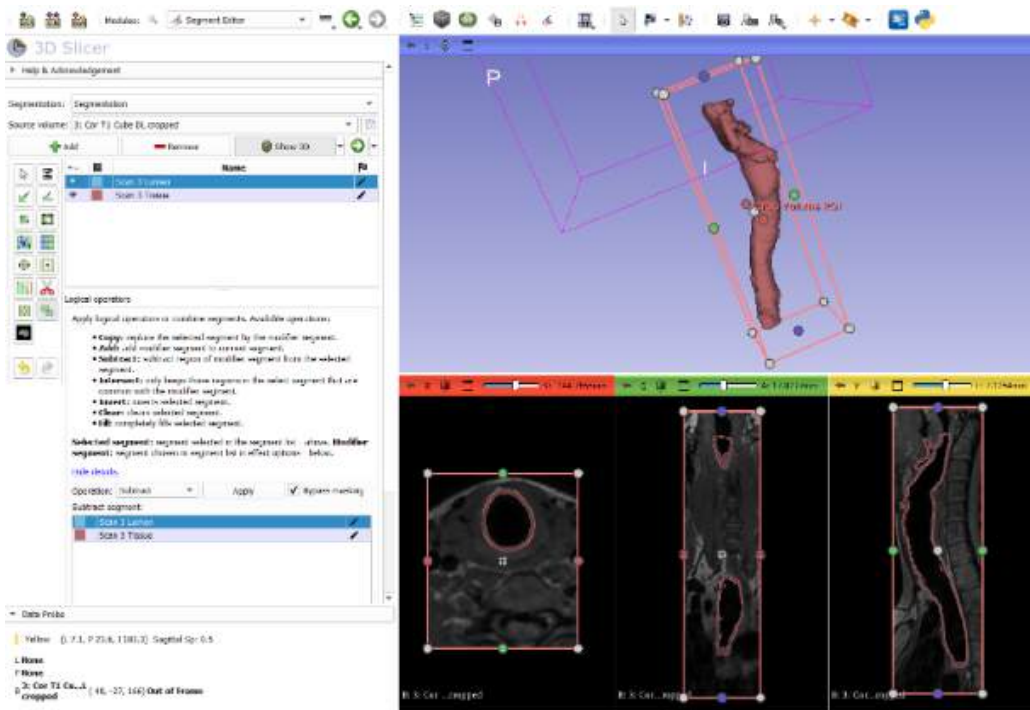
- At this point, there will still be a lot of undesired segments still included, so you will need to use the Scissors tool to cut out sections that should not be included. This can be done by cutting small parts where the desired and undesired portions are connected to create an island, and then using the Split islands to segments feature from step 4 to remove them. This will be the longest step.
- Once the airway is cleaned up, you will need to make the tissue around it. To do this, you need to go to logical operators, and then press Add to create a new segment, and name it something like Scan 3 Tissue. Then press Copy, and select Scan 3 Tissue up above, and Scan 3 Lumen below, then press Apply. At this point, you should have 2 identical segments.



7. Next, take this new segment and go to Margin on the left side, select Grow, and make the margin size 2 mm. Then make sure to select Allow overlap under modify other segments at the bottom! Then press Apply, and this segment should be slightly bigger than the other one.



8. Finally, in Logical Operators, select subtract, and select the tissue as your chosen segment at the top and subtract the air from the tissue. This should leave you with a hollow shell of the airway!



9. Next, go to the Segmentations module, and under Export/Import models and labelmaps, select Export and Models and then Export to the desired folder.

10. Finally, go to the Data module, select the Airway, and export as an STL file.

Conclusions/action items:

The team can now convert this model into a 3D print.



Airway Professional Testing Handout 4/20/2026

Cody Kryzer - Apr 21, 2026, 4:42 PM CDT

Title: Airway professional testing handout

Date: 4/21

Content by: Dan

Present: Whole team

Goals: Create a questionare for industry professionals who we will have test our prototype so that we can gather feedback

Content:

Thank you so much for your feedback on our project! We appreciate your time and look forward to making changes based on what you have to say. Below are a few questions about our trainer as well as a place to leave suggestions on what could be improved.

On a scale of 1-5, how would you rate the following...

Your intubation skills

How accurate is our trainer compared to a real life intubation

How well would this prepare you for a surgery with a restricted airway

How well do the airway slides represent actual restrictions

How easy is it to change the vocal cord slides

How stable is the trainer when conducting intubation

How well do the aesthetics of our manikin match an individual in the sniffing position

Short Answers

How does our trainer feel compared to other trainers you have used?

Could you see yourself using our trainer to prepare for a surgery?

What works well in our trainer?

What additions would you make to our trainer?

What would you remove from our trainer?

Any other general feedback or things we should know?

Conclusions/action items:

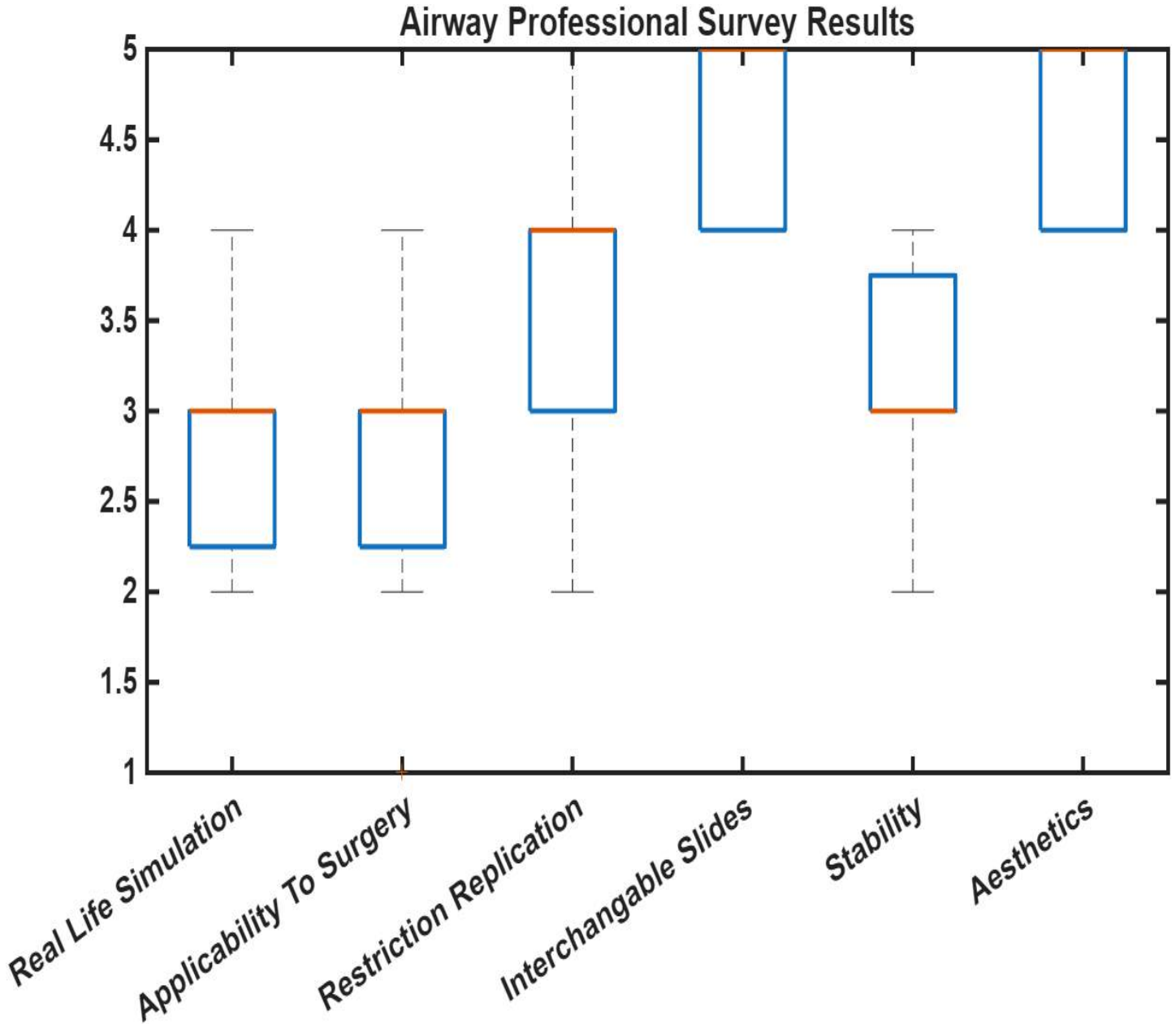
Much of the valuable feedback we received was through conversation, but having them fill out these forms helps us chart the data and see potential trends

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:07 PM CDT

Intubation Skills	Real life simulation	Applicability to surgery	Restriction replication	Interchangable slides	Stability	Aesthetics
4	3	2	3	5	2	4
3	2	1	2	5	3	4
3	3	4	4	5	4	4
3	3	3	5	5	3	5
5	4	3	4	4	4	4
1	3	3	5	5	3	5

3	3	3	4	4	3	5
3	2	3	3	4	3	5
2	3	3	3	4	2	5
3	2	2	4	4	3	4
4	3	3	3	5	4	5

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:08 PM CDT





Airway Professional Testing 4/21/26

Cody Kryzer - Apr 21, 2026, 4:50 PM CDT

Title: Airway professional testing

Date: 4/21/26

Content by: Cody

Present: Whole team

Goals: Gather feedback from industry professionals about our manikin

Content:

Feedback we received:

