**Statistical Design Consulting**

**SEMESTER REPORT**

**Spring 2025**

**Client:** Sarwat Amin  **File Number:** 25-023

**Department:** Biomedical Engineering **Major Prof:** Dr. Matthew Ward

**Consultant:** Sumeeth Guda **Initial Meeting Date:** 02/18/25

**Meeting Attendees:** Sarwat Amin, Sumeeth Guda, Dr. Matthew Ward, Dr. Chong Gu

**Statement of Problem:** To determine how early one can detect a deviation of physiological data from pre-vaccine baseline.

**Goal of This Project:** Journal Article / PhD Dissertation.

**Background:** The client is a PhD student in the BME department who is investigating the long-term effects of the COVID-19 vaccine amidst the electrocardiogram (ECG) data from 84 people. They are estimating heart rate variability (HRV) metrics from the ECG sensors and using the metrics along with the biological data (skin temperature, respiration, etc.) to see which metrics are the earliest to deviate / change from the pre vaccine baseline. They collected these data through an observational study involving data collected both pre and post vaccine.

The client and her advisor came to the SCS because they needed help analyzing the pre-vaccine data since it violated their initial assumption that the collected data would be normally distributed. Additionally, she designed an 81 by 22 treatment matrix and fitted a stepwise logistic regression model to analyze the results. They wanted validation that their analysis methods were valid and statistically sound.

**Progress During Current Semester:**

The client had to fit her model using a mixed effect model, so the majority of the work this semester was with Sumeeth teaching Sarwat how to interpret the model results and how to introduce covariates to determine the best fitting model using stepwise selection. Additionally, Sumeeth taught her how to use AIC and BIC to choose between models. Since this project was in the early stages of the analysis phase Sumeeth showed Sarwat the techniques needed to fully solve her model. But she indicated that she would continue with the SCS in the next semester.

**Current Status: Continuing**