

# **Progress Report - Week 9**

**Title:** Vaginal Self-Swab Device to Minimize Contact Contamination

**Client:** Dr. Jean Riquelme

**Advisor:** Dr. Megan McClean

**Team:**

Sara Morehouse (Leader)

Cherry Qiu (Communicator)

Katherine Kafkis (BWIG and BSAC)

Adam Berdusco (BPAG)

**Date:** April 4, 2024

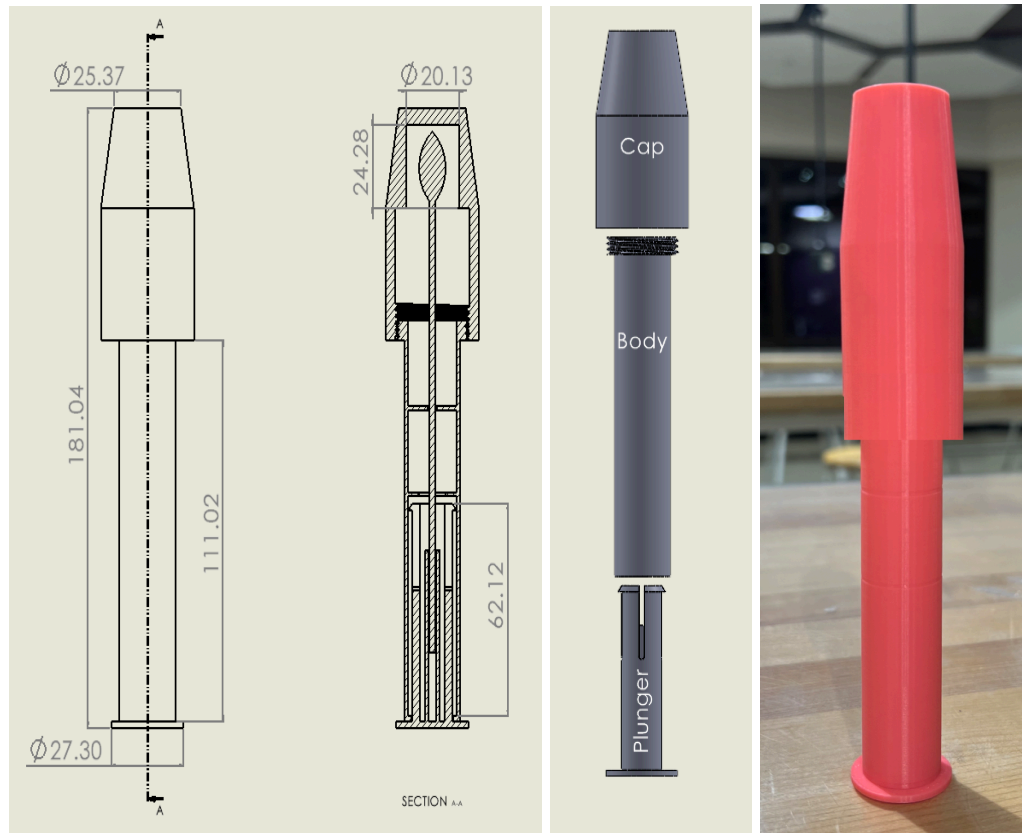
## **Problem Statement:**

Quality sexual health is important for every woman to sustain, but with women ages 15-24 accounting for 43% of undiagnosed STI cases, the system supporting women's sexual health could use some improvement (CDC). The team has developed a novel self-swab STI testing device that allows women the privacy of swabbing themselves without the potential discomfort of a physician present. This was conceived with the goal in mind of making STI testing more accommodating while reducing contamination of the testing environment. However, the current design has issues with media leaking from the device after use, as well as with the aesthetics of the design. Additionally, the device requires the addition of a thin, puncturable film to the cap to contain transport media. The team is tasked with modifying the original design to address the issues currently being faced while still seeking to limit contamination of the device and testing environment as well as account for patient comfort.