- Material is very compliant
- Too easy
- Head is too light - most clinicians lift the head with one hand - "you could put a ten pound weight in here"
- The visuals are very accurate
- Resistance for opening the mouth
- Highest block feels the most realistic - more occluded
- Likes the flexible jaw
- Put your thumb on something to open the mouth
- Position of everything feels good
- Approximates how you would do it in real life, easier - but actual motions
- I like it better than the ones we have in the basement
- Very deep glottis
- Easy to get a good view
- Very cost effective
- Tube just does not fit through paralyzed insert - visually is very accurate
- Basic anatomy is down
- Head is already in the perfect position - this is bad
- Very easy compared to other manikins

Things we noticed:

- Many users used their thumb to grab the jaw/lip/teeth and hold the mouth open
- Tallest block was most appreciated and most realistic

Conclusions/action items:

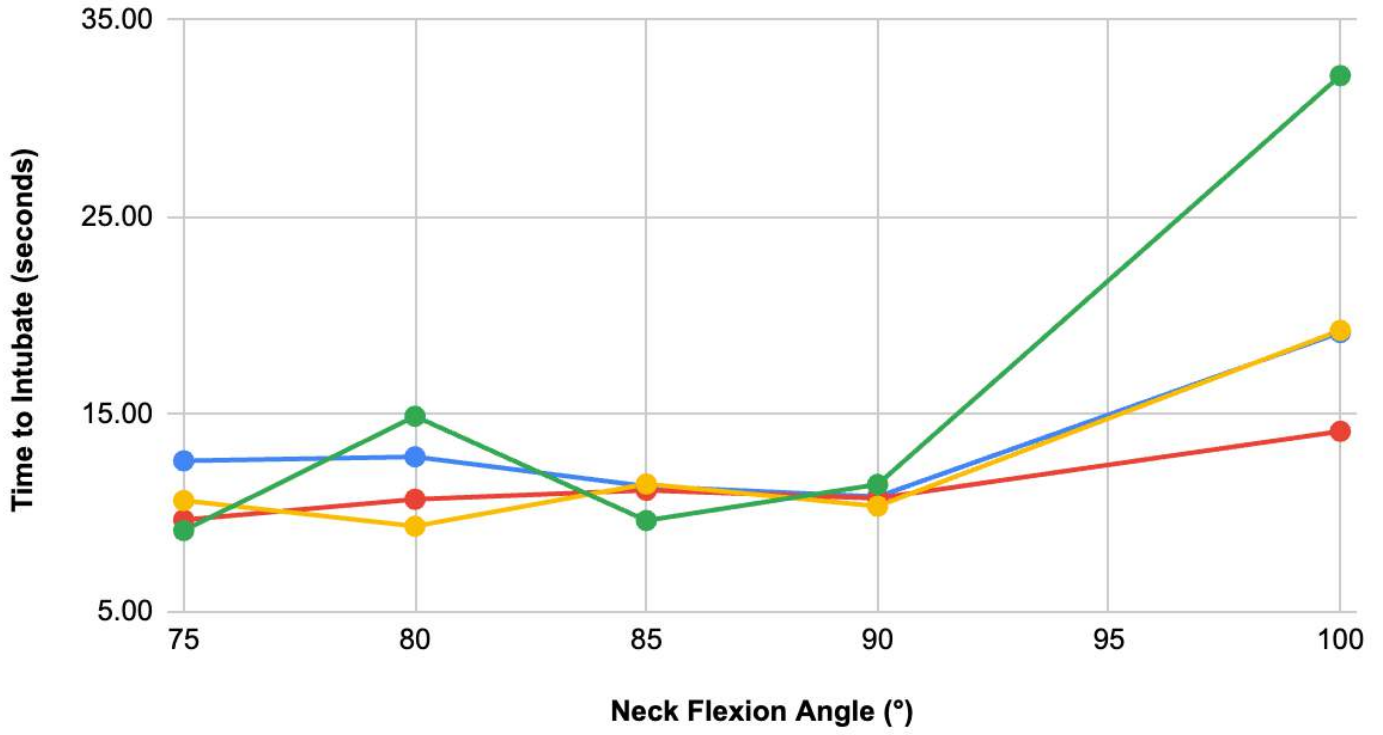
We are very happy with the feedback we received, but we wish we could have done this sooner since we would like to improve our prototype



Dan Altschuler (daltshuler2@wisc.edu) - May 01, 2026, 4:21 PM CDT

Block Angle	Attempt 1	Attempt 2	Attempt 3	Mean	StDev
75	10.11	15.41	12.45	12.66	2.66
80	12.92	13.61	12.05	12.86	0.78
85	12.09	11.57	10.44	11.37	0.84
90	11.92	10.12	10.47	10.84	0.95
100	28.74	13.02	15.72	19.16	8.41
P2 (Lance)					
Block Angle	Attempt 1	Attempt 2	Attempt 3	Mean	StDev
75	9.4	9.32	10.27	9.66	0.53
80	9.84	10.29	11.99	10.71	1.13
85	11.02	11.77	10.7	11.16	0.55
90	10.29	10.99	11	10.76	0.41
100	14.34	13.45	14.67	14.15	0.63
P3 (Matt)					
Block Angle	Attempt 1	Attempt 2	Attempt 3	Mean	StDev
75	11.26	11.06	9.61	10.64	0.90
80	8.32	9.43	10.28	9.34	0.98
85	11.96	11.78	10.71	11.48	0.68
90	10.18	10.48	10.41	10.36	0.16
100	35.41	10.96	11.44	19.27	13.98
P4 (Elle)					
Block Angle	Attempt 1	Attempt 2	Attempt 3	Mean	StDev
75	8.28	9.03	10.06	9.12	0.89
80	18.21	16.13	10.41	14.92	4.04
85	9.66	9.65	9.58	9.63	0.04
90	13.36	11.71	9.31	11.46	2.04
100	37.02	43.31	16.22	32.18	14.18

Intubation Time vs. Neck Flexion Angles



 **Intubation Testing Analysis**

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:20 PM CDT

Testing Results

P1 (Cody):

100° vs 75°: $t = 1.036$, $p = 0.4092$ 100° vs 80°: $t = 1.281$, $p = 0.3285$ 100° vs 85°: $t = 1.707$, $p = 0.2299$ 100° vs 90°: $t = 1.935$, $p = 0.1927$

P2 (Lance):

100° vs 75°: $t = 18.856$, $p = 0.0028$ 100° vs 80°: $t = 6.329$, $p = 0.0241$ 100° vs 85°: $t = 4.388$, $p = 0.0482$ 100° vs 90°: $t = 7.078$, $p = 0.0194$

P3 (Matt):

100° vs 75°: $t = 1.109$, $p = 0.3831$ 100° vs 80°: $t = 1.157$, $p = 0.3669$ 100° vs 85°: $t = 0.993$, $p = 0.4255$ 100° vs 90°: $t = 1.092$, $p = 0.3887$

P4 (Elle):

100° vs 75°: $t = 2.681$, $p = 0.1155$ 100° vs 80°: $t = 2.777$, $p = 0.1089$ 100° vs 85°: $t = 2.763$, $p = 0.1098$ 100° vs 90°: $t = 2.848$, $p = 0.1044$

Paired t-tests with Bonferroni correction ($\alpha = 0.0125$) were used to compare intubation time at 100° to lower flexion angles for each participant. A statistically significant difference was observed only for Participant 2 between 100° and 75° ($p = 0.0028$). No other comparisons reached significance. Despite higher mean times at 100° for some participants, large variability and small sample size ($n = 3$) limited

statistical significance.



2025/12/13- Outreach Outline

Elle Thom - Dec 13, 2025, 9:34 PM CST

Title: Outreach Outline

Date: 12/13/2025

Content by: Whole Team

Goals: Create an activity that is fun for a 5th-grade classroom and involves the learning objectives of biomedical engineering in a fun and creative way.

Content:

The outreach outline is attached below.

Conclusions/action items:

This activity is now planned out and ready to be used in an outreach format. Next steps involve gathering the materials needed and scheduling a time for outreach to take place.

Elle Thom - Dec 13, 2025, 9:24 PM CST



Cost Away!

Organization: University of Wisconsin-Madison Department of Biomedical Engineering

Contact person(s): Sebastian Maki

Contact information: smaki@madison.wisc.edu

General Description

Type of activity

Two demonstrations were conducted by hand by an activity. The two demonstrations included an electrostatic battery and a artificial hand. The electrostatic battery demonstration will have to change the strength of the battery and its ability to pick up more paper bits. The artificial hand will help the students understand the design mechanisms behind a prosthetic limb. This is an activity for the students will be designing and making a prototype of a cost. The prototype will then be tested against varying sizes of weights and the cost that holds it against the most weights will have a prize.

Program Objectives

Big ideas

The goal of the activity is to introduce the students to the field of biomedical engineering in a way that will allow them to explore their interests. We also want to prove that engineering methods and demonstrate how they can be used to create a functional medical device.

Learning goals

As a result of participating in this program, students will be able to:

[Download](#)

Outreach_Activity_Outline.pdf (223 kB)



2025/12/13- Outreach Presentation

Elle Thom - Dec 13, 2025, 9:41 PM CST

Title: Outreach Presentation

Date: 12/13/2025

Content by: Whole Team

Goals: Create a presentation for 5th-grade students explaining biomedical engineering and the project they will work on

Content:

The presentation is attached below.

Conclusions/action items:

The presentation was delivered, and outreach has been submitted. There are no other action items for this assignment.

Elle Thom - Dec 13, 2025, 9:26 PM CST



[Download](#)

Outreach_Slideshow.pdf (816 kB)

2025/12/13- Design Matrix

Elle Thom - Dec 13, 2025, 9:29 PM CST

Title: Design Matrix

Date: 12/13/2025

Content by: Whole Team

Goals: Create a design matrix that accurately shows three separate designs and rate them against each other to determine the best option for the project.

