DVT Data Analysis

2023-07-08

Introduction

In this report, I conducted a multitude of bivariate analysis that mostly calculates the odds ratios and incidence rates of the different relevant features in the dataset. Sections 1,2, and 3 all focus on this analysis and the summary of the results can be in the "Findings" sub-section of the respective sections. Then, in Section 4, I conducted an odds ratio test between the different types of thromboprophylaxis and the bleeding results of the patients to see if there is a significant relationship between the two. I then filtered the patients to satisfy the requirements pertaining the hypothesis before finally finding the incidence rates of the patients developing VTE within 30 days of chemotherapy induction of hematopoietic stem cell transplantation.

If you want to skip all the R code and just go to the findings, here are links to each section:
- Section 1a) Findings
- Section 1b) Findings
- Section 2a) Findings
- Section 2b) Findings
- Section 3 Findings
- 4) Hypothesis
- Conclusion
- Tables

Imports

```
library(readxl)
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
## v ggplot2 3.4.0     v purrr   1.0.1
## v tibble  3.1.8     v dplyr   1.1.0
## v tidyr   1.3.0     v stringr 1.5.0
## v readr   2.1.3     v forcats 1.0.0
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(dplyr)
library(epitools)
library(openxlsx)
```

Load Data

```
# Reading the excel file
df = read_excel('/Users/Anaqi_Amir/Downloads/DVTRetrospective22_DataCollection_CariniCurrent_DVTHemOncD
df
```

```
## # A tibble: 862 x 94
##    study_id first~1  Male   age hem_m~2 year_~3 dxtime dx1y     mv o2    dialy~4
##       <dbl>   <dbl> <dbl> <dbl>   <dbl> <chr>   <chr>  <chr> <dbl> <chr> <chr>
##  1        1       1     0  76.6       2 2014    0      0         1 0     0
##  2        2       1     1  33.0       2 2012    2      1         1 0     0
##  3        3       1     1  67.1       2 2007    9      1         2 2     0
##  4        4       1     0  69.1       7 2018    0      0         1 0     0
##  5        5       1     1  79.1       2 2020    0      0         1 0     0
##  6        6       1     1  59.3       9 2017    0      0         1 0     1
##  7        7       1     0  72.4       6 2015    0      0         1 1     1
##  8        8       1     1  64.0       2 2018    1      1         0 2     0
##  9        9       1     0  75.6       2 2021    0      0         0 3     0
## 10       10       1     0  67.4       2 2015    0      0         0 0     0
## # ... with 852 more rows, 83 more variables: pressors <chr>,
## #   hospital_admission_date <dttm>, icu_admission_date <dttm>,
## #   icu_discharge_date <dttm>, icu_disposition <dbl>,
## #   hospital_discharge_date <chr>, hospital_disposition <chr>, dnr_icu <dbl>,
## #   dnr_ward <chr>, pre_icu_los <dbl>, icu_los <dbl>, hospital_los <chr>,
## #   hospital_ad_dx <dbl>, icu_diag <dbl>, weight <chr>, height <chr>,
## #   bmi <chr>, covid <dbl>, cmbd_htn <dbl>, cmbd_cad <dbl>, cmbd_chf <dbl>, ...
```

1) EDA for prophylaxis

a) Factors of prophylaxis

In this section, I will be seeing what are some of the factors that determines whether someone will receive prophylaxis

Male vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(Male == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(Male == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(Male == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(Male == 0 & dvt.icu.proph != 4)

type = c('Male', 'Not Male')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##           Result
## Type       SCDs in ICU No SCDs in ICU Total
##   Male             225            282   507
```

```
##   Not Male         142            213   355
##   Total            367            495   862
##
## $measure
##           odds ratio with 95% C.I.
## Type       estimate     lower    upper
##   Male     1.000000        NA       NA
##   Not Male 1.196382 0.9086887 1.577112
##
## $p.value
##           two-sided
## Type       midp.exact fisher.exact chi.square
##   Male             NA           NA         NA
##   Not Male  0.2016121    0.2083526  0.2006787
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Male vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(Male == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(Male == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(Male == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(Male == 0 & icuproph == 0)

type = c('Male', 'Not Male')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##           Result
## Type       Pharmacological Prophylaxis in ICU
##   Male                                     98
##   Not Male                                 94
##   Total                                   192
##           Result
## Type       No Pharmacological Prophylaxis in ICU Total
##   Male                                        409   507
##   Not Male                                    261   355
```