## **Brief Status Update:**

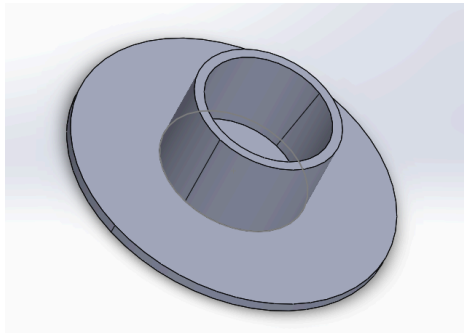
This week we worked on updating our design and creating a plan for the coming weeks. During Show and Tell on Friday 3/22, we received some feedback on the aesthetics of the device as well as ideas for how to quantitatively test contamination. Using this feedback, we plan to reprint our design in the next few days then begin testing once we have the functional prototype.

## Current Design:

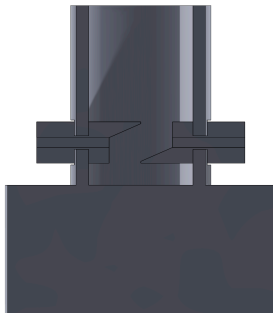


The current design was developed last semester and includes a plunger, body and cap. The prototype was 3D-printed and assembled with the plunger being inserted into the bottom of the body, and the cap screws onto the top of the body. A swab is inserted through the body and into the plunger.

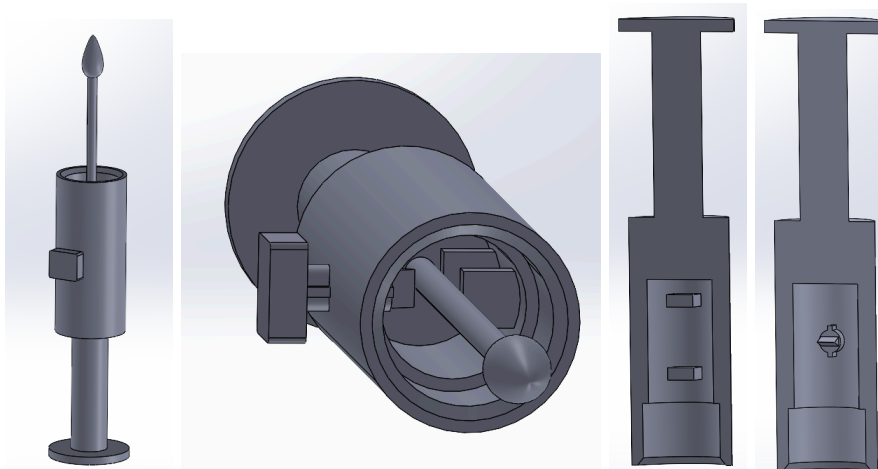
## New Design Ideas:



This component is a base to house the Aptima tube while the patient conducts the test.