Content:

The design matrix pdf is attached below

Conclusions/action items:

This design matrix helped the team choose the lamp rod design for adjustability in the neck of the manikin. Next steps include designing the rest of the manikin, fabrication and testing.

Elle Thom - Dec 13, 2025, 9:23 PM CST

Design Matrix for Neck Manipulation

Design Criteria (Weights)	Design 1: Adjustable Rods Design	Design 2: Flexible Lamp Design	Design 3: Rotating Pin Design			
Ease of Use (20)	4.5	10	3.5	20	4.5	10
Stability (20)	2.5	8	2.5	8	3.5	20
Durability (15)	5.5	13	3.5	9	5.5	15
Flexibility (15)	2.5	9	3.5	18	2.5	9
Ease of Fabrication (10)	5.5	10	4.5	8	3.5	6
Cost (10)	9.5	10	9.5	10	2.5	4
Safety (10)	9.5	10	9.5	10	4.5	8
Total Score (100)	78	88	88	78		

- *Zhang et al. (2018) suggest that the design should be simple and easy to use.*
- *Ease of Fabrication: Refers to how simple it is to build.*
- *Cost: Breaking the bank.*
- *Precision: Represented by human anatomy. Manipulation is crucial.*
- *Ease of Use: Intuitive design, quick and easy to adjust position.*
- *Safety: Potential harmful areas. Does the design do a good job of training the user so they will be able to perform safe manipulations?*
- *Durability: Can the design be used over and over without wear and tear?*
- *Stability: Can the design stay secure and in place during use?*

[Download](#)

Design_Matrix_9_25_25.pdf (1.27 MB)



2026/04/13-Product Design Specifications

Elle Thom - Dec 15, 2025, 6:05 PM CST

Title: Product Design Specifications

Date: 12/15/2025

Content by: Whole Team

Goals: Create design specifications that reflect the end goal of the project.

Content:

Attached below

Conclusions/action items:

These specifications serve as the team's guidelines on how the final design should operate.

Elle Thom - Dec 15, 2025, 6:05 PM CST



3D Printing Airway Trainers

Product Design Specifications (PDS)

BME 400 Section 303
September 18th, 2023

Client

Kristopher Schroeder, MD

Advisor

Dr. Paul Czapigzola

Team

Matt Sheridan	msheridan7@wvu.edu
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[Download](#)

9_18_25_Updated_PDS_1_.pdf (355 kB)



2026/04/13-Outreach Report

Elle Thom - Apr 13, 2026, 5:34 PM CDT

Title: Outreach Report

Date: 4/13/2026

Content by: Team

Goals: Complete report for outreach activity

Content:

Attached below

Conclusions/action items:

Completed all outreach documents

Elle Thom - Apr 13, 2026, 5:34 PM CDT

We completed our BME outreach program on November 11th, 2025 in front of 34 9th grade students of Van Hise elementary school in Madison, in Mrs. Maly's classroom. Van Hise is a predominantly white school with significant Asian and mixed populations, and 15% of students are economically disadvantaged. Mrs. Maly's class has 7 students with individualized education programs and 3 students whose English is a second language. We introduced ourselves to the students and told them about what it meant to be an engineer, and specifically what it meant to be a biomedical engineer. Since we knew we would have a variety 9th grade audience, we ensured that we had ample opportunities for them to answer questions and share what they thought which worked perfectly for the group of students we were working with. We also made sure that our slideshows had enough graphics for the students to look at and figures that they could read even if they were not fully paying attention to everything we said. We first started out by talking about being an engineer and gave an overview picture on why we love our major and how we knew we wanted to be engineers as we grew up. We then moved into talking about the many things that biomedical engineers build to emphasize it is a very wide field of study with a lot of things covered under the umbrella of biomedical engineering. Once we felt the students had a good idea on engineering and what we were, we then moved on to an activity. We initially planned to have some introductory activities to playfully show some of the medical devices biomedical engineers work on including a pumpable, balloon-based heart model and an elastic band arm exoskeleton. However, based on the time constraints of the activity and the excitement of the class, we chose to move straight to our main activity. We put the students into groups of 3 and presented our main activity where they were tasked to first draw out a design for, and then eventually build a cart to protect a paper towel roll with the egg inside as a makeshift arm. We gave the students 20 minutes to brainstorm, sketch, and then make their carts while we all walked around to help and also connect with the students. Once the time was up, we tested their carts by dropping a weight off a desk onto their makeshift arms to test how successfully they made their carts. The students seemed to love the activity and were engaged for nearly the whole time.

While we initially planned to have some better fun activities before the main cart making task, we were given time constraints that prevented us from being able to do anything but the main activity. The students at first responded well to the presentation and there was a lot of audience participation on questions such as, "what does it mean to be an engineer?" "what do you think an engineer does," and "what is a biomedical engineer?" Hands shot up for all the questions, but by the end of the presentation, feedback appeared that the students were looking to get started, so we decided to speed into our main activity. We gave the students instructions for the cart activity and they quickly started to brainstorm in groups of three. Once they agreed on a design they all drew plans out for what they wanted to make, and then we handed out the materials, but not until they had come up with a design beforehand. Working to give them the materials helped us make sure they did not just put pieces together once they got there, and instead thought about what might work and what might not. This also helped keep the students on task. By taking their carts using eggs, it helped keep the students engaged even when their cart was not being tested as the egg breaking would always lead to excitement and energy in the room. Reflecting on our outreach program, there is a lot that went right as seen in the pictures of the carts the students made for in after we left. We would likely make our presentation shorter as we did lose some of the students' attention towards the end, and we would also be more diligent to continue to walk around and answer questions. We would also want to be able to show our introductory activities as we would have the students would have loved them. Overall, we had a very successful outreach program and we think the students at Van Hise elementary would love more programs from UW-BME students.

[Download](#)

Altschuler-Johnson-Kryzer-Sheridan-Thom-outreach-report.pdf (4.36 MB)



Smooth Muscle in Abnormal Airways

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:15 PM CDT

Title: Smooth Muscle in Abnormal Airways

Content by: Dan

Search Term: Google Scholar: abnormal airways

Link: https://www-sciencedirect-com.ezproxy.library.wisc.edu/science/article/pii/S2468867321000377?casa_token=1kSNmlusfeQAAAAA:gHy7XG3wYVgeA-pC5ACkFTxe1REUjMWXM0LcvtaCgtd6DCRvk2hnejgu03Z8YRbQmLT2e9Ln9w

Citation:

Y. Bossé, "Smooth muscle in abnormal airways," *Current Opinion in Physiology*, vol. 21, pp. 1–8, Jun. 2021, doi: <https://doi.org/10.1016/j.cophys.2021.03.002>.

Goals: Learn about the smooth muscle in abnormal airways

Content:

Airway responsiveness tends to be measured by the contraction of the smooth muscle in an airway (ASM), but this does not take into account other contributing factors to airway shrinkage, such as diseases or age. ASM that is considered to be normal size and have a normal contractile limit can trigger warnings in airway responsiveness in abnormal airways. For many individuals, it is possible that they have completely normal ASM, but can still show the signs of AHR. While this is the case, it is also important to note that normal ASM does not necessarily mean that there are not other problems in the airway. There is a lot of literature on ASM defects, but this study shows that there may be more to observe with AHR problems.

Conclusions/action items:

This information is important for designing our airway trainer, as we are going to be dealing with abnormal airways, so understanding the mechanism by which an airways responsiveness is regarded is helpful.



Out-of-Hospital Endotracheal Intubation Experience and Patient Outcomes

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:15 PM CDT

Title: Out-of-Hospital Endotracheal Intubation Experience and Patient Outcomes

Content by: Dan

Goals: Get some numbers on general intubation patient outcomes for background information

Search Term: patient outcomes in intubation

Link: [https://www.annemergmed.com/article/S0196-0644\(09\)01841-1/fulltext](https://www.annemergmed.com/article/S0196-0644(09)01841-1/fulltext)

Citation:

H. E. Wang, G. K. Balasubramani, L. J. Cook, J. R. Lave, and D. M. Yealy, "Out-of-Hospital Endotracheal Intubation Experience and Patient Outcomes," *Annals of emergency medicine*, vol. 55, no. 6, pp. 527-537.e6, Jun. 2010, doi:

<https://doi.org/10.1016/j.annemergmed.2009.12.020>.

Content:

As observed in Pennsylvania statewide emergency medicine services, the patient survival rate for out of hospital intubation is associated with rescuer experience with the difficult process of intubation. This is only the case for cardiac and medical non-arrest patients, not for trauma non-arrest patients. Tracheal intubation is an incredibly complex process for any medical professionals, and is increasingly difficult for individuals that do not have practice with standard intubation procedures. By increasing the access to practice trainers or manikins, there was shown to be an improvement in overall patient outcomes. The uncontrolled out of hospital setting poses many risks, so wide access to training for EMS is integral to making a difference in patient outcomes.

Conclusions/action items:

Using this information, it seems very clear that there is a link between intubation experience and patient outcome. Since the major goal of the project is to make these airway trainers accessible so many people can practice, there is a definite link between our project and improved patient outcome.



Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:15 PM CDT

Title: Difficult Airways

Content by: Dan

Search Term: 3d printing abnormal airways

Link: <https://pubmed.ncbi.nlm.nih.gov/33358011/>

Citation:

D. Ormandy et al., "Difficult airways: a 3D printing study with virtual fiberoptic endoscopy," British Journal of Oral and Maxillofacial Surgery, vol. 59, no. 2, pp. e65–e71, Feb. 2021, doi: <https://doi.org/10.1016/j.bjoms.2020.08.045>.

