# Paracervical Block Training Model

Renee Sobania, Evelyn Ojard, Ellinore Letts, Abigayle Chapman,
Nora Lorentz, Cadence Seymour

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Client: Dr. Jessica Dalby

Advisor: Professor Randolph Ashton

# Team Members

Co-Team Leaders: Evelyn Ojard & Renee Sobania

Communicator: Ellinore Letts

BSAC: Abigayle Chapman

BWIG: Nora Lorentz

BPAG: Cadence Seymour

Advisor: Randolph Ashton

Client: Dr. Jessica Dalby

*Figure 1:* Team Picture

# Overview of Presentation

1. Client Description
2. Background and Anatomy
3. Problem Statement
4. Current solutions and existing designs
5. Product Design Specifications
6. Design alternatives
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8. Future work
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10. References

# Client Description

- Dr. Jessica Dalby is a Family medicine physician at UW health and an associate professor at University of Wisconsin School of Medicine and Public Health.
- Frequently instructs physicians, and medical students on the process of paracervical block administering.
- Seeking a more realistic and practical task trainer to aid in her clinics.

*Figure 2:* Dr. Jessica Dalby

# Project Background

- A paracervical block is a procedure done to help aid in pain during gynecological procedures
- Injection at 12 O'Clock and tenaculum placement
- lidocaine injections at 2, 4, 8, and 10 in the cervicovaginal junction to a depth of 3cm

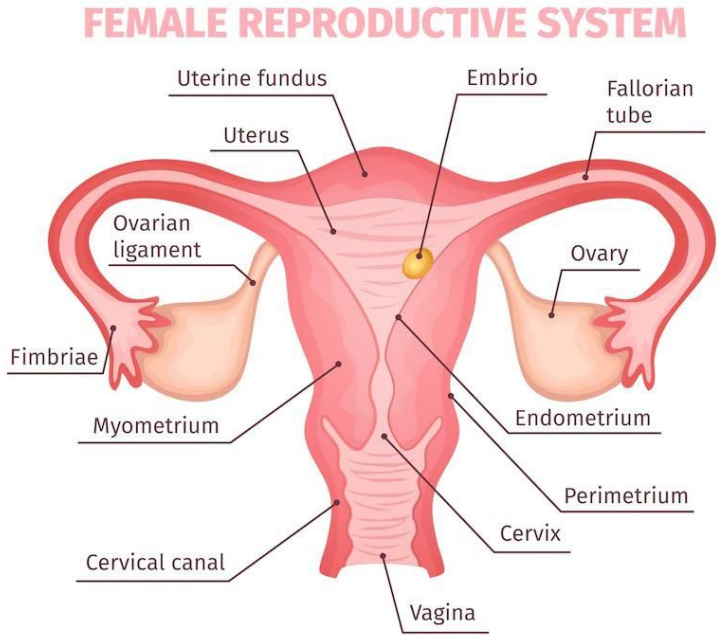



*Figure 4:* Reproductive System

*Figure 3:* Paracervical Block

*Figure 5:* Nerve Blocking

# Problem Statement

A **paracervical block (PCB)** is a medical procedure in which a local anesthetic is injected into the tissue at the cervicovaginal junction.

- Reduces procedural pain.

Lack of accessible, anatomically accurate, and affordable training for PCB administration.

- Unprepared providers.
- Women undergo procedures without anesthetic.
- Unnecessary pain and risk.

Our group will design a **Paracervical Block Training Model (PBTM)** to combat this problem.

# Current Methods

**Roma Tomato Model:**

Made out of dixie cup, condom, and roma tomato.

**Pros:**

- Cheap, easy to make.
- Models vaginal canal.

**Cons:**

- High anatomical and material inaccuracy.
- No cervicovaginal junction.
- Leaves residents highly unprepared to perform on patient.


*Figure 6:* Miya Model

*Figure* 7: Roma Tomato Model

*Figure 8:* Task Trainer

# Product Design Specifications

Design a **Paracervical Block Training Model (PBTM)**

- **Realistic Functionality:** Replicates cervicovaginal junction, supports instrument insertion.
- **Anatomical Accuracy:** Dimensions, hardness, elasticity matching that of an adult female
- **Durability:** Withstands repeated use, replaceable components. .
- **Ergonomics:** Stable and adjustable stand at exam height, accommodates speculum instruments.
- **Low-Cost & Scalable:** 10 prototypes at $50 each, affordable for widespread training.