```
##   Total                                       670   862
##
## $measure
##           odds ratio with 95% C.I.
## Type        estimate     lower     upper
##   Male     1.0000000        NA        NA
##   Not Male 0.6656225 0.4816348 0.9199103
##
## $p.value
##           two-sided
## Type       midp.exact fisher.exact chi.square
##   Male             NA           NA         NA
##   Not Male 0.01373067   0.01575165 0.01303192
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Male vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(Male == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(Male == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(Male == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(Male == 0 & dvt.icu.proph != 0)

type = c('Male', 'Not Male')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##           Result
## Type       No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   Male                       103                     404   507
##   Not Male                    76                     279   355
##   Total                      179                     683   862
##
## $measure
##           odds ratio with 95% C.I.
## Type        estimate    lower    upper
##   Male     1.0000000       NA       NA
```

```
##   Not Male 0.9356223 0.670874 1.309084
##
## $p.value
##           two-sided
## Type       midp.exact fisher.exact chi.square
##   Male             NA           NA         NA
##   Not Male  0.6963341    0.7331075  0.6970419
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Female vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(Male == 0 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(Male == 0 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(Male == 1 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(Male == 1 & dvt.icu.proph != 4)

type = c('Female', 'Not Female')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##             Result
## Type         SCDs in ICU No SCDs in ICU Total
##   Female             142            213   355
##   Not Female         225            282   507
##   Total              367            495   862
##
## $measure
##             odds ratio with 95% C.I.
## Type          estimate     lower    upper
##   Female     1.0000000        NA       NA
##   Not Female 0.8358732 0.6340704 1.100487
##
## $p.value
##             two-sided
## Type         midp.exact fisher.exact chi.square
##   Female             NA           NA         NA
##   Not Female  0.2016121    0.2083526  0.2006787
```

```
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Female vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(Male == 0 & icuproph == 1)
type_and_no_result = df %>%
  count(Male == 0 & icuproph == 0)
no_type_and_result = df %>%
  count(Male == 1 & icuproph == 1)
no_type_and_no_result = df %>%
  count(Male == 1 & icuproph == 0)

type = c('Female', 'Not Female')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##             Result
## Type         Pharmacological Prophylaxis in ICU
##   Female                                     94
##   Not Female                                 98
##   Total                                     192
##             Result
## Type         No Pharmacological Prophylaxis in ICU Total
##   Female                                        261   355
##   Not Female                                    409   507
##   Total                                         670   862
##
## $measure
##             odds ratio with 95% C.I.
## Type         estimate    lower    upper
##   Female      1.00000       NA       NA
##   Not Female  1.50239 1.087062 2.076262
##
## $p.value
##             two-sided
## Type         midp.exact fisher.exact chi.square
##   Female             NA           NA         NA
##   Not Female 0.01373067   0.01575165 0.01303192
##
```

```
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Female vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(Male == 0 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(Male == 0 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(Male == 1 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(Male == 1 & dvt.icu.proph != 0)

type = c('Female', 'Not Female')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##             Result
## Type         No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   Female                        76                     279   355
##   Not Female                   103                     404   507
##   Total                        179                     683   862
##
## $measure
##             odds ratio with 95% C.I.
## Type         estimate    lower    upper
##   Female     1.000000       NA       NA
##   Not Female 1.068807 0.763893 1.490593
##
## $p.value
##             two-sided
## Type         midp.exact fisher.exact chi.square
##   Female             NA           NA         NA
##   Not Female  0.6963341    0.7331075  0.6970419
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Platelet < 20 vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(vlow_plt == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(vlow_plt == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(vlow_plt == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(vlow_plt == 0 & dvt.icu.proph != 4)

type = c('Platelet<20', 'Platelet>=20')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##               Result
## Type           SCDs in ICU No SCDs in ICU Total
##   Platelet<20          269            227   496
##   Platelet>=20          98            268   366
##   Total                367            495   862
##
## $measure
##               odds ratio with 95% C.I.
## Type           estimate    lower    upper
##   Platelet<20  1.000000       NA       NA
##   Platelet>=20 3.233776 2.422701 4.340629
##
## $p.value
##               two-sided
## Type             midp.exact fisher.exact   chi.square
##   Platelet<20            NA           NA           NA
##   Platelet>=20 4.440892e-16 4.274059e-16 7.708732e-16
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Platelet < 20 vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(vlow_plt == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(vlow_plt == 1 & icuproph == 0)
no_type_and_result = df %>%
```