Goals: Learn about the use of 3D printing in difficult airways, and how that can impact patient outcomes

Content:

The thorough study of abnormal airways during the preoperative phase can improve patient outcomes. 3D printing these abnormal airways is an important growing field for assisting doctors with this study. These models allow the doctor and the anesthesiologist to choose the correct intubation approach for the surgery. CT scans were done on patients airways and then these scans were moved to 3D rendering software. These softwares (OsiriX, Primeo) can be helpful for our project if we are looking for some form of a rendering service.

Conclusions/action items:

Using this resource to consider the patient outcomes for individuals with abnormal airways will be crucial for writing about the background and motivation for this project.



Management of difficult tracheal intubation

Dan Altschuler (daltschuler2@wisc.edu) - May 01, 2026, 4:15 PM CDT

Title: Management of difficult tracheal intubation: a closed claims analysis

Content by: Dan

Search Term: doctor intubation practice

Citation:

A. M. Joffe, M. F. Aziz, K. L. Posner, L. V. Duggan, S. L. Mincer, and K. B. Domino, "Management of Difficult Tracheal Intubation," *Anesthesiology*, vol. 131, no. 4, pp. 818–829, Oct. 2019, doi: <https://doi.org/10.1097/ain.0000000000002815>.

Link: <https://pmc.ncbi.nlm.nih.gov/articles/PMC6779339/>

Goals: Learn about medical malpractice as it relates to tracheal intubation

Content:

Inadequate airway planning and judgement errors were considered to be the largest contributors to patient harm in this study. There continues to be a need for further practice for medical practitioners on tracheal intubation. Since there was shown to be a considerable link between practitioners comfort with the intubation process and morbidity and malpractice in the hospital setting, there needs to be an increase in trainers on the market. While trainers are also shown to be helpful for improving patient outcomes, the improvements in the guidelines for difficult airway management can also lead to increased outcomes for patients.

Conclusions/action items:

Looking at this study, there still exists a great need for further airway trainers be made available on the market. While it is not possible to prepare practitioners for every single airway they may face, widely accessible abnormal airway trainers will improve patient outcomes.



Human Subjects Training

Dan Altschuler (daltschuler2@wisc.edu) - Dec 16, 2025, 12:34 PM CST

LW Human Subjects Protections Course	Basic/Refresher Course - Human Subjects Research	8/28/2024	8/28/2027
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Screenshot_2025-02-10_at_4.04.51_PM.png (30.7 kB)



Dan Altschuler (daltschuler2@wisc.edu) - Dec 16, 2025, 12:34 PM CST

My Memberships				
Membership Type	Start Date	Expiry Date	Renew	Card Info
Shop Tools	Tue, Aug 20 2024	Thu, Jan 4 2026	Not Renewable	N/A
Machining	Fri, Mar 1 2024	Permanent	Not Renewable	N/A

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Screenshot_2025-02-06_at_9.27.12_PM.png (183 kB)

HIPAA Privacy and Security Training

Dan Altschuler (daltschuler2@wisc.edu) - Dec 16, 2025, 12:34 PM CST

2024-2025 HIPAA Privacy & Security Training | 2024-2025 HIPAA Privacy & Security Training | 4/7/2025

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Screenshot_2025-04-24_at_9.42.24_PM.png (25 kB)

Chemical and Biosafety Lab Training

Dan Altschuler (daltschuler2@wisc.edu) - Dec 16, 2025, 12:34 PM CST



This certificate (for Altschuler) is based on training for the following course(s):

Course	Assessment	Completion	Expiration
Basic Safety Training	Basic Safety Training Exam	2/15/25	2/15/25
Chemical Safety Training	Chemical Safety Training Exam	2/15/25	2/15/25

[Download](#)

Training_for_430.pdf (82.4 kB)



Dan Altschuler (daltshuler2@wisc.edu) - May 01, 2026, 4:17 PM CDT

This certifies that Dan Altschuler has completed training for the following course(s):

[Expand All](#) [Collapse All](#)

Course	Assignment	Completion	Expiration
2024-2025 HIPAA Privacy & Security Training	2024-2025 HIPAA Privacy & Security Training	4/7/2025	
Biosafety Required Training	Biosafety Required Training Quiz 2024	2/7/2024	2/7/2029
Chemical Safety: Fume Hood Safety Training	Fume Hood Final Quiz	3/19/2026	3/19/2031
Chemical Safety: The OSHA Lab Standard	Final Quiz	4/11/2025	
UW Human Subjects Protections Course	Basic/Refresher Course - Human Subjects Research	8/28/2024	8/28/2027

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Screenshot_2026-03-20_at_12.57.32_PM.png (788 kB)



Manikins' Anatomical Accuracy 12/16

Cody Kryzer - Dec 16, 2025, 1:02 PM CST

Title: Anatomic accuracy of airway training manikins compared with humans

Date: 12/16/25

Content by: Cody

Present: Cody

Goals: Consider proper measurements for making an airway training manikin

Link: <https://doi.org/10.1111/anae.15238>

Citation:

[1] M. B. Blackburn *et al.*, "Anatomic accuracy of airway training manikins compared with humans*," *Anaesthesia*, vol. 76, no. 3, pp. 366–372, Aug. 2020, doi: <https://doi.org/10.1111/anae.15238>.

Content:

This study takes a look at three different airway manikins and compares their measurements to values found from human CT scans. The main discrepancy between trainer and human was the space between epiglottis and posterior pharyngeal wall.

Measurement	Mean (SD)	Value (percentile)		
		Human participants	SynDaver	Laerdal
Tongue to PPW	12.22 (5.42)	19.9 (0.96 ^a)	24.0 (> 0.99 ^a)	16.8 (0.86 ^a)
Epiglottis to PPW	7.94 (3.35)	15.4 (0.99 ^b)	23.5 (> 0.99 ^b)	11.3 (0.84 ^a)
Tip of tongue to vallecula	71.49 (6.01)	50.7 (< 0.01 ^b)	73.6 (0.64)	63.9 (0.1 ^a)
Tip of tongue to tongue dorsum	34.38 (5.25)	29.7 (0.18)	23.2 (0.02 ^b)	28.7 (0.14 ^a)
Vallecula to epiglottis	14.64 (4.2)	16.0 (0.62)	16.3 (0.66)	8.7 (0.08 ^a)
Base of epiglottis to PPW	11.84 (3.1)	23.9 (> 0.99 ^b)	28.7 (> 0.99 ^b)	16.0 (0.91 ^a)
Vertical distance of soft palate	26.50 (7.71)	15.5 (0.08 ^a)	41.3 (0.97 ^a)	11.1 (0.02 ^b)
Soft palate to laryngeal inlet	60.64 (9.97)	66.2 (0.71)	112.0 (> 0.99 ^b)	82.8 (0.99 ^b)
Uvula to epiglottis	21.40 (7.88)	28.1 (0.8)	28.4 (0.81)	25.0 (0.68)

Measurement	Mean (SD)	Value (percentile)			
		Published human values	SynDaver	Laerdal	AirSim
Height mouth opens; cm [17]	4.78 (0.83)		5.98 (0.93)	4.52 (0.38)	8.10 (> 0.99)
First tracheal ring width; mm [18]	1.9 (0.6)		2.44 (0.82)	1.52 (0.26)	1.92 (0.51)
Trachea length; cm [19]	8.6 (1.1)		9.54 (0.80)	3.27 (< 0.01)	7.83 (0.24)
Neck circumference; cm [20]	36.6 (3.5)		33.4 (0.18)	43.55 (0.98)	41.23 (0.91)
Tongue to PPW; mm [16]	16.0 (0.7)		23.0 (> 0.99)	35.7 (> 0.99)	23.2 (> 0.99)

Measurement	Mean (SD)	Value (percentile)		
	Published human values	SynDaver	Laerdal	AirSim
Epiglottis to PPW; mm [16]	9.0 (0.4)	16.7 (> 0.99)	35.4 (> 0.99)	14.8 (> 0.99)

These tables show the differences in spacing at different relevant points in the human and manikin anatomy.

Conclusions/action items:

We should refer to these tables when using 3D modeling software to ensure our prints will be anatomically accurate. The airway itself must get values from the MRI scans, but the spaces around it are determined by us and should be precise.



Guidelines for Difficult Airway Management 12/16

Cody Kryzer - Dec 16, 2025, 1:18 PM CST

Title:

Date: 12/16/25

Content by: Cody

Present: Cody

Goals: Learn about differences and similarities of different intubation devices

Link: <https://www.sciencedirect.com/science/article/abs/pii/S0735675707007292>

Citation: [1]B. Trabold, C. Schmidt, B. Schneider, D. Akyol, and M. Gutsche, "Application of three airway devices during emergency medical training by health care providers--a manikin study," *The American Journal of Emergency Medicine*, vol. 26, no. 7, pp. 783–788, Sep. 2008, doi: <https://doi.org/10.1016/j.ajem.2007.11.006>.

Content:

The study takes a look at the use of a Combitube, Easytube, and Laryngeal tube when used by healthcare providers with varying airway management experience.

The outcomes measured are: time to successful insertion, success rate, level of education, and professional experience.

The laryngeal tube had the shortest insertion time and the highest success rate.

There was shown to be no correlation between years of professional experience and insertion time. And also level of education and the number of failed intubations.

Conclusions/action items:

Unfortunately this study does not address difficult airways, but there is still much to glean from it.

This study can be used as a framework for potential testing that our team can perform next semester. We only have one intubation device available but we can use a similar process, especially having subjects of different skills intubating on our manikin.