# Design 1 - Box Design

**Function:** Box with removable lid containing vaginal canal, uterus, and removable cervix.

**Pros:**

- Removable cervix
- Visibility during procedure practice
- Accuracy of material properties

**Cons:**

- Difficult to fabricate
- Not at correct height
- Anatomical inaccuracy, especially in vaginal canal

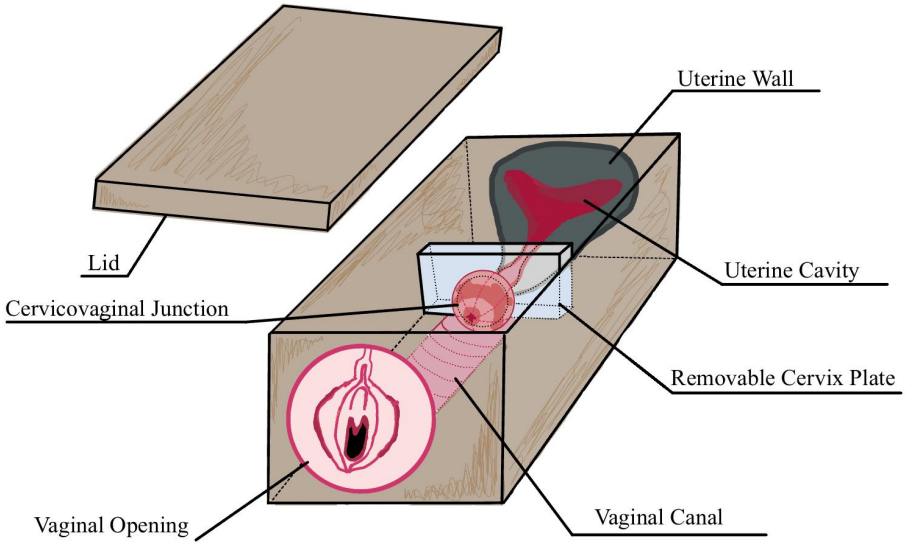



*Figure* 9: Box Design Labelled

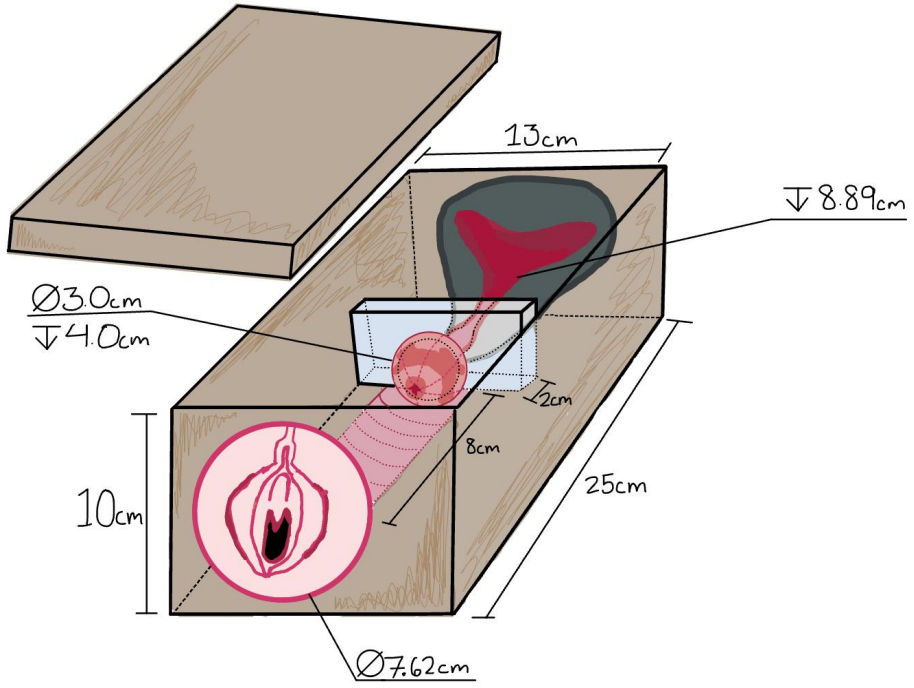



*Figure* 10: Box Design Dimensions

# Design 2 - Modified Venus Design

**Function:** Tabletop stand supporting a visually accurate silicon vagina, which contains a cervix with a cervicovaginal junction and attached uterus.

