My First R Project

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Laryngoscope: Practice Analysis

A laryngoscope is a medical instrument which is used to examine the larynx(voice box) during a laryngoscopy. It has lights and a lens, and can be used to during intubation to insert a breathing tube in a patient who is having difficulty breathing.

The Laryngoscope dataset in R is part of the medical data package which comes from a study by Abdullah et al., published in Anasthesia Analgesia in 2011. It compares the Pentax AWS Video Laryngoscope and the Macintosh Laryngoscope. https://search.r-project.org/CRAN/refmans/medicaldata/html/laryngoscope.html.

Setting up my environment

Note: To set up the environment by installing and loading tidyverse, and the medicaldata in R datasets

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.4     v readr     2.1.5
## v forcats   1.0.0     v stringr   1.5.2
## v ggplot2   4.0.0     v tibble    3.3.0
## v lubridate 1.9.4     v tidyr     1.3.1
## v purrr     1.1.0
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
install.packages("medicaldata")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.5'
## (as 'lib' is unspecified)
```

```
library(medicaldata)
```

Selecting the laryngoscope data and saving it as a tibble called 't_laryngoscope'

```
data("laryngoscope")
t_laryngoscope <- as_tibble(laryngoscope)
head(t_laryngoscope)
```

```
## # A tibble: 6 x 22
##     age gender   asa   BMI Mallampati Randomization attempt1_time attempt1_S_F
##   <dbl>  <dbl> <dbl> <dbl>      <dbl>         <dbl>         <dbl>        <dbl>
## 1    51      0     3  56.2          1             0            29            1
## 2    52      0     3  44.6          2             0            29            1
```

```
## 3    37      0     3  41.6          1             0            31            0
## 4    20      0     3  46.3          2             0            31            0
## 5    35      0     3  61            2             0            21            1
## 6    39      0     3  44            2             0            10            1
## # i 14 more variables: attempt2_time <dbl>, attempt2_assigned_method <dbl>,
## #   attempt2_S_F <dbl>, attempt3_time <dbl>, attempt3_assigned_method <dbl>,
## #   attempt3_S_F <dbl>, attempts <dbl>, failures <dbl>,
## #   total_intubation_time <dbl>, intubation_overall_S_F <dbl>, bleeding <dbl>,
## #   ease <dbl>, sore_throat <dbl>, view <dbl>
```

Data Cleaning

The data columns are all presented as numerical data. In order to be able to explore the data using charts, I would need to convert some of the data to categorical data.

```
t_laryngoscope$gender <- factor(t_laryngoscope$gender, levels = c(1, 0), labels = c("Male", "Female"))
t_laryngoscope$asa <- as.factor(t_laryngoscope$asa)
t_laryngoscope$Mallampati <- as.factor(t_laryngoscope$Mallampati)
t_laryngoscope$Randomization <- factor(t_laryngoscope$Randomization, levels = c(1, 0), labels = c("Vide
t_laryngoscope$attempts <- as.factor(t_laryngoscope$attempts)
t_laryngoscope$failures <- as.factor(t_laryngoscope$failures)
t_laryngoscope$intubation_overall_S_F <- factor(t_laryngoscope$intubation_overall_S_F, levels = c(1, 0)
t_laryngoscope$bleeding <- factor(t_laryngoscope$bleeding, levels = c(1, 0), labels = c("yes", "no"))
t_laryngoscope$sore_throat <- factor(t_laryngoscope$sore_throat, levels = c(3, 2, 1, 0), labels = c("se

head(t_laryngoscope)
```

```
## # A tibble: 6 x 22
##     age gender asa     BMI Mallampati Randomization attempt1_time attempt1_S_F
##   <dbl> <fct>  <fct> <dbl> <fct>      <fct>                 <dbl>        <dbl>
## 1    51 Female 3      56.2 1          Standard                 29            1
## 2    52 Female 3      44.6 2          Standard                 29            1
## 3    37 Female 3      41.6 1          Standard                 31            0
## 4    20 Female 3      46.3 2          Standard                 31            0
## 5    35 Female 3      61   2          Standard                 21            1
## 6    39 Female 3      44   2          Standard                 10            1
## # i 14 more variables: attempt2_time <dbl>, attempt2_assigned_method <dbl>,
## #   attempt2_S_F <dbl>, attempt3_time <dbl>, attempt3_assigned_method <dbl>,
## #   attempt3_S_F <dbl>, attempts <fct>, failures <fct>,
## #   total_intubation_time <dbl>, intubation_overall_S_F <fct>, bleeding <fct>,
## #   ease <dbl>, sore_throat <fct>, view <dbl>
```

Outlining the column names to make them easily accessible.