The study included two separate sessions and was shown to have no significant difference in results between sessions. This means our team can perform the testing just once will be save time and be easier to organize.



Prototype Improvement 12/16/25

Cody Kryzer - Dec 16, 2025, 12:55 PM CST

Title: Prototype Improvement

Date: 12/16/25

Content by: Cody

Present: Cody

Goals: Put on paper my ideas for improving our prototype

Content:

Current strengths of prototype:

- Accurate and patient specific airway anatomy
- Contains most parts of facial anatomy
- Adjustable neck angle
- Made of good material
- includes a "spine"

Current drawbacks of prototype

- non specific oral cavity anatomy
- Absence of mandible
- Nonadjustable tongue
- Mouth and airway is piecewise and connected with zip ties and glue

Conclusions/action items:

The easiest way to significantly improve the design is to cast the mouth and airway all in one piece of silicone. This should be achievable by combining the two molds at the proper intersection point.

It is also necessary to add a jaw to the manikin. This will make it easier to adjust the mouth opening angle which is significant in making intubation scenarios more difficult.



Title: Training

Date: 3/19

Content by: Cody

Present: N/A

Goals: Complete a new training

Content: This semester I completed the fume hood training

OVCR Training Information Lookup Tool
University of Wisconsin-Madison



WISCONSIN
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This certifies that Cody Kryzer has completed training for the following course(s):

Course	Assignment	Completion	Expiration
2024-2025 HIPAA Privacy & Security Training	2024-2025 HIPAA Privacy & Security Training	4/7/2025	
Biosafety Required Training	Biosafety Required Training Quiz 2024	2/17/2024	2/17/2029
Chemical Safety: Fume Hood Safety Training	Fume Hood Final Quiz	3/18/2026	3/18/2031
Chemical Safety: The OSHA Lab Standard	Final Quiz	2/17/2024	
Responsible and Ethical Conduct of Research (RECR)	RCR Certification	10/30/2025	No Expiration
UW Human Subjects Protections Course	Basic/Refresher Course - Human Subjects Research	2/12/2025	2/12/2028

Data Last Imported: 03/19/2026 10:56 AM

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Conclusions/action items:

Creation of Vocal Cord Inserts - 5/1/26

Lance Johnson - May 05, 2026, 7:09 PM CDT

Title: Creation of Vocal Cord Inserts

Date: 5/1/26

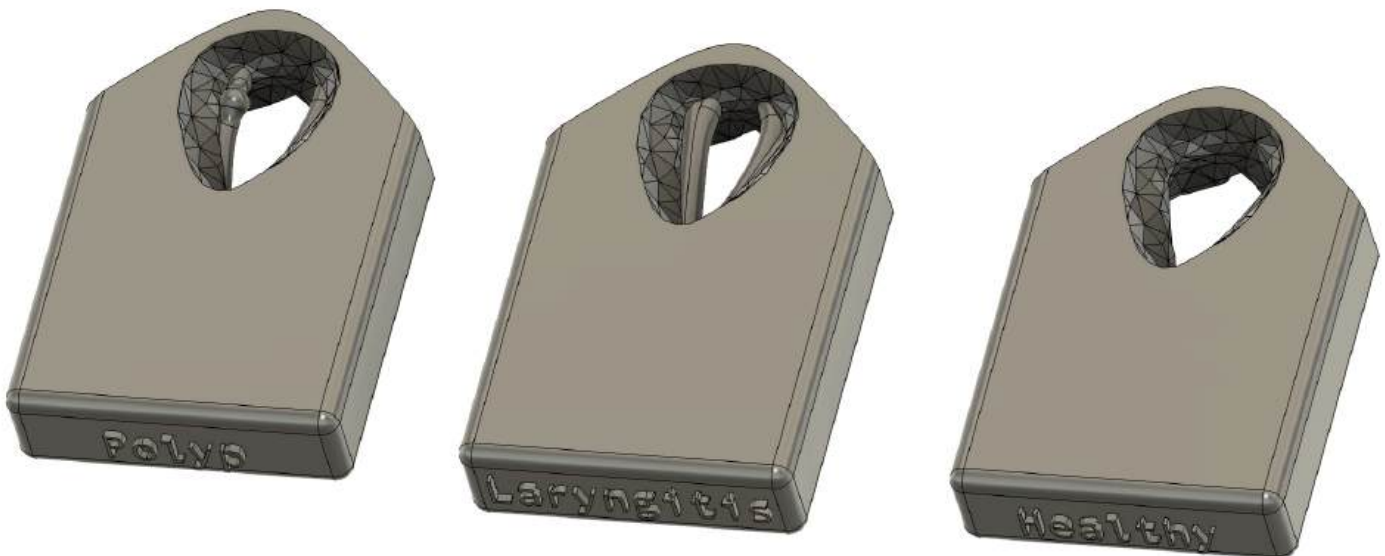
Content by: Lance

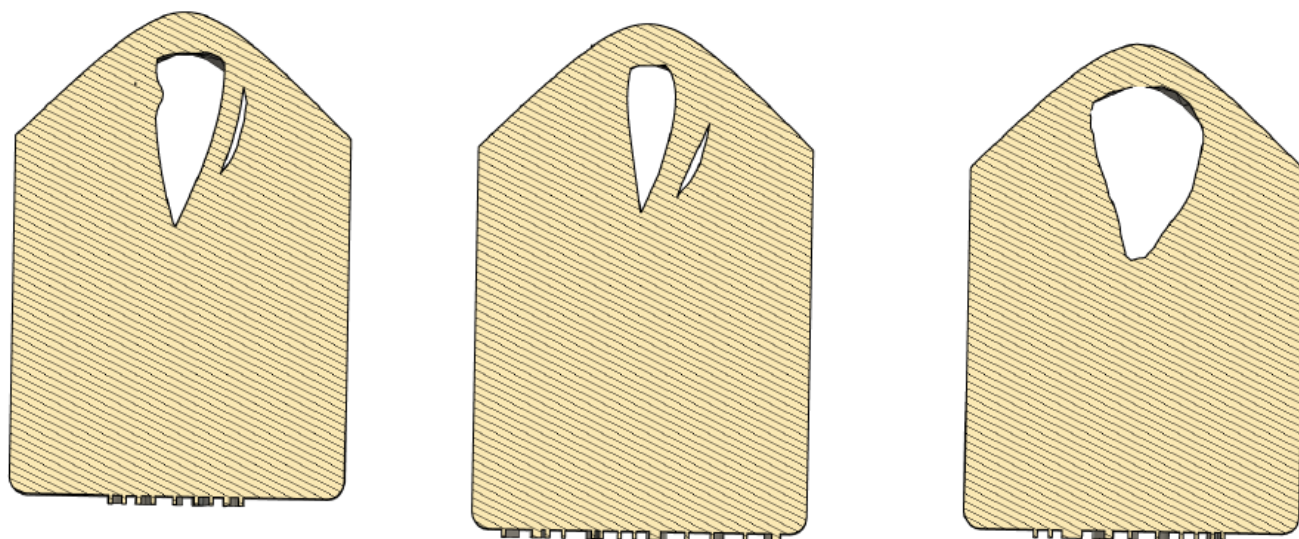
Present: n/a

Goals: To create accurate airway inserts that represent various airway pathologies to add difficulty modulation to the manikin

Content:

The airway inserts were modeled based on the airway negative I designed earlier to create room for these in the silicone cast. The vocal cord opening was modified to represent 3 distinct states/conditions for vocal cords seen during intubation. Cross-section views of the final inserts modeled in Fusion 360 are shown below and from left to right are the polyp-afflicted vocal cords, laryngitis, and a healthy airway. The width of the opening directly correlates to difficulty during intubation, so having variability in that aspect was crucial. The opening sizes were based on values found in literature, and I did my best to replicate the look of each affliction in fusion using extruding and sketching tools.





Conclusions/action items:

Print the inserts out of both flexible and elastic Formlabs resin to determine which is more suitable for intubation. Also, a holder for the inserts might be useful to better present the labels for each.



3/19/26 - Fume Hood Training

Lance Johnson - Mar 19, 2026, 1:12 PM CDT

Title: Fume Hood Safety Training

Date: 3/19/26

Content by: Lance

Present: N/A

Goals: To complete the Fume Hood Safety Training

Content:

Completed the Fume Hood Safety Training



This certifies that Lance Johnson has completed training for the following course(s):

Course	Assignment	Completion	Expiration
2024-2025 HIPAA Privacy & Security Training	2024-2025 HIPAA Privacy & Security Training	4/7/2025	
Biosafety Required Training	Biosafety Required Training Quiz 2024	2/17/2024	2/17/2029
Chemical Safety: Fume Hood Safety Training	Fume Hood Final Quiz	3/18/2026	3/18/2031
Chemical Safety: The OSHA Lab Standard	Final Quiz	2/17/2024	
Risk Communication in Animal Facilities	Risk Communication in Animal Facilities Quiz 2023	9/19/2023	
Safety for Personnel with Animal Contact	Animal Contact Personnel Quiz 2023	9/19/2023	9/19/2028
UW Human Subjects Protections Course	Basic/Refresher Course - Human Subjects Research	2/13/2025	2/13/2028

Data Last Imported: 03/19/2026 10:26 AM

Conclusions/action items:

None



2025/12/15- Comparison of four manikins and fresh frozen cadaver models for direct laryngoscopic orotracheal intubation training

Elle Thom - Dec 15, 2025, 6:50 PM CST

Title: Comparison of four manikins and fresh frozen cadaver models for direct laryngoscopic orotracheal intubation training

Date: 12/15/2025

Content by: Elleana Thom

Present: Elleana Thom

Goals: Research more on intubation training

Content:

Comparing manikins vs fresh frozen cadavers for teaching direct laryngoscopic intubation.