**Pros:**

-Aesthetic appearance

-Portability

-Stability during procedure

**Cons:**

-Incorrect height

-Inaccurate uterine angle

-Not durable

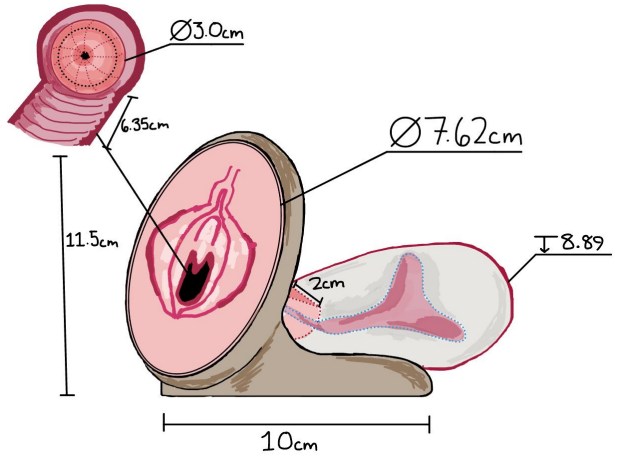



*Figure* 11: Modified Venus Design Dimensions

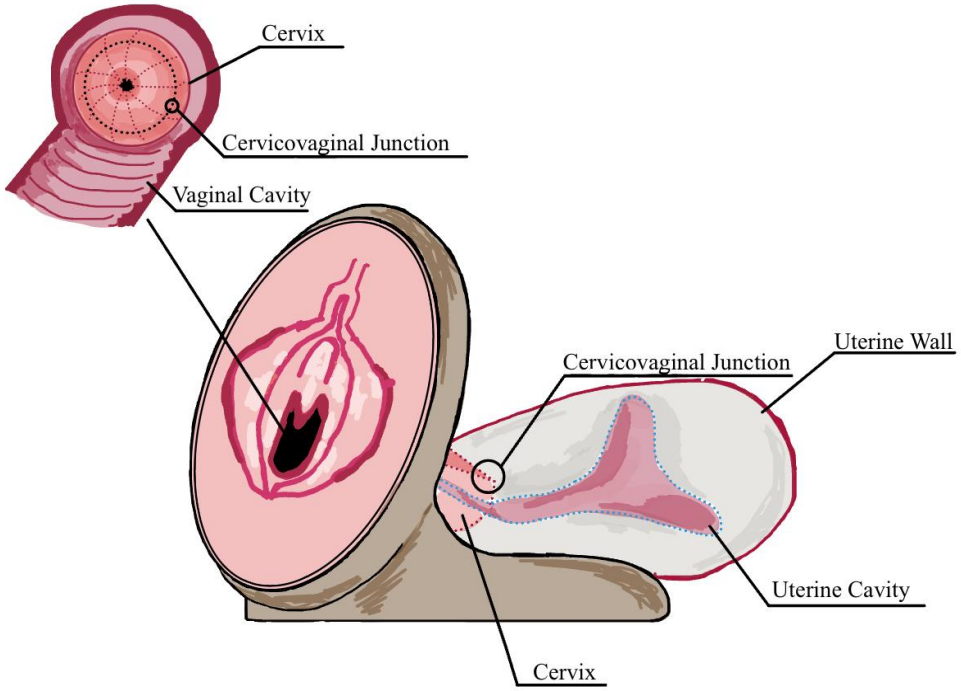



*Figure* 12: Modified Venus Design

# Design 3 - Modified Task Trainer

## Function:

Tabletop model at realistic height, replaceable cervix with cervicovaginal junction, anatomically accurate uterus shape and removable vaginal opening

## Pros:

- Replaceable Parts  (Cervix, Uterus, Vagina)
- Easily Reproducible
- Provides Realistic procedure
- Affordable

