Math 536 Exam 2: Spring 2024

For this exam you will be assisting LSU's hospital with analyzing some patient data following colo-rectal surgery: 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 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 (Not necessary)
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. (Be careful, I think this was a free text field, so there might be like 'white,' and 'White,' so you may have to do a little bit of cleaning.)
Tobacco: 1 = yes, 0 = no
DM: Diabetes 1 = yes, 0 = no
CAD/PAD: Coronary or Pulminary 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. Articulate the risks of anastomotic leaking following a colectomy associated with BMI. In addition to treating BMI numerically, you may want to also consider discretizing BMI.

2. Identify any other potentially important predictors of anastomotic leaking following a colectomy.

3. 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 your data is measured in days…not minutes).

The second is a for Richard Webber, a 62 African American male who uses tobacco and has diabetes 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. If there are any weaknesses to your model, please discuss.