Models Tested

- Airway Management Trainer (Ambu)
- Airway Trainer (Laerdal)
- Airsim (Trucorp)
- Bill 1(VBM)
- Fresh Frozen Cadaver (FFC)

Method

- 56 participants did intubations on all models.

Rated on:

- Jaw mobility realism
- Mouth opening difficulty
- Neck flexibility realism
- Intubation difficulty
- overall reality
- Used a 0–10 visual analogue scale

Summarizing results

- FFC cadaver scored highest for jaw movement realism, overall reality, and preference.
- Trucorp (Airsim) & Laerdal manikins were next best and similar to each other.
- Trucorp manikin had lowest difficulty scores for mouth opening and intubation (i.e., easier).
- Overall: cadaver was more realistic and preferred, but some manikins are good alternatives.

Conclusion

- Fresh frozen cadaver is most realistic/preferred for training.
- Trucorp and Laerdal manikins are acceptable alternatives.

[1]J. H. Yang et al., "Comparison of four manikins and fresh frozen cadaver models for direct laryngoscopic orotracheal intubation training," *Emergency Medicine Journal*, vol. 27, no. 1, pp. 13–16, Dec. 2009, doi: <https://doi.org/10.1136/emj.2008.066456>.

Conclusions/action items:

Use this information as research and background knowledge when making decisions on the project and future work.



2025/12/15-Manikin to patient intubation: does it translate?

Elle Thom - Dec 15, 2025, 7:31 PM CST

Title: Manikin to patient intubation: does it translate?

Date: 12/15/2025

Content by: Elleana Thom

Present: Elleana Thom

Goals: Collect more background research notes

Content:

Problem: Students have very little opportunity to practice intubation in a "real" setting before their first surgery

Challenges: Training requires hundreds of attempts at intubation in order to achieve high success rates for intubation competence, but residents get very few chances to do this. Simulation training is not always seen as a very realistic application when training.

Goals of the study: Evaluation of whether manikin based simulation training actually improves real patient intubation performance when paired with guided instruction.

Methods: Pediatric residents on NICU rotation attended training with: direct laryngoscopy practice on a manikin head with instructor guidance using videolaryngoscopy. Having standard clinical intubation opportunities in the NICU

Conclusions: Intubation manikins have a long way to go in terms of being realistic training tools.

[1] J. Rumpel et al., "Manikin to patient intubation: does it translate?," *Journal of Perinatology*, vol. 43, no. 2, pp. 233–235, Nov. 2022, doi: <https://doi.org/10.1038/s41372-022-01553-9>.

Conclusions/action items:

Use this information as background research.



2025/12/15- Predicting Difficult Intubation

Elle Thom - Dec 15, 2025, 7:44 PM CST

Title: Predicting Difficult Intubation

Date: 12/15/2025

Content by: Elleana Thom

Present: Elleana Thom

Goals: Find more research for background

Content:

Purpose: Evaluating simple pro-operative tests to predict which patients will be difficult to intubate before anesthesia.

Methods: patients scheduled for surgery were examined before anesthesia. Two main tests were used-

-Modified Mallampati test - how much of the throat structures can be seen when the patient opens their mouth

-Thyromental distance - distance from the thyroid cartilage to the chin, shorter distances are linked to more difficulty

Results: If a patient has a poor mallampati view and a thyromental distance < 7cm, they were much more likely to be difficult to intubate. The tests should be used together for best accuracy

Conclusion: Doing simple airway assessments before surgery can help predict many difficult intubations and let clinicians plan ahead.

[1]C. M. FRERK, "Predicting difficult intubation," *Anaesthesia*, vol. 46, no. 12, pp. 1005–1008, Dec. 1991, doi: <https://doi.org/10.1111/j.1365-2044.1991.tb09909.x>.



2025/12/15- Difficult intubation in adults

Elle Thom - Dec 15, 2025, 8:00 PM CST

Title: Difficult intubation in adults

Date: 12/15/2025

Content by: Elleana Thom

Present: Elleana Thom

Goals: Find more background research on difficult intubation

Content:

Purpose: review how to recognize and manage difficult endotracheal intubation in adult patients undergoing anesthesia

Preoperative recognition: clinical exam can often detect difficult airways

- anatomical signs:
- small mouth opening
- protruding upper teeth
- stiff cervical spine
- tongue swelling
- cervical swelling
- unstable cervical spine

indirect predictors: inability to visualize soft palate, small inframandibular space, reduced atlanto-occipital mobility

Review of strategies to handle difficult intubation:

- specialized equipment
- confirming tube placement
- alternative airway tools
- surgical front of neck access

Guidlines: Discussion of the american society of anesthesiologists difficult airway algorithm and its importance for planning

Conclusion: better preoperative airway assessment, clear guidelines, and training can reduce morbidity/mortality from difficult intubation

[1]H. Langenstein and G. Cunitz, "Die schwierige Intubation beim Erwachsenen," *Der Anaesthetist*, vol. 45, no. 4, pp. 372–383, Apr. 1996, doi: <https://doi.org/10.1007/s001010050274>.



2026/05/03- Optimizing Management Strategies for Vocal Cord Nodules: A Systematic Review

Elle Thom - May 03, 2026, 8:05 PM CDT

Title: Optimizing Management Strategies for Vocal Cord Nodules: A Systematic Review

Date: 5/3/2026

Content by: Elle Thom

Goals: Take notes on vocal cord afflictions

Content:

- **Vocal chord nodules are benign, inflammatory lesions of the vocal cords**
- **most common cause of hoarseness**
- **no great treatment**
- **repetitive mechanical stress - increased mass of vocal cords, altered vibration**
- **Incomplete glottic closure causes hoarseness**
- vocal cord nodules are primarily a behavior driven biomechanical injury and the best outcomes come from voice therapy rather than surgery alone

[1]M. Pedersen and J. McGlashan, "Surgical versus non-surgical interventions for vocal cord nodules," Cochrane Database of Systematic Reviews, no. 6, Jun. 2012, doi: <https://doi.org/10.1002/14651858.cd001934.pub2>.

Conclusions/action items:

More research on vocal cord afflictions to offer new ideas to team



2026/05/03-Vocal cord dysfunction: a review

Elle Thom - May 03, 2026, 7:57 PM CDT

Title: Vocal cord dysfunction: a review

Date: 5/3/2026

Content by: Elle Thom

Goals: Take notes on vocal cord afflictions

Content:

- adduction of the vocal folds during breathing
- episodic airway obstruction
- asthma like symptoms
- VCD is classified as a functional laryngopharyngeal disorder where the vocal cords are anatomically normal but do not act correctly during breathing cycles
- overactive glottis reflex
- paradoxically closed during inspiration
- Vocal cord dysfunction is an intermittent, functional airway obstruction caused by vocal cord closure when it shouldn't be closed during inspiration, often being misdiagnosed as asthma but treated primarily with behavioral speech therapy interventions

[1]N. M. Dunn, R. K. Katial, and F. C. L. Hoyte, "Vocal cord dysfunction: a review," *Asthma research and practice*, vol. 1, Sep. 2015, doi: <https://doi.org/10.1186/s40733-015-0009-z>.

Conclusions/action items:

Could be an added feature to the manikin but it seems like it might not be prevalent enough.



2026/05/03-Endotracheal intubation in a patient with an almost complete obstruction of the glottis due to a movable supraglottic tumor: A case report

Elle Thom - May 03, 2026, 8:17 PM CDT

Title: Endotracheal intubation in a patient with an almost complete obstruction of the glottis due to a movable supraglottic tumor: A case report

Date: 05/03/2026

Content by: Elle Thom

Goals: Take notes on difficult intubation case studies

Content:

- Large supraglottic tumor causing near complete obstruction of airway
- high risk difficult airway
- limited visualization
- airway took many tries to intubate
- tumor eventually moved over enough that the EDT could be inserted into the airway
- initial failure even with correct tools
- intubation while awake
- in severe supraglottic tumor obstruction, fiberoptic intubation may succeed visually but fail mechanically, making tube delivery the true limiting step rather than visualization

[1]S. Y. Lee, T. S. Hahm, and H. S. Jin, "Endotracheal intubation in a patient with an almost complete obstruction of the glottis due to a movable supraglottic tumor - A case report -," Korean journal of anesthesiology, vol. 56, no. 1, pp. 87–87, Jan. 2009, doi: <https://doi.org/10.4097/kjae.2009.56.1.87>.

Conclusions/action items:

Interesting case report on intubation of almost complete obstruction of the airway. could be useful in designing more difficulties to add to the airway. Implement moving parts to obstruction of airway.



2026/01/29-Usability testing of a blind intubation device for intubation novices: a randomized crossover simulation study

Elle Thom - Jan 29, 2026, 4:23 PM CST

Title: Usability testing of a blind intubation device for intubation novices: a randomized crossover simulation study

Date: 1/29/2026

Content by: Elle Thom

Goals: Take notes on this article and try to get some ideas the team can use for testing

Content:

Study Objective

To evaluate the usability of a new blind intubation device (BID) compared to the traditional direct laryngoscopy (DL) and video laryngoscopy (VL) when used by inexperienced healthcare providers.

