Math 439 Case Study 3: Spring 2020

Hello class…welcome to the big leagues.

For this exam you will be investigating a dataset called colon2017.csv

We are interested in the risks of anastomotic leaking (essentially your colon leaks into your body and potentially kills you) following a colectomy (partial or full removal of your colon) associated with unhealthy weight levels (measured by Body Mass Index or BMI). Meredith Grey is a research physician who has collected the data. She has provided you with the following information on the variables.

Patient Identifier: A unique patient ID

Diagnosis ICD9 Code: Not necessary for this, all patients required a colectomy

CPT Code: Not necessary

Procedure: Not necessary

Gender: Male and Female

Height: Numerical

Weight: Numerical

BMI: Body Mass Index (note you shouldn't be using height and weight, you should be using BMI).

Age: Numerical

Race: AA (African American) and White. There were no other ethnicities represented in this data. (Be careful this was a free text field…White shows up spelled a couple of different ways).

Tobacco: 1 = yes, 0 = no

DM: Diabetes 1 = yes, 0 = no

CAD/PAD: Coronary or Pulmonary Artery Disease 1 = yes, 0 = no

Cancer: 1 = yes, 0 = no

Albumin (g/dL): Albumin is a proxy measurement for how much blood you have following the procedure.

Incision Start:

Incision Close:

Operative Length: Length (in days) of operation. Note if you use this field you can ignore incision start and close.

Anastomotic Leak: Response variable (1 = yes, 0 = no)

The remaining variables are other potential responses that we don't care about.

Dr. Grey has contracted you to collaborate on the following research goals:

1. Dr. Grey’s research team is primarily interested in the risks associated with anastomotic leaking following a colectomy and how those risks are impacted by unhealthy weight (weight health measured by BMI). Dr. Grey informs you that BMI is measured numerically but often doctors categorize weight health into the following categories. (BMI < 30 = healthy), (BMI 30-35 = unhealthy). (BMI 35-40 = obese), (BMI > 40 = severely obese). Articulate the risks of anastomotic leaking following a colectomy associated with BMI. **Be sure to evaluate risks associated with BMI in the context of other potential predictors.**

2. Because Dr. Grey is interested in publishing her results, she wants you to determine if BMI is a statistically significant predictor of increased risk for anastomotic leaking. Also, please identify any other potential statistically significant predictors of anastomotic leaking following a colectomy.

3. (Challenge Question…only worth 10 points, if you’re stressed for time I’d prioritize this question last)

The hospital is interested in two case studies. The first is for Arizona Robbins, a 35 year old white female who doesn't use tobacco, doesn't have diabetes, doesn't have CAD or PAD, doesn't have cancer, has a post-operative albumin level of 4.2 and whose operation length took 90 minutes (note operation length currently isn’t measured in minutes).

The second is a for Richard Webber, a 62 year old African American male who uses tobacco and has diabetes but has never had cancer or CAD and whom had an albumin level of 2.8 following a 210 minute operation.

For each case study, graphically represent the dangers associated with obesity (BMI).

As is always the case, please provide a write-up discussing the methodology (or methodologies) you’ve employed to address Dr. Grey’s research needs in an organized easy to digest report.