```
  count(vlow_plt == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(vlow_plt == 0 & icuproph == 0)

type = c('Platelet<20', 'Platelet>=20')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##               Result
## Type           Pharmacological Prophylaxis in ICU
##   Platelet<20                                  45
##   Platelet>=20                                147
##   Total                                       192
##               Result
## Type           No Pharmacological Prophylaxis in ICU Total
##   Platelet<20                                    451   496
##   Platelet>=20                                   219   366
##   Total                                          670   862
##
## $measure
##               odds ratio with 95% C.I.
## Type            estimate    lower     upper
##   Platelet<20  1.0000000       NA        NA
##   Platelet>=20 0.1493278 0.102068 0.2148482
##
## $p.value
##               two-sided
## Type           midp.exact fisher.exact   chi.square
##   Platelet<20          NA           NA           NA
##   Platelet>=20          0 1.304011e-27 2.131193e-27
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Platelet < 20 vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(vlow_plt == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(vlow_plt == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
```

```
  count(vlow_plt == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(vlow_plt == 0 & dvt.icu.proph != 0)

type = c('Platelet<20', 'Platelet>=20')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##               Result
## Type           No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   Platelet<20                    112                     384   496
##   Platelet>=20                    67                     299   366
##   Total                          179                     683   862
##
## $measure
##               odds ratio with 95% C.I.
## Type           estimate     lower    upper
##   Platelet<20  1.000000        NA       NA
##   Platelet>=20 1.300229 0.9288686 1.830951
##
## $p.value
##               two-sided
## Type           midp.exact fisher.exact chi.square
##   Platelet<20          NA           NA         NA
##   Platelet>=20  0.1265709    0.1486004  0.1261862
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

20 <= Platelet < 50 vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(low_plt == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(low_plt == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(low_plt == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(low_plt == 0 & dvt.icu.proph != 4)

type = c('20<=Platelet<50', 'Platelet<20 or Platelet>=50')
```

```
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                               Result
## Type                           SCDs in ICU No SCDs in ICU Total
##   20<=Platelet<50                       73            126   199
##   Platelet<20 or Platelet>=50          294            369   663
##   Total                                367            495   862
##
## $measure
##                               odds ratio with 95% C.I.
## Type                            estimate     lower    upper
##   20<=Platelet<50              1.0000000        NA       NA
##   Platelet<20 or Platelet>=50 0.7279513 0.5233008 1.007039
##
## $p.value
##                               two-sided
## Type                           midp.exact fisher.exact chi.square
##   20<=Platelet<50                      NA           NA         NA
##   Platelet<20 or Platelet>=50 0.05517378   0.06018816 0.05527447
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

20 <= Platelet < 50 vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(low_plt == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(low_plt == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(low_plt == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(low_plt == 0 & icuproph == 0)

type = c('20<=Platelet<50', 'Platelet<20 or Platelet>=50')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
```

```
                  nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                              Result
## Type                          Pharmacological Prophylaxis in ICU
##   20<=Platelet<50                                              52
##   Platelet<20 or Platelet>=50                                 140
##   Total                                                       192
##                              Result
## Type                          No Pharmacological Prophylaxis in ICU Total
##   20<=Platelet<50                                               147   199
##   Platelet<20 or Platelet>=50                                   523   663
##   Total                                                         670   862
##
## $measure
##                              odds ratio with 95% C.I.
## Type                          estimate     lower    upper
##   20<=Platelet<50             1.000000        NA       NA
##   Platelet<20 or Platelet>=50 1.322758 0.9104609 1.902191
##
## $p.value
##                              two-sided
## Type                          midp.exact fisher.exact chi.square
##   20<=Platelet<50                     NA           NA         NA
##   Platelet<20 or Platelet>=50  0.1405293    0.1453781  0.1359613
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

20 <= Platelet < 50 vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(low_plt == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(low_plt == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(low_plt == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(low_plt == 0 & dvt.icu.proph != 0)

type = c('20<=Platelet<50', 'Platelet<20 or Platelet>=50')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
```