```
colnames(t_laryngoscope)
```

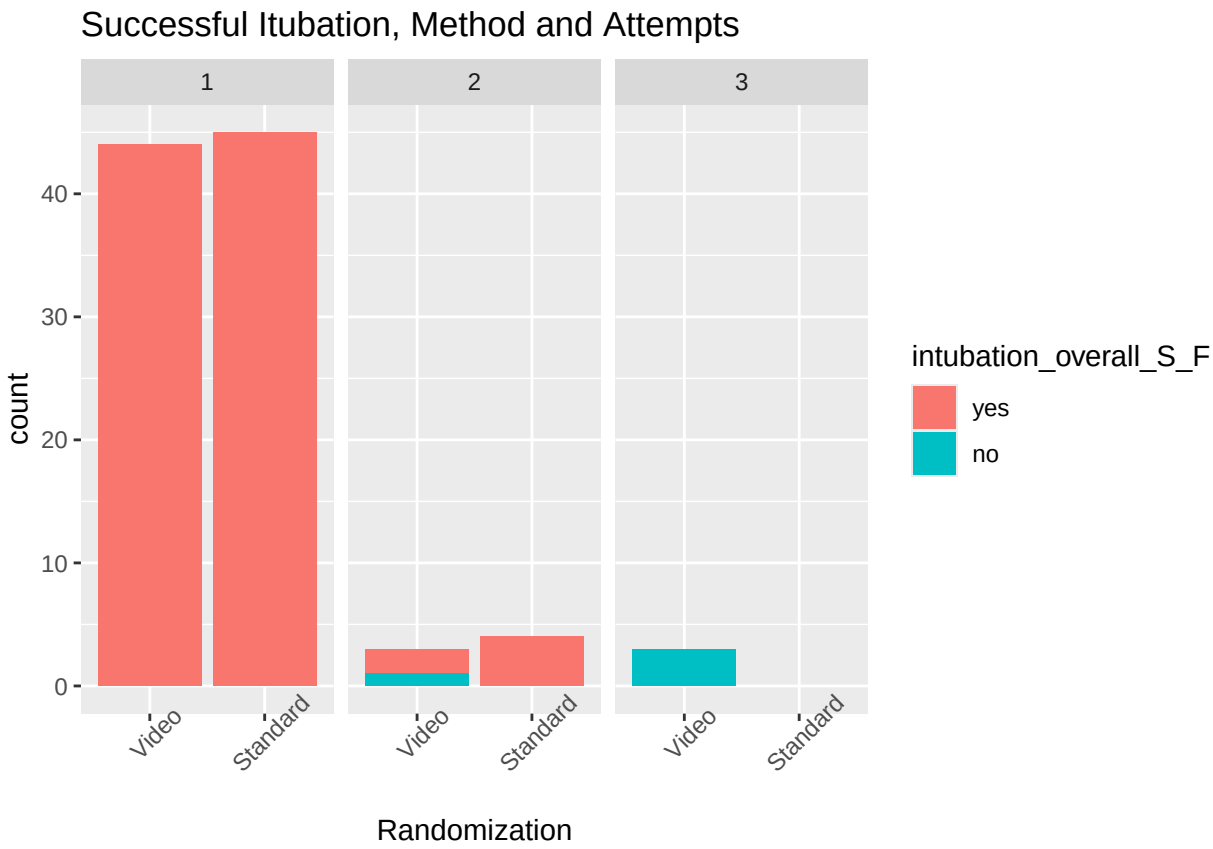
```
##  [1] "age"                     "gender"
##  [3] "asa"                     "BMI"
##  [5] "Mallampati"              "Randomization"
##  [7] "attempt1_time"           "attempt1_S_F"
##  [9] "attempt2_time"           "attempt2_assigned_method"
## [11] "attempt2_S_F"            "attempt3_time"
## [13] "attempt3_assigned_method" "attempt3_S_F"
## [15] "attempts"                "failures"
## [17] "total_intubation_time"   "intubation_overall_S_F"
## [19] "bleeding"                "ease"
```

