**Hsci 2117: Homework Assignment #2**

Instructions

This problem set utilizes the Laryngoscope data set used in a study by Abdallah et al. (2011). (https://www.causeweb.org/tshs/laryngoscope/). The Data Introduction, Data Dictionary, and Data Set can be downloaded through blackboard.

If you use StatKey or Excel, explain any formulas or procedures you used, and copy and paste all graphs, charts, or images into a final word document or pdf. Also include in your final word document a description of the process and method you used to solve each question. Provide sufficient explanation of how you got the answer to any question.

Introduction

Abdallah et al. (2011) ask the question *Is intubation easier and faster with the Pentax AWS laryngoscope compared to the Macintosh laryngoscope?* In this assignment you will conduct an analysis to help inform the answer to this question. To complete Part 1, read the dataset introduction, the data dictionary, and the study paper’s introduction and methods sections. Use excel or statkey to complete Part 2. Read the study paper’s methods section and use statkey to complete Part 3. Read the study paper’s results section to complete Part 4.

Part 1 – Study Design

1. What is the intended study population? How were the participants of this study recruited? Was random sampling utilized? What does this mean for the generalizability of results to the entire population of interest?
2. What is the main outcome variable? What are the main explanatory variables? What are the covariate/confounding variables the researchers collected and analyzed? Provide a complete list.
3. How was the study designed? Was prospective randomization (i.e., random allocation before the experiment is conducted) utilized to assign participants to groups? What does this mean for the interpretation of the relationships between the main explanatory variable and the outcome variable? Can a causal relationship be established?

Part 2 – Preliminary Analyses

1. Calculate the proportion of successful first attempt intubations by laryngoscope type. Using Macintosh as a reference group, calculate the absolute risk difference and relative risk for successful first attempt intubation. Do there appear to be any practically significant differences?
2. The researchers are particularly interested in speed of intubation. Conduct a randomization test for a difference in means for the attempt 1 time by group. Do you find evidence that there may be a difference? Support your answer by including and interpreting the test *p*-value as well as the difference in means and the ratio of means. If you find evidence of a difference, estimate the difference with an interval estimate.

Part 3 – Sensitivity Analyses

The purpose of Table 1 in the paper is to ensure that the patients who were assigned to each laryngoscope group are similar. This is important in order to limit the effect of confounding variables. While random allocation *on average* creates similar groups, there is the possibility that in this one particular instance, there is an imbalance. The researchers of the study used an advanced statistical method to control for the effects of potential confounding variables and adjust estimates based on those effects, but we’ll examine these potential confounding variables with the tools we’ve learnt in this course.

A potential confounding variable may invalidate our main analyses if (1) the confounding variable is significantly associated with the main outcome variable, and, (2) the two groups have different proportions/means for the confounding variable. We will focus our investigations on the ASA status variable.

1. Conduct an ANOVA test for a difference in means to assess whether ASA status is related to attempt 1 intubation time. Provide a summary that includes the null hypothesis, your decision regarding the null hypothesis, the test *p*-value, and an analysis of clinical significance. Do you believe that ASA status is related to intubation time? (Hint: Review Professor Rao’s week 5 lecture on ANOVA. It’s the sample F-statistic that you will use to get a p-value in StatKey).
2. Conduct Chi-Squared test for Independence to assess whether ASA status is related to the laryngoscope group. Provide a summary that includes the null hypothesis, your decision regarding the null hypothesis, the test *p*-value, and an analysis of clinical significance. Do you think ASA status is related to intubation group? (Hint: Review Professor Rao’s week 6 lecture on Chi-Squared Tests. It’s the sample Chi-Squared-statistic that you will use to get a p-value in StatKey).
3. Do you think ASA status may be confounding the analysis of the relationship between laryngoscope group and intubation time? Support your answer by including your interpretation of results from questions 6 and 7 and considering both statistical significance and clinical significance.

Part 4 – Results

1. After adjusting for the effects of potential confounding variables, did the authors determine that there was a difference between inbutation time between groups? Include the researchers’ *p*-value in your summary.
2. The researchers were also interested in the ease of intubation. What did they determine based on the results of this study – was one of the laryngoscopes easier to use than the other? Include the researchers’ *p*-value in your summary.