```
                  nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                              Result
## Type                          No Prophylaxis in ICU Some Prophylaxis in ICU
##   20<=Platelet<50                                43                     156
##   Platelet<20 or Platelet>=50                   136                     527
##   Total                                         179                     683
##                              Result
## Type                          Total
##   20<=Platelet<50               199
##   Platelet<20 or Platelet>=50   663
##   Total                         862
##
## $measure
##                              odds ratio with 95% C.I.
## Type                          estimate     lower    upper
##   20<=Platelet<50             1.000000        NA       NA
##   Platelet<20 or Platelet>=50 1.070066 0.7203521 1.565823
##
## $p.value
##                              two-sided
## Type                          midp.exact fisher.exact chi.square
##   20<=Platelet<50                     NA           NA         NA
##   Platelet<20 or Platelet>=50  0.7327723    0.7651649  0.7383477
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low Hemoglobin vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(low_hb == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(low_hb == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(low_hb == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(low_hb == 0 & dvt.icu.proph != 4)

type = c('Hemoglobin<70', 'Hemoglobin>=70')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
```

```r
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                 Result
## Type             SCDs in ICU No SCDs in ICU Total
##   Hemoglobin<70          223            234   457
##   Hemoglobin>=70         144            258   402
##   Total                  367            492   859
##
## $measure
##                 odds ratio with 95% C.I.
## Type             estimate    lower    upper
##   Hemoglobin<70  1.000000       NA       NA
##   Hemoglobin>=70 1.705919 1.297604 2.247337
##
## $p.value
##                 two-sided
## Type               midp.exact fisher.exact   chi.square
##   Hemoglobin<70            NA           NA           NA
##   Hemoglobin>=70 0.0001253008 0.0001418684 0.0001250495
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low Hemoglobin vs Pharmacological Prophylaxis in ICU

```r
type_and_result = df %>%
  count(low_hb == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(low_hb == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(low_hb == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(low_hb == 0 & icuproph == 0)

type = c('Hemoglobin<70', 'Hemoglobin>=70')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                 Result
```

```
## Type             Pharmacological Prophylaxis in ICU
##   Hemoglobin<70                                  62
##   Hemoglobin>=70                                129
##   Total                                         191
##                 Result
## Type             No Pharmacological Prophylaxis in ICU Total
##   Hemoglobin<70                                   395   457
##   Hemoglobin>=70                                  273   402
##   Total                                           668   859
##
## $measure
##                 odds ratio with 95% C.I.
## Type              estimate     lower    upper
##   Hemoglobin<70  1.0000000        NA       NA
##   Hemoglobin>=70 0.3329927 0.2357846 0.466157
##
## $p.value
##                 two-sided
## Type               midp.exact fisher.exact   chi.square
##   Hemoglobin<70            NA           NA           NA
##   Hemoglobin>=70 6.735457e-11 8.788047e-11 7.301502e-11
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low Hemoglobin vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(low_hb == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(low_hb == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(low_hb == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(low_hb == 0 & dvt.icu.proph != 0)

type = c('Hemoglobin<70', 'Hemoglobin>=70')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                 Result
## Type             No Prophylaxis in ICU Some Prophylaxis in ICU Total
```

```
##   Hemoglobin<70                    101                    356   457
##   Hemoglobin>=70                    76                    326   402
##   Total                            177                    682   859
##
## $measure
##                 odds ratio with 95% C.I.
## Type             estimate    lower    upper
##   Hemoglobin<70  1.000000       NA       NA
##   Hemoglobin>=70 1.216172 0.872011 1.701729
##
## $p.value
##                 two-sided
## Type             midp.exact fisher.exact chi.square
##   Hemoglobin<70          NA           NA         NA
##   Hemoglobin>=70  0.2494786     0.272003  0.2479785
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

High White Blood Cells vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(high_wbc == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(high_wbc == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(high_wbc == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(high_wbc == 0 & dvt.icu.proph != 4)

type = c('White Blood Cells>30', 'White Blood Cells<=30')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     SCDs in ICU No SCDs in ICU Total
##   White Blood Cells>30           54             78   132
##   White Blood Cells<=30         312            415   727
##   Total                         366            493   859
##
## $measure
##                         odds ratio with 95% C.I.
## Type                      estimate     lower    upper
```

```