## Cons:

- Hard to Transport
- Could tip during procedure

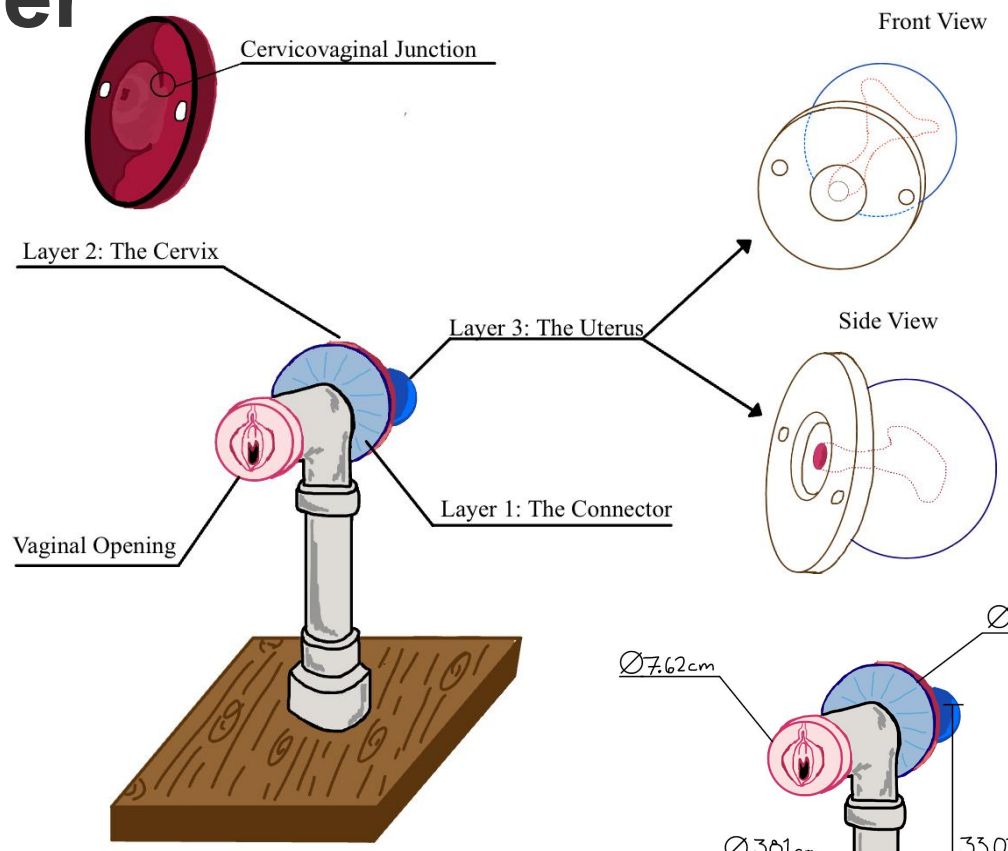



*Figure* 13: Modified Task Trainer Design

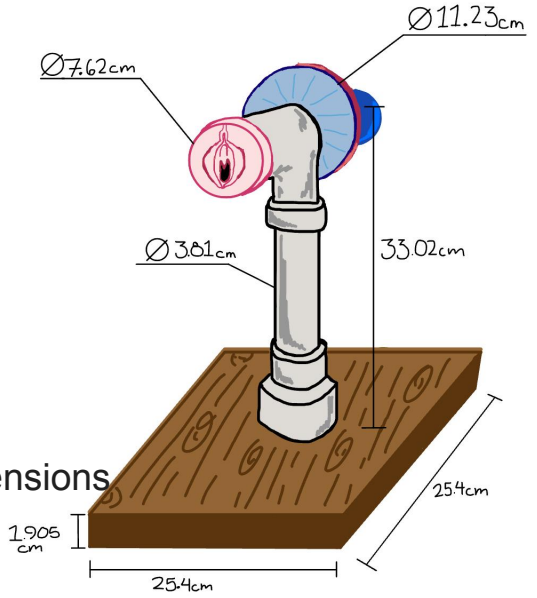
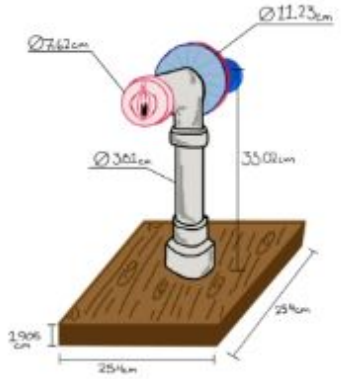
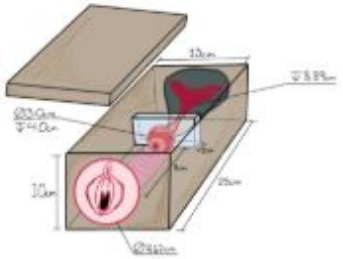
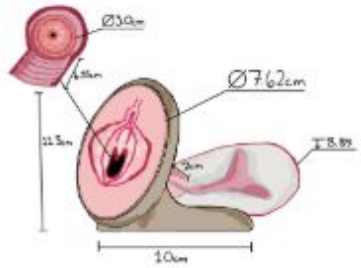



*Figure* 14: Modified Task Trainer Dimensions

# Paracervical Block Model Design Matrix

| Criteria (Weight) | Modified Task Trainer | | Shoebox Design | | Modified Venus Design | |
|---|---|---|---|---|---|---|
| |  | |  | |  | |
| Realistic (25) | 5/5 | 25 | 4/5 | 20 | 2/5 | 10 |
| Ease of Fabrication (25) | 5/5 | 25 | 1/5 | 5 | 1/5 | 5 |
| Anatomical Accuracy (20) | 4/5 | 16 | 2/5 | 8 | 3/5 | 12 |
| Cost (15) | 5/5 | 15 | 3/5 | 9 | 4/5 | 12 |
| Portability (10) | 3/5 | 9 | 3/5 | 9 | 4/5 | 12 |
| Safety (5) | 4/5 | 1 | 5/5 | 5 | 5/5 | 5 |
| Total (100) | | 91 | | 56 | | 56 |

# Future Work

## October

- Submit our preliminary report
- Meet with our client and advisor
- Purchase materials
- Begin prototyping

## November

- Have a physical design for the show and tell
- Revise our design
- Prototype testing with client
- Data analysis of prototype

## December

- Present final poster
- Develop our Final Report

# Acknowledgements

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**Supporting Organizations:**

Department of Biomedical Engineering

# References


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# Questions