Study Design

Type: Randomized crossover simulation study

Participants: 45 healthcare workers with fewer than five prior intubations (interns, EMTs, nurses)

Setting: Manikin simulation using a Laerdal airway trainer

Devices tested:

Blind Intubation Device (BID)

Direct Laryngoscopy (DL)

Video Laryngoscopy (VL)

Primary Outcomes

First-Pass Intubation Success:

BID: 93.3%

DL: 91.1%

VL: 97.8%

Time to First Ventilation

BID: ~13.15 seconds

DL: ~19.07 seconds

VL: ~17.31 seconds

Dental Injury

Rates varied by profession:

Physicians: 0% with all devices

EMTs: BID showed lower dental injury than DL but similar to VL

Nurses: BID and VL had more dental injuries than DL in some comparisons

Conclusions

The blind intubation device (BID) was:

Comparable to traditional DL and VL in first-pass success.

Quicker to achieve ventilation.

Suggests the BID may be useful for inexperienced intubators, especially when speed is important.

Limitations & Notes

Simulation environment: Results may differ in real clinical settings (not tested in actual patients).

Participants: Only novices — findings may not apply to experienced providers.

Pilot study: Larger studies are needed to confirm clinical effectiveness and safety.

Clinical Implication

The study suggests that a blind intubation device could be a helpful tool for rapid airway management by providers with limited intubation experience, potentially improving speed without compromising success rates.

Reference:

[1] D. K. Kim, Y. J. Kim, J. Jeong, Y. H. Joo, Y. H. Jo, and S. M. Park, "Usability testing of a blind intubation device for intubation novices: a randomized crossover simulation study," *Clinical and experimental emergency medicine*, vol. 10, no. 2, pp. 181–190, Jun. 2023, doi: <https://doi.org/10.15441/ceem.22.370>.

Conclusions/action items:

This information can be useful when thinking about what factors the team should be looking at for testing



2026/05/03-Comprehensive evaluation of manikin-based airway training with second generation supraglottic airway devices

Elle Thom - May 03, 2026, 7:27 PM CDT

Title: Comprehensive evaluation of manikin-based airway training with second generation supraglottic airway devices

Date: 5/3/2026

Content by: Elle Thom

Goals: Take notes on competing designs

Content:

- Manikins compared were the TruCorp AirSim and Laerdal Resusci Anne airway trainer
- Ventilation assessed via lung inflation measuring chest rise
- measured oropharyngeal leakage pressure
- tube insertion success
- insertion time
- user subjective ratings
- Both models worked well
- TruCorp had a better seal
- tube insertion performed better on the Laerdal
- Laerdal was voted better for realism
- both manikins had differing strengths and weaknesses

[1]A. Schmutz, E. Bohn, J. Spaeth, and S. Heinrich, "Comprehensive evaluation of Manikin-based airway training with second generation supraglottic airway devices," *Therapeutics and Clinical Risk Management*, vol. Volume 15, pp. 367–376, Mar. 2019, doi: <https://doi.org/10.2147/tcrm.s194728>.

Conclusions/action items:

This article offers different ways our team could go about testing and what questions to ask the airway professionals at the hospital



2025/12/15- Spring 2025 Final Report Notes

Elle Thom - Dec 15, 2025, 6:24 PM CST

Title: Spring 2025 Final Report Notes

Date: 9/8/2025

Content by: Elleana Thom

Present: Just me taking Notes

Goals: Get a better idea of what this project entails, what has been done, and make a list of questions if any.

Content:

Notes:

- Abstract
 - Making airway trainers for anesthesiologists to practice intubation
 - Intubation: insertion of an artificial airway tube into a patient's trachea
 - Some difficult trainers exist but they focus on craniofacial abnormalities
 - This project focuses on internal airway irregularities
 - This project is creating patient specific airway trainers using MRI imaging
 - Used formlabs elastic resin, flexible resin and TPU when evaluating material performance
 - Future work
 - Enhance anatomical accuracy when tracing
 - Integrate fully customizable manakins
- Intro
 - ETI = endotracheal intubation
 - Project is designing ways to practice intubation on multiple abnormal airways in a cheaper way
 - **Question:** Is this the new goal of the project: A larger tongue, a smaller mouth opening, an overbite, and a short thyromental distance can all lead to a more difficult intubation procedure. On an idealized airway trainer, these craniofacial factors would be adjustable by allowing for variation in mandible positioning, thyromental distance, and tongue size.
 - This is an exam[ple] of craniofacial abnormalities
 - Airway anomalies
 - Pyriform aperture stenosis: narrowing of the nasal airway
 - Laryngeal cleft: abnormal connection between larynx and esophagus
 - Can cause accidental esophageal intubation (Deadly)
 - Laryngeal Stenosis: narrowing of larynx
 - Laryngeal webs: partial obstructions in larynx
 - Laryngeal atresia: full blockage
 - Circular tracheal ring: leads to Tracheal stenosis
 - Magnetic resonance Imaging

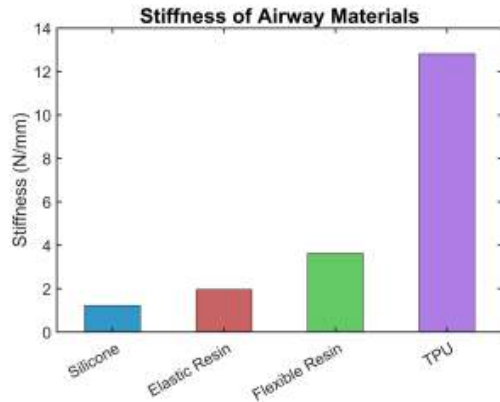
- **Question:** How are they getting their MRI Data?
- Segmentation and 3D printing
 - 3D Slicer
 - ITK-SNAP
 - Capable of tracing slices automatically
 - Was there an error in this
 - Where was the prototype 3D printed using the SLA method
 - makerspace
 - SLA method is more accurate in medical industry
 - FDM printing (Makerspace) not as accurate
- Design Specs
 - Process has to be under 72 hours
 - Stay under competitors price of \$272
 - Capable of 20,000 intubations
 - Mimic size, look, and texture of a real airway
 - Match youngs modulus and hardness
- Preliminary designs
 - Material Choice 1 - Formlabs Flexible resin
 - Durable, stiff yet flexible, SLA resin, ideal material properties
 - Disadvantage: This material can only be used in formlab printers, \$0.29/g at Makerspace
 - How much does the final product weigh? In grams
 - Look into Shore Hardness and how it's measured
 - Material choice 2 - EcoFlex 00-50 liquid Silicone
 - Strong and flexible
 - 2 part process
 - Mold printed in PLA then cast with liquid silicone
 - Material properties are not good
 - Lower cost \$0.05/g
 - Material Choice 3 - Thermoplastic Polyurethane (TPU)
 - Flexible, durable, abrasion resistant
 - Ideal material properties
 - Can be printed very easily
 - \$0.05/g cost
- Final Design
 - TPU
 - Formlabs resin and TPU were both printed for testing purposes

- Final Prototype

- 3D printed airway attached to silicone mouth so testing could be preformed(Child's anatomy, contains an esophagus, created a wider opening
 - Was the mouth made or obtained from the client?
 - Wasn't the point of abnormal airways that it should stay accurate to anatomically since it will be harder for a laryngoscope and intubation tube to get through?

- Testing

- Is the goal to get a material that matches the stiffness of silicone?



◦

- Discussion

- TPU is too stiff
 - Are we looking for a new material to use?
- TPU does not easily stretch
- In future testing, it is vital that the airway opening is wider than a laryngoscope. **What if anatomically it's not?**
- The device should specify to the user any mechanical differences between the printed airway and a typical human since in cases like this it is not reasonable for the training device to be perfectly accurate. **Add to Design Spec**

- Conclusions


- The team also found that the previously desired Shore hardness based on the design specifications was too stiff to accurately simulate intubation, so the team opted to use the Formlabs 50A resin as its stiffness was much more comparable to the silicone based manikin given to the team by our client
 - So they did end up using the flexible resin?
- Future work
 - Integrate the 3D printed airway onto a manikin that will be fabricated by the team
 - Other factors tongue size, mandible position, and neck angle could be considered. **Vomiting, things stuck in the throat**
 - Hopes to enhance performance in the slicer software
 - Does ITK-SNAP help with slicing or does it help with the mesh in postprocessing or both

Conclusions/action items:

Ask questions: In text **red**

Intubation during anaphylaxis?

3d printing problem due to mesh?



2025/04/29-DMA Training

Elle Thom - Apr 29, 2025, 2:47 PM CDT

Title: DMA Training

Date: 4/29/2025

Content by: Elle Thom

Present: Rayona and Elle

Goals: Learn how to use the DMA to get the resonance frequency of PMMA

Content:

Attachments:

-Email from Rayona to Anna Kiyanova

-Dynamic Strain Sweep

-Data tables:

PMMA Sample Test 1:

Frequency (Hz)	E' Pa	E'' Pa	tan(d)	Force (g)
9.01E-06	1.37E+09	1.04E+09	0.7564	0.01546
1.17E-05	3.84E+08	2.39E+08	0.622590	0.00529
1.47E-05	5.81E+08	1.03E+08	0.177990	0.00869
1.93E-05	1.06E+09	6.70E+07	0.0632	0.0205
2.36E-05	1.13E+09	1.13E+08	0.0999	0.02681
2.98E-05	7.80E+08	8.90E+07	0.114060	0.02335
3.82E-05	5.3E+08	4.54E+07	0.053250	0.03254
4.77E-05	8.39E+08	4.12E+07	0.0491	0.04002
5.98E-05	8.00E+08	1.04E+08	0.129770	0.04817
7.62E-05	8.48E+08	1.51E+08	0.177830	0.06558
9.48E-05	9.73E+08	1.11E+08	0.1139	0.09275
1.20E-04	8.99E+08	7.41E+07	0.0825	0.10819
1.52E-04	8.49E+08	1.24E+08	0.145770	0.12985
1.90E-04	8.70E+08	8.22E+07	0.0944	0.16553