##   White Blood Cells>30  1.0000000        NA       NA
##   White Blood Cells<=30 0.9216639 0.6294975 1.341192
##
## $p.value
##                         two-sided
## Type                     midp.exact fisher.exact chi.square
##   White Blood Cells>30          NA           NA         NA
##   White Blood Cells<=30  0.6714111    0.7025707  0.6679395
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

High White Blood Cells vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(high_wbc == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(high_wbc == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(high_wbc == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(high_wbc == 0 & icuproph == 0)


type = c('White Blood Cells>30', 'White Blood Cells<=30')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     Pharmacological Prophylaxis in ICU
##   White Blood Cells>30                                  31
##   White Blood Cells<=30                                161
##   Total                                                192
##                         Result
## Type                     No Pharmacological Prophylaxis in ICU Total
##   White Blood Cells>30                                    101   132
##   White Blood Cells<=30                                   566   727
##   Total                                                   667   859
##
## $measure
##                         odds ratio with 95% C.I.
## Type                     estimate     lower   upper
```

```
##   White Blood Cells>30   1.00000        NA      NA
##   White Blood Cells<=30  1.08215 0.6878325 1.66268
##
## $p.value
##                         two-sided
## Type                     midp.exact fisher.exact chi.square
##   White Blood Cells>30          NA           NA         NA
##   White Blood Cells<=30  0.7263358    0.7340153   0.734061
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

High White Blood Cells vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(high_wbc == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(high_wbc == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(high_wbc == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(high_wbc == 0 & dvt.icu.proph != 0)

type = c('White Blood Cells>30', 'White Blood Cells<=30')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   White Blood Cells>30                    20                     112   132
##   White Blood Cells<=30                  158                     569   727
##   Total                                  178                     681   859
##
## $measure
##                         odds ratio with 95% C.I.
## Type                      estimate     lower    upper
##   White Blood Cells>30  1.0000000        NA       NA
##   White Blood Cells<=30 0.6471753 0.3791129 1.054436
##
## $p.value
##                         two-sided
## Type                     midp.exact fisher.exact chi.square
```

```
##   White Blood Cells>30          NA           NA         NA
##   White Blood Cells<=30 0.08192169      0.10178 0.08610153
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low White Blood Cells vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count(low_wbc == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(low_wbc == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(low_wbc == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(low_wbc == 0 & dvt.icu.proph != 4)

type = c('White Blood Cells<4', 'White Blood Cells>=4')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                       Result
## Type                   SCDs in ICU No SCDs in ICU Total
##   White Blood Cells<4          225            226   451
##   White Blood Cells>=4         142            269   411
##   Total                        367            495   862
##
## $measure
##                       odds ratio with 95% C.I.
## Type                   estimate    lower    upper
##   White Blood Cells<4  1.000000       NA       NA
##   White Blood Cells>=4 1.884012 1.432754 2.483299
##
## $p.value
##                       two-sided
## Type                     midp.exact fisher.exact  chi.square
##   White Blood Cells<4            NA           NA          NA
##   White Blood Cells>=4 5.334824e-06 5.356428e-06 5.38597e-06
##
## $correction
## [1] FALSE
##
## attr(,"method")
```

```
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low White Blood Cells vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(low_wbc == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(low_wbc == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(low_wbc == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(low_wbc == 0 & icuproph == 0)


type = c('White Blood Cells<4', 'White Blood Cells>=4')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                       Result
## Type                   Pharmacological Prophylaxis in ICU
##   White Blood Cells<4                                  58
##   White Blood Cells>=4                                134
##   Total                                               192
##                       Result
## Type                   No Pharmacological Prophylaxis in ICU Total
##   White Blood Cells<4                                   393   451
##   White Blood Cells>=4                                  277   411
##   Total                                                 670   862
##
## $measure
##                       odds ratio with 95% C.I.
## Type                    estimate     lower     upper
##   White Blood Cells<4  1.0000000        NA        NA
##   White Blood Cells>=4 0.3059125 0.2154609 0.4298415
##
## $p.value
##                       two-sided
## Type                     midp.exact fisher.exact   chi.square
##   White Blood Cells<4            NA           NA           NA
##   White Blood Cells>=4 2.690514e-12 3.171031e-12 3.449164e-12
##
## $correction
## [1] FALSE
##
## attr(,"method")
```

```
## [1] "median-unbiased estimate & mid-p exact CI"
```