```
## [21] "sore_throat"              "view"
```

Data Exploration Using Plots

Using scatter plots and bar charts to explore the data for significant insights.

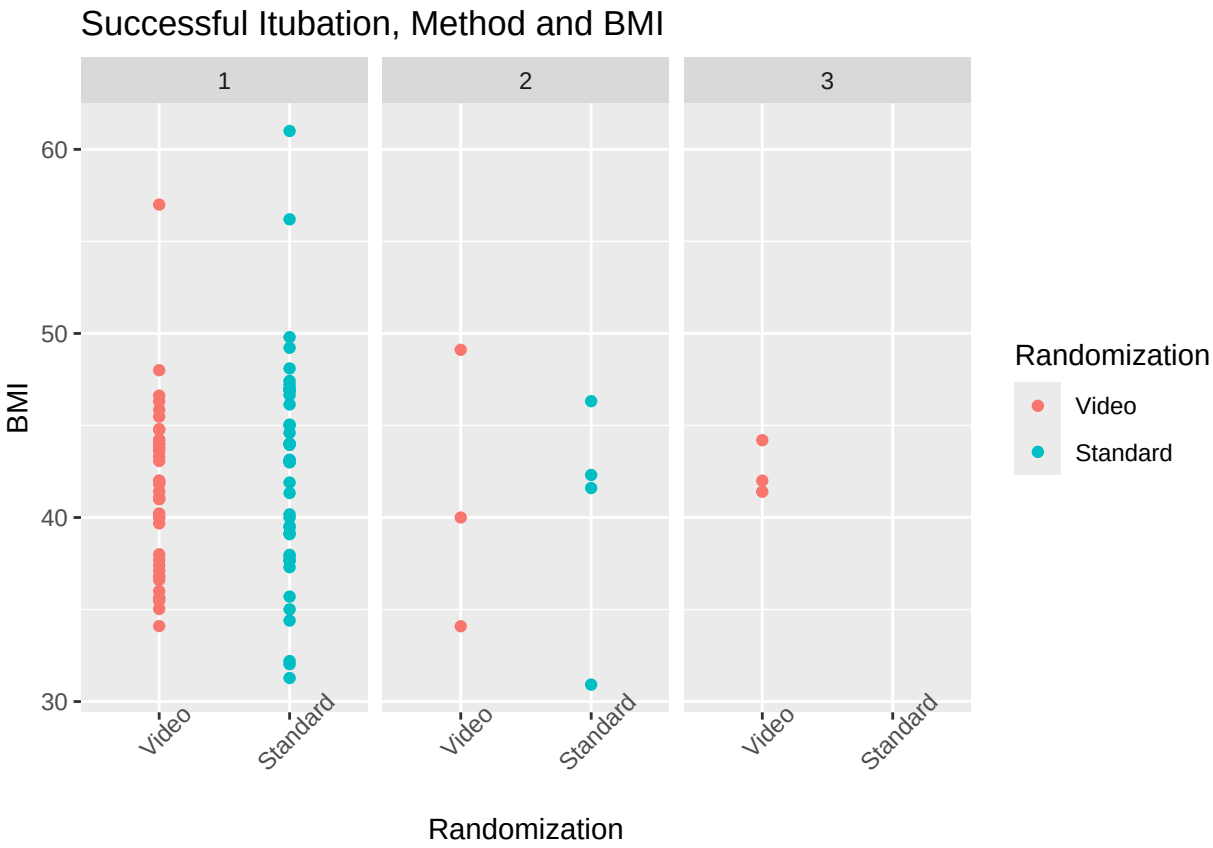
```
ggplot(data = t_laryngoscope) +
  geom_bar(mapping = aes(x = Randomization, fill = intubation_overall_S_F)) +
  facet_wrap(~ attempts) +
  theme(axis.text.x = element_text(angle = 45)) +
  labs(title="Successful Itubation, Method and Attempts")
```



