MTHS4005 Practice Coursework description

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The average length of time that a patient will remain in hospital following heart surgery is 7.8 days. The standard deviation for the length of stay is 1.7 days.

A new surgical procedure is being developed which it is hoped will shorten the average length of time that patients remain in hospital following heart surgery.

In order to assess whether or not the new surgery is beneficial in reducing the length of hospital stays, the following data were collected in the csv file, Surgery_20594616.csv.

- The length of hospital stays (in days) of 29 patients receiving the new surgical procedure. (`New.surgery`)

- The length of hospital stays (in days) of 29 patients who received the current surgical procedure from historical records. (`Current.surgery`)

The patients chosen for the `Current.surgery` data column are chosen to match as closely as possible the characteristics (sex, age, etc) of the corresponding patient receiving the new surgical procedure. This is known as Matched Case control study and looks to account for variability in hospital stay due to demographic characteristics.

1. Do the data from the new surgical procedure support the hypothesis that new surgical procedure reduces the mean length of hospital stays? [20 Marks]

2. Using the Matched Case control study data, assess the size of reduction in the length of hospital stay due to the new surgical procedure. [20 Marks]

In answering both questions consider:

- Exploratory analysis of the data, including visualisation.

- Formal analysis of the question.

Only material up to and including Week 5 of the lecture notes is required to answer the questions. However, using material from later weeks would allow for a more in-depth investigation.

Your report should be no more than **3 pages** in length, and should include:

- **Introduction** - An introduction to your analysis, including the research questions you are answering.

- **Exploratory Data Analysis** - A summary of an initial investigation of the data.

- **Methods** - The statistical methods that you have used to perform the analysis.

- **Results** - Analysis of the data.

- **Conclusions** - A summary of your findings, including strengths and weaknesses of your analysis.

Submit your **R** code along with your report. No **R** code or direct **R** output should appear in the report. Summarise your **R** output appropriately. The **R** code allows me to check your results, in particular, if something does not seem quite right.