Low White Blood Cells vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(low_wbc == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(low_wbc == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(low_wbc == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(low_wbc == 0 & dvt.icu.proph != 0)

type = c('White Blood Cells<4', 'White Blood Cells>=4')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                       Result
## Type                   No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   White Blood Cells<4                    100                     351   451
##   White Blood Cells>=4                    79                     332   411
##   Total                                  179                     683   862
##
## $measure
##                       odds ratio with 95% C.I.
## Type                   estimate   lower    upper
##   White Blood Cells<4  1.000000      NA       NA
##   White Blood Cells>=4 1.196652 0.85984 1.669922
##
## $p.value
##                       two-sided
## Type                   midp.exact fisher.exact chi.square
##   White Blood Cells<4          NA           NA         NA
##   White Blood Cells>=4  0.2875978    0.3132917  0.2859609
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pre-ICU Prophylaxis vs Mechanical Prophylaxis (SCDs) in ICU

```
type_and_result = df %>%
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
```

```
        & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
        & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & dvt.icu.proph != 4)

type = c('Pre-ICU Prophylaxis', 'No Pre-ICU Prophylaxis')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                          Result
## Type                      SCDs in ICU No SCDs in ICU Total
##   Pre-ICU Prophylaxis             20             63    83
##   No Pre-ICU Prophylaxis         347            432   779
##   Total                          367            495   862
##
## $measure
##                          odds ratio with 95% C.I.
## Type                       estimate     lower     upper
##   Pre-ICU Prophylaxis    1.0000000        NA        NA
##   No Pre-ICU Prophylaxis 0.3976722 0.2299418 0.6598456
##
## $p.value
##                          two-sided
## Type                        midp.exact fisher.exact   chi.square
##   Pre-ICU Prophylaxis               NA           NA           NA
##   No Pre-ICU Prophylaxis 0.0002582632 0.0002751934 0.0003415239
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pre-ICU Prophylaxis vs Pharmacological Prophylaxis

```
type_and_result = df %>%
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
        & icuproph == 1)
type_and_no_result = df %>%
```

```
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
        & icuproph == 0)
no_type_and_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & icuproph == 1)
no_type_and_no_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & icuproph == 0)

type = c('Pre-ICU Prophylaxis', 'No Pre-ICU Prophylaxis')
result = c('Pharmacological Prophylaxis in ICU',
           'No Pharmacological Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     Pharmacological Prophylaxis in ICU
##   Pre-ICU Prophylaxis                                    46
##   No Pre-ICU Prophylaxis                                146
##   Total                                                 192
##                         Result
## Type                     No Pharmacological Prophylaxis in ICU Total
##   Pre-ICU Prophylaxis                                      37    83
##   No Pre-ICU Prophylaxis                                  633   779
##   Total                                                   670   862
##
## $measure
##                         odds ratio with 95% C.I.
## Type                     estimate  lower    upper
##   Pre-ICU Prophylaxis    1.000000     NA       NA
##   No Pre-ICU Prophylaxis 5.371371 3.3636 8.637165
##
## $p.value
##                         two-sided
## Type                       midp.exact fisher.exact   chi.square
##   Pre-ICU Prophylaxis              NA           NA           NA
##   No Pre-ICU Prophylaxis 4.019451e-12 3.408835e-12 2.261213e-14
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pre-ICU Prophylaxis vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
        & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count((dvt_proph_preicu == 1 | dvt_proph_preicu == 2 | dvt_proph_preicu == 4)
        & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count((dvt_proph_preicu != 1 & dvt_proph_preicu != 2 & dvt_proph_preicu != 4)
        & dvt.icu.proph != 0)

type = c('Pre-ICU Prophylaxis', 'No Pre-ICU Prophylaxis')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                          Result
## Type                      No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   Pre-ICU Prophylaxis                       12                     71    83
##   No Pre-ICU Prophylaxis                   167                    612   779
##   Total                                    179                    683   862
##
## $measure
##                          odds ratio with 95% C.I.
## Type                      estimate     lower    upper
##   Pre-ICU Prophylaxis    1.000000        NA       NA
##   No Pre-ICU Prophylaxis 0.626181 0.3153085 1.142499
##
## $p.value
##                          two-sided
## Type                      midp.exact fisher.exact chi.square
##   Pre-ICU Prophylaxis            NA           NA         NA
##   No Pre-ICU Prophylaxis  0.1318973     0.155371  0.1361448
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Age > 61 (median age) vs Mechanical Prophylaxis (SCDs) in ICU

```
age_series = df$age

for (row in 1:length(age_series)) {
  if (age_series[row] < 61) {
    age_series[row] = 0
  }
  else {
    age_series[row] = 1
  }
}

df$above_61 = c(age_series)
```

```
type_and_result = df %>%
  count(above_61 == 1 & dvt.icu.proph == 4)
type_and_no_result = df %>%
  count(above_61 == 1 & dvt.icu.proph != 4)
no_type_and_result = df %>%
  count(above_61 == 0 & dvt.icu.proph == 4)
no_type_and_no_result = df %>%
  count(above_61 == 0 & dvt.icu.proph != 4)

type = c('Above 61 years old', 'Not above 61 years old')
result = c('SCDs in ICU', 'No SCDs in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                          Result
## Type                      SCDs in ICU No SCDs in ICU Total
##   Above 61 years old              186            256   442
##   Not above 61 years old          181            239   420
##   Total                           367            495   862
##
## $measure
##                          odds ratio with 95% C.I.
## Type                       estimate     lower   upper
##   Above 61 years old     1.0000000        NA      NA
##   Not above 61 years old 0.9594374 0.7320659 1.25737
##
## $p.value
##                          two-sided
## Type                      midp.exact fisher.exact chi.square
##   Above 61 years old              NA           NA         NA
##   Not above 61 years old  0.7640073    0.7830556  0.7635015
##
```

```
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Age > 61 (median age) vs Pharmacological Prophylaxis in ICU