2.39E-048.45E+089.69E+07 0.114690.20298

3.01E-048.55E+087.95E+07 0.093070.25787

3.79E-048.52E+089.48E+07 0.111250.32455

4.78E-048.49E+087.57E+07 0.089110.40664

6.02E-048.41E+088.42E+07 0.100090.50789

7.57E-048.46E+087.85E+07 0.092760.64221

9.54E-048.47E+089.15E+07 0.107920.8116

0.00121 8.43E+088.83E+07 0.104741.023

0.00152 8.41E+088.88E+07 0.105621.28421

0.00192 8.38E+089.45E+07 0.112711.61408

0.00241 8.36E+089.04E+07 0.108232.02507

0.00304 8.23E+089.97E+07 0.121082.51883

0.00383 8.02E+081.04E+08 0.1296 3.08964

0.00482 7.76E+089.73E+07 0.125343.76674

0.00609 7.28E+088.87E+07 0.121774.45943

0.00769 6.70E+088.32E+07 0.124185.18246

0.00971 6.17E+087.42E+07 0.120336.02093

0.01225 5.60E+086.42E+07 0.114556.89636

0.01546 5.20E+085.58E+07 0.107418.0646

0.0195 4.85E+084.92E+07 0.101479.49834

0.02459 4.61E+084.42E+07 0.0960511.3577

0.031 4.40E+084.08E+07 0.0926413.6756

0.03904 4.26E+083.77E+07 0.0885 16.6507

0.04918 4.15E+083.56E+07 0.0856820.4654

0.06192 4.15E+083.36E+07 0.0809525.7192

0.07797 4.07E+083.20E+07 0.0786531.8075

0.09818 3.99E+083.08E+07 0.0772139.19

0.12347 3.92E+083.00E+07 0.0763848.5062

0.15532 3.88E+082.92E+07 0.0751460.3164

0.19527 3.83E+082.87E+07 0.075 74.9061

0.24555 3.77E+082.82E+07 0.0747992.7758

0.30899 3.73E+082.74E+07 0.07357115.252

0.38864 3.68E+082.69E+07 0.07325143.084

0.48908 3.66E+082.65E+07 0.0724 178.968

0.61565 3.63E+082.63E+07 0.07246223.533

0.77481 3.59E+082.62E+07 0.0729 278.612

0.97534 3.52E+082.61E+07 0.07396343.928

PMMA Sample Test 2:

e %	E' Pa	E'' Pa	tan(d)	Force (g)
-----	-------	--------	--------	-----------

9.47E-057.77E+086.47E+070.0833 0.07368

1.20E-048.60E+084.55E+070.052880.10352

1.51E-048.57E+087.82E+070.091240.12971

1.90E-048.31E+084.64E+070.055780.15774

2.39E-048.44E+088.35E+070.099010.20239

3.01E-048.54E+089.61E+070.112420.25848

3.79E-048.55E+088.38E+070.098040.32494

4.78E-048.38E+089.37E+070.111840.40209

6.02E-048.37E+088.45E+070.100990.50518

7.58E-048.46E+087.72E+070.091220.64262

9.53E-048.42E+089.18E+070.109010.80635

0.00121 8.38E+088.65E+070.1033 1.01532

0.00152 8.43E+088.77E+070.104071.28649

0.00192 8.36E+088.74E+070.104631.60652

0.00241 8.36E+088.82E+070.105572.0232

0.00304 8.34E+088.90E+070.106772.54405

0.00382 8.30E+088.67E+070.104513.18151

0.00481 8.20E+089.02E+070.110043.96266

0.00608 7.71E+088.46E+070.109674.70511

0.00768 7.02E+087.88E+070.112275.4131

0.00969 6.42E+087.11E+070.1108 6.2518

0.01224 5.84E+086.33E+070.108427.17506

0.01544 5.39E+085.62E+070.104318.3485

0.01949 5.02E+085.00E+070.099569.82246

0.02457 4.73E+084.58E+070.0967211.6623

0.03099 4.49E+084.17E+070.0929913.9468

0.03903 4.30E+083.89E+070.0904916.8115

0.0492 4.08E+083.63E+070.0889920.1188

0.06196 4.01E+083.40E+070.0848324.8842

0.078 4.01E+083.19E+070.0796331.2828

0.09819 3.97E+083.04E+070.0766739.0367

0.12345 3.95E+082.98E+070.0754748.7578

**Note: Sample 1 is one side of a single sample of PMMA and Sample 2 is the other side of the sample.

**Note: Row highlighted dark blue was the data used to calculate resonant frequency.



2024/2/13 Biosafety & Chemical Safety Training

Elle Thom - Dec 15, 2025, 6:34 PM CST

Title: Biosafety & Chemical Safety Training

Date: 2/13/2024

Content by: Elleana Thom

Present: Elleana Thom

Goals: Complete two training modules

- Biosafety Training

- Chemical Safety Training

Content: Attachment of file containing proof of course completion attached below.

Conclusions/action items:

I completed my required biosafety and chemical safety training that is needed for BME 201

Elle Thom - Feb 13, 2024, 3:09 PM CST



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apps.research.wisc.edu_TILT_Details_8853196.pdf (69.4 kB)



2025/12/15- Human Subjects Research Training

Elle Thom - Dec 15, 2025, 6:33 PM CST

Title: Human Subjects Research Training

Date: 12/15/2025

Content by: Elleana Thom

Present: Elle Thom

Goals: Complete the Human Subjects Research training online before getting MRI scans from the client at the hospital.

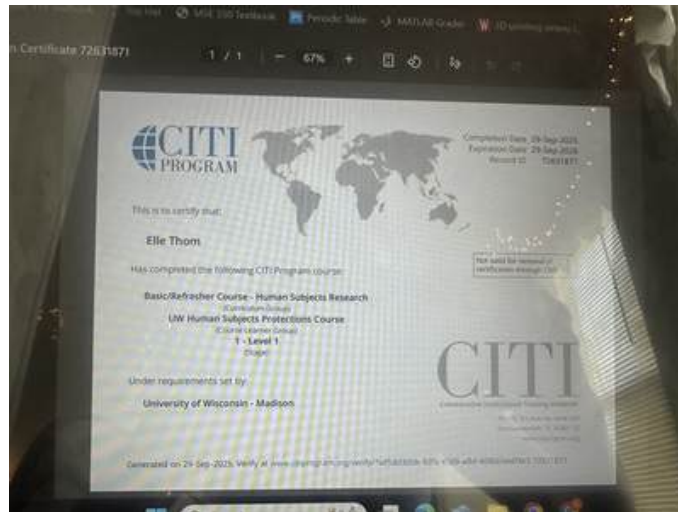
Content:

Attached below

Conclusions/action items:

I am now able to attend MRI scanning sessions with the team.

Elle Thom - Dec 15, 2025, 6:33 PM CST



[Download](#)

IMG_2005_1_.jpg (2.92 MB)



2024/03/06 Machining Permit TeamLab

Elle Thom - Mar 06, 2024, 2:08 PM CST

Title: Machining permit TeamLab

Date: 2024/03/06

Content by: Elleana Thom

Present: Individual Assignment

Goals: Complete the canvas quizzes, video quiz, and in person Team Lab Machining training.

Content:

Completed the Machining permit for BME 201, including the canvas quizzes, video quiz, and the 4-hour in-person Teamlab training.

Proof of permit is attached below.

Conclusions/action items:

This training is a great way to learn how to use the Lathe and Mill. Developing skills in the team lab is important for future and present use in education and the workforce. The training was long but a lot was learned from it and it was a really great experience qith amazing instructors.

Elle Thom - Mar 06, 2024, 2:04 PM CST



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MachiningPermitTeamLab.pdf (127 kB)



2026/04/13- Fume Hood Safety Training

Elle Thom - Apr 13, 2026, 6:12 PM CDT

Title: Fume Hood Safety Training

Date: 4/13/26

Content by: Elle Thom

Goals: Complete a training for the semester

Content:



This certifies that Elle Thom has completed training for the following course(s):

Course	Assignment	Completion	Expiration
Biosafety Required Training	Biosafety Required Training Quiz 2024	1/29/2024	1/29/2029
Chemical Safety: Fume Hood Safety Training	Fume Hood Final Quiz	3/16/2026	3/16/2031
Chemical Safety: The OSHA Lab Standard	Final Quiz	1/23/2024	
UW Human Subjects Protections Course	Basic/Refresher Course - Human Subjects Research	9/29/2025	9/29/2028

Data Last Imported: 04/13/2026 05:26 PM

Conclusions/action items:

Training requirement for Spring semester is done.



2014/11/03-Entry guidelines

John Puccinelli - Sep 05, 2016, 1:18 PM CDT

Use this as a guide for every entry

- Every text entry of your notebook should have the **bold titles** below.
- Every page/entry should be **named starting with the date** of the entry's first creation/activity, subsequent material from future dates can be added later.

You can create a copy of the blank template by first opening the desired folder, clicking on "New", selecting "Copy Existing Page...", and then select "2014/11/03-Template")

Title: Descriptive title (i.e. Client Meeting)

Date: 9/5/2016

Content by: The one person who wrote the content

Present: Names of those present if more than just you (not necessary for individual work)

Goals: Establish clear goals for all text entries (meetings, individual work, etc.).

Content:

Contains clear and organized notes (also includes any references used)

Conclusions/action items:

Recap only the most significant findings and/or action items resulting from the entry.



2014/11/03-Template

John Puccinelli - Nov 03, 2014, 3:20 PM CST

Title:

Date:

Content by:

Present:

Goals:

Content:

Conclusions/action items: