# EarVac: Negative Pressure Wound Therapy Device for Improved Microtia Reconstruction Surgery Recovery

**Clients:** Ms. Nada Botros
Division of Plastic Surgery
UW School of Medicine and Public Health
nbotros@wisc.edu
(414) 687-9117

Dr. Daniel Cho
Division of Plastic Surgery
UW School of Medicine and Public Health
chod@surgery.wisc.edu

**Advisor:** Dr. Russ Johnson

**Team:** Bryan Heaton (Leader)
Meghan Kaminski (Communicator)
Dhruv Nadkarni (BWIG)
Serena Evers (BSAC)
Harshad Gunasekar (BPAG)
Muhaison Ibrahim

**Date:** February 6, 2026 - February 12, 2026

## Problem Statement

Newly reconstructed ears after microtia reconstruction surgery are fragile, prone to destructive fluid buildup, and difficult to dress securely. Clinicians need a conformal negative-pressure wound therapy device that holds a foam dressing over the ear, maintains consistent negative pressure over complex 3D geometry, and safely collects drainage from existing drains to reduce complications and support consistent healing. Current temporary drains often lose suction and dressings fail to seal around the ear's contours which increases a burden on clinical staff. A device specifically shaped for postoperative ear anatomy would provide a more stable seal, more reliable pressure delivery, more reliable wound drainage, and greater protection during the critical early healing period.

## Brief Status Update

The team is ramping up operations to begin testing on a model! The team has found that the adhesive sticks more effectively to our styrofoam head model than either of the silicone ear models. The team is focusing on the most secure options to create a seal while inserting the therapeutic tube into the dressing.

## Summary of Weekly Team Member Design Accomplishments

- Team:
    - Decided on possible path forward for secure seal generation
    - Created solid plan to prioritize prototyping, patent filing, IP protection
- Bryan Heaton
    - Created target timeline for initial testing, semester deliverables
    - Engineered v1 seal for therapeutic tube, begin testing hopefully 2/13
    - Purchased additional parts for a v2 seal
- Meghan Kaminski
    - Continued general research
    - Began working on the SolidWorks design
    - Preliminary Presentation
- Serena Evers
    - Preliminary presentation
    - Organizing outreach
    - General research
- Harshad Gunasekar
    - Preliminary Presentation
    - Continued purchasing items to validate seal of dressing
    - Began rough testing of Version 1 of seal
- Dhruv Nadkarni
    - General research regarding testing methods and possible quantitative data
    - Preliminary presentation

## Weekly/Ongoing Difficulties

None for now.

## Upcoming Team and Individual Goals

- Team:
    - Complete initial testing by 2/18 (next client meeting) or end of month if needed
    - Begin framework for journal article
- Bryan Heaton
    - Secure tube into dressing, emphasizing long-term seal
    - Test tube adaptor setups
    - Begin testing
- Meghan Kaminski
    - Finish solidworks design
    - Print out a new headband
    - Order materials from Nada
- Serena Evers
    - Order y connector

    - Look into journals
    - test
- Harshad Gunasekar
    - Secure tube into dressing, make sure seal is viable
    - Purchase items necessary for seal if needed
    - Begin testing
- Dhruv Nadkarni
    - Create flowmeter circuit
    - Begin testing

## Project Timeline

| **Project Goal** | **Deadline** | **Team Assigned** | **Progress** | **Completed** |
|---|---|---|---|---|
| Preliminary Presentation | February 9, 2026 | All | 100% | X |
| Preliminary Deliverables | February 25, 2026 | All | 0% | |
| Show and Tell | March 30, 2026 | All | 0% | |
| Executive Summary Application | April 3, 2026 | All | 0% | |

| | | | | |
|---|---|---|---|---|
| Final Presentations | April 24, 2026 | All | 0% | |
| Final Deliverable | April 29, 2026 | All | 0% | |