This plot indicates that both methods are quite effective. However, In a few cases, There is need for a secod or even a third attempt at intubation. Is this in anyway related to the level of obesity as measured by the BMI?

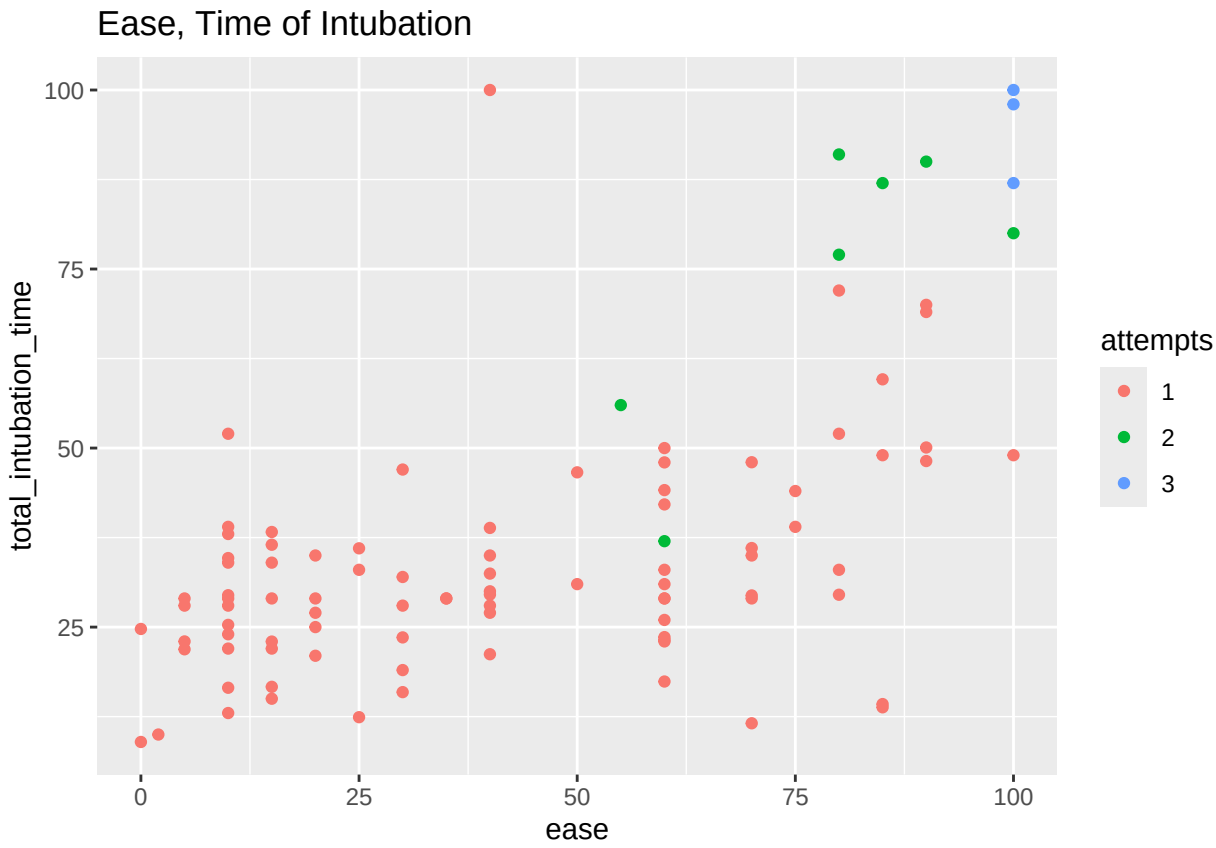
```
ggplot(data = t_laryngoscope) +
  geom_point(mapping = aes(x = Randomization, y = BMI, color =Randomization)) +
  facet_wrap(~ attempts) +
  theme(axis.text.x = element_text(angle = 45)) +
  labs(title="Successful Itubation, Method and BMI")
```