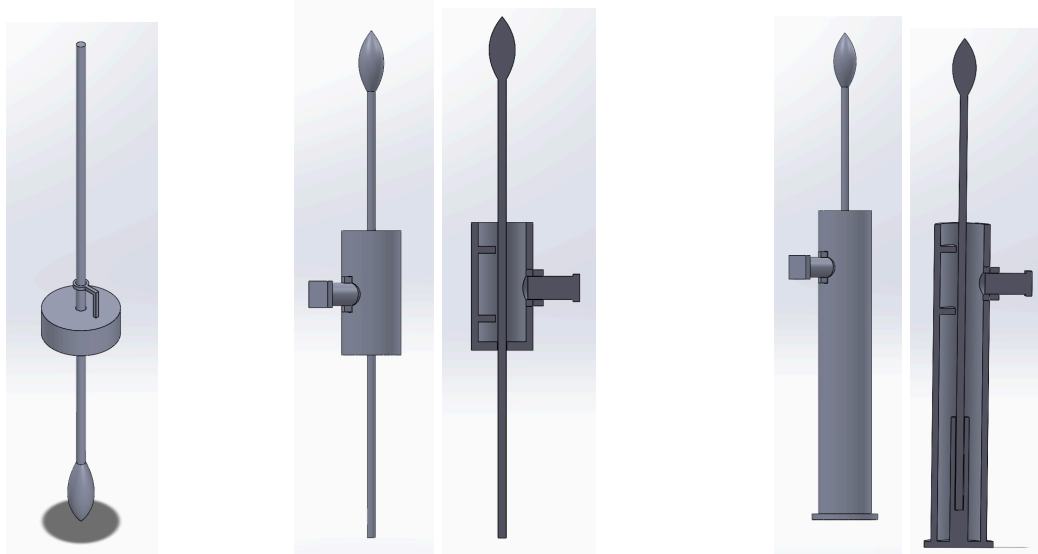


This design is a potential solution to breaking the swabs. There are two edges that actuate to apply pressure and bend the swab. If enough force is applied to the swab it will break at the already perforated section.



This design uses a 3-point bending mechanism to break the swab. When the patient is done swabbing, they press the device onto the uncapped Aptima tube and push the button to break the

swab, causing it to fall into the tube. They would then remove the device and screw the Aptima cap back on.



The leftmost design simply attaches to the Aptima tube over the threads, then the patient applies pressure to snap the swab and break the small support, which allows for the snapping of the swab to be contained within the tube.

The middle design also utilizes 3-point bending to break the swab and uses a button to apply a central force at the swab perforation.

The rightmost design is identical to the middle design except that it includes a full body that is the length of the swab and provides a base for it to stand up on.

## Materials and Expenses:

Item	Description	Manufac - turer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Preliminary prototype print	Material: PLA	n/a	n/a	Makerspace	n/a	2/27	n/a	n/a	\$3.34	n/a
Prototype prints	Material: PLA	n/a	n/a	Makerspace	n/a	3/20	n/a	n/a	\$4.92	n/a
-									\$0.00	
-									\$0.00	
-								<b>TOTAL:</b>	<b>8.26</b>	

### Major team goals for the next week:

1. Print functional prototype for testing
2. Draft detailed protocols for testing and begin tests once the prototype is complete.

### Next week's individual goals:

- Sara:
  - Complete detailed protocols for MTS testing and contamination testing
  - Begin testing
- Katherine:
  - Help work on protocols for MTS testing and contamination testing
  - Begin conducting tests and analyzing the results
- Cherry:
  - Finish drafting protocols for MTS testing
  - Connect with facility to use MTS machine.
- Adam:
  - Finish protocols for different testing methods so that we can start testing the device

## Timeline:

Task	Jan	Feb				March					April				May	
	26	2	9	16	23	1	8	15	22	29	5	12	19	26	3	10
<b>Project R&amp;D</b>																
Background research	X	X	X	X	X	X	X									
Design development				X	X	X	X	X	X		X					
Prototyping						X			X		X					
Testings																
<b>Deliverables</b>																
Progress Reports		X	X	X	X	X	X	X	X		X					
PDS			X			X	X									
Prelim presentation/report						X	X									
Final Poster																
<b>Meetings</b>																
Client			X					X								
Advisor	X	X	X	X	X			X			X					
<b>Website</b>																
Update	X	X	X	X	X	X	X	X	X		X					

## Previous week's goals and accomplishments:

- Goal: After our spring break next week, we hope to come up with a testing plan and begin drafting protocols.
  - We plan to print in the next couple of days and then begin testing next week.
- Goal: Finalize prototypes to be printed for testing.
  - Using the feedback from Show and Tell, we have updated the design and will be printing it shortly.

**Activities:**

Name		Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Katherine		4/3	Modified solidworks drawing to be compatible with the new plastic shaft swabs	1	2	29.5
		4/4	Conducted research on the use of fluorescent dyes for contamination testing	1		
Sara		4/3	Brainstormed testing methods and how to create protocols	0.5	1.5	26
		4/4	Researched contamination testing	1		
Cherry		4//4	Researched contamination testing	1	1	20.7 5
Adam		4/3	Worked on testing protocols	1	2	24
		4/4	Researched contamination testing	1		