SCS Client 25-023

IM Agenda

2/18/25 | Tuesday | 9:30 AM

Phase: Analysis (All data has been collected)

Purpose: PhD Dissertation / Journal Article

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 metrics from the ECG sensors and using the metrics along with the biological data (skin temperature, respiration, etc), they are discovering which metrics are the earliest to deviate / change from the pre vaccine baseline.
* The pre vaccine data for the baseline covers 4 days, and they have 5 days of post vaccine data. They are measuring the deviation in the post vaccine phase and are looking at the vaccine impact through changes in heart rate, temperature, etc. They did this for all 84 of the participants.
* This is an observational study.

The client needs consultation for two issues:

1. The heart rate and heart rate derived physiological signals from the ECG sensor are not normally distributed as they exhibit circadian rhythm.
   1. The client assumed normality with the pre-vaccine baseline data, to compare to the post-vaccine data. However, this wasn’t the case
   2. They want us to run through her methods to identify any edge cases / caveats to address within her analysis.
2. The client computed an 81 by 22 array of duration of deviation, where 81 is the total number of participants and the number of physiological and HRV features is 22.
   1. They performed a stepwise logistic regression analysis with the 81 by 22 array as experimental factors and a binary array of 1 by 81 as a response variable that is created from self-reported systemic symptoms.
   2. They need help with interpreting the results.

Research Questions:

* How early can we detect a deviation of physiological data from pre-vaccine baseline?
* How long was deviation sustained?

Statistical Concerns:

* How can we identify which feature is crucial to explain vaccine response?
* Do people receiving a certain brand of vaccine have higher odds of experiencing vaccine related symptoms? Do people with a certain age or Body Mass index have higher odds of experiencing vaccine related symptoms?

Questions to ask client:

* Did all the participants have the same dosage of the vaccine?
* Even though the participants were all 18 years old and above, how significant is age within this study?
* What is the official experiment design,