```
## Warning: Removed 2 rows containing missing values or values outside the scale range
## (`geom_point()`).
```



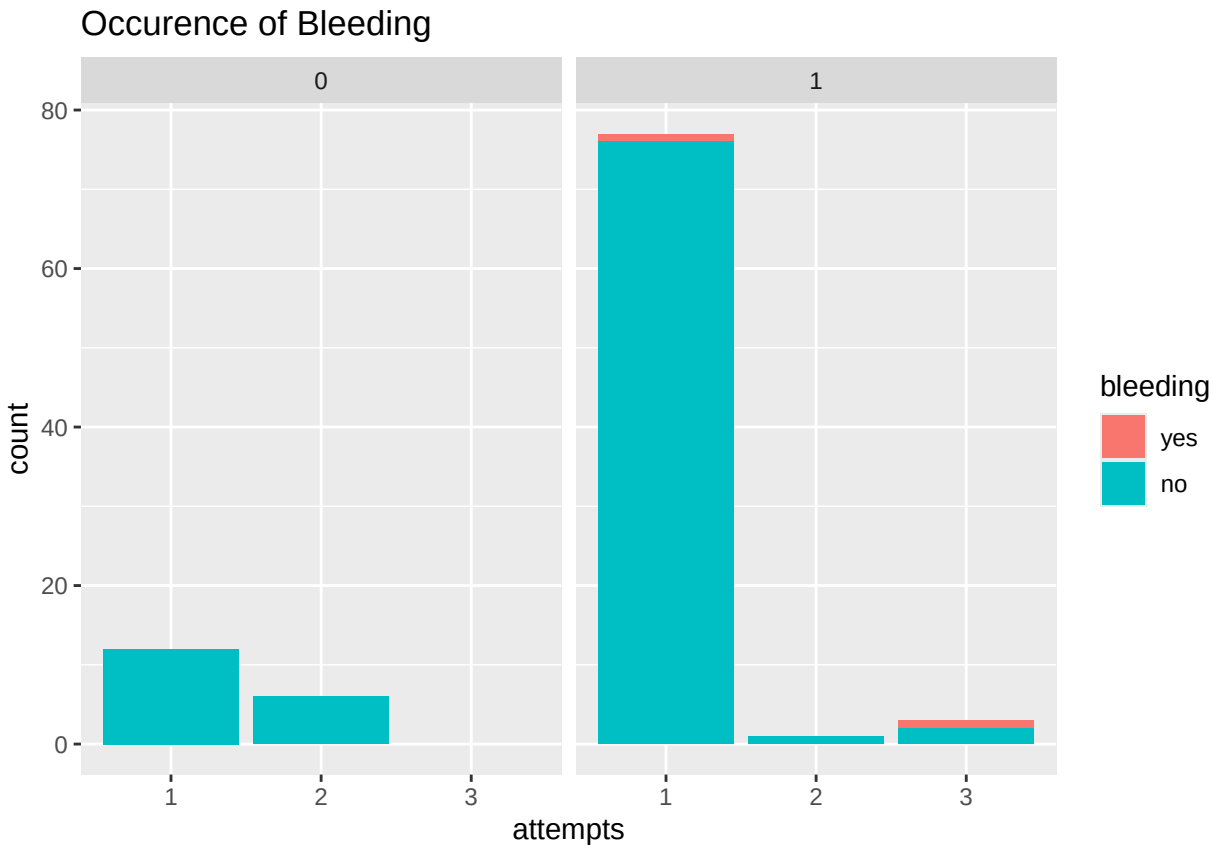
This doesnt indicate that at all. Infact, majority of the patients have BMI between 30 and 50. Those with higher, had a successful intubation on the first attempt, and only a few who are slightly abve 40 needed a third attempt.

```
ggplot(data = t_laryngoscope) +
  geom_point(mapping = aes(x = ease, y = total_intubation_time, colour = attempts)) +
  labs(title="Ease, Time of Intubation")
```



This plot indicates that easier intubations are likely to require only one attempt and take less time.

```
ggplot(data = t_laryngoscope) +
  geom_bar(mapping = aes(x = attempts, fill = bleeding )) +
  facet_wrap(~ view) +
  labs(title="Occurence of Bleeding")
```



Finally, this plot indicates that bleeding can occur even when the glottic view is good. However occurence of bleeding seems to be very few.