```
type_and_result = df %>%
  count(above_61 == 1 & icuproph == 1)
type_and_no_result = df %>%
  count(above_61 == 1 & icuproph == 0)
no_type_and_result = df %>%
  count(above_61 == 0 & icuproph == 1)
no_type_and_no_result = df %>%
  count(above_61 == 0 & icuproph == 0)


type = c('Above 61 years old', 'Not above 61 years old')
result = c('Prophylaxis in ICU', 'No Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     Prophylaxis in ICU No Prophylaxis in ICU Total
##   Above 61 years old                    106                   336   442
##   Not above 61 years old                 86                   334   420
##   Total                                 192                   670   862
##
## $measure
##                         odds ratio with 95% C.I.
## Type                     estimate     lower    upper
##   Above 61 years old     1.000000        NA       NA
##   Not above 61 years old 1.224589 0.8875285 1.693413
##
## $p.value
##                         two-sided
## Type                     midp.exact fisher.exact chi.square
##   Above 61 years old             NA           NA         NA
##   Not above 61 years old  0.2176912    0.2205502  0.2162905
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Age > 61 (median age) vs No Prophylaxis in ICU

```
type_and_result = df %>%
  count(above_61 == 1 & dvt.icu.proph == 0)
type_and_no_result = df %>%
  count(above_61 == 1 & dvt.icu.proph != 0)
no_type_and_result = df %>%
  count(above_61 == 0 & dvt.icu.proph == 0)
no_type_and_no_result = df %>%
  count(above_61 == 0 & dvt.icu.proph != 0)

type = c('Above 61 years old', 'Not above 61 years old')
result = c('No Prophylaxis in ICU',
           'Some Prophylaxis in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                         Result
## Type                     No Prophylaxis in ICU Some Prophylaxis in ICU Total
##   Above 61 years old                        81                     361   442
##   Not above 61 years old                    98                     322   420
##   Total                                    179                     683   862
##
## $measure
##                         odds ratio with 95% C.I.
## Type                     estimate     lower    upper
##   Above 61 years old     1.000000        NA       NA
##   Not above 61 years old 0.737727 0.5290508 1.026343
##
## $p.value
##                         two-sided
## Type                     midp.exact fisher.exact chi.square
##   Above 61 years old             NA           NA         NA
##   Not above 61 years old 0.07098506   0.07775547 0.07003849
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Section 1a) Findings

```
# Creating a table to summarize results
relationship = c('Biologically Male vs SCDs',
                 'Biologically Male vs Pharmacological',
                 'Biologically Male vs No Proph',
```

```
                'Biologically Female vs SCDs',
                'Biologically Female vs Pharmacological',
                'Biologically Female vs No Proph',
                'Plt<=20 vs SCDs',
                'Plt<=20 vs Pharmacological',
                'Plt<=20 vs No Proph',
                '20<Plt<50 vs SCDs',
                '20<Plt<50 vs Pharamcological',
                '20<Plt<50 vs No Proph',
                'Low HB vs SCDs',
                'Low HB vs Pharmacological',
                'Low HB vs No Proph',
                'High WBC vs SCDs',
                'High WBC vs Pharmacological',
                'High WBC vs No Proph',
                'Low WBC vs SCDs',
                'Low WBC vs Pharmacological',
                'Low WBC vs No Proph',
                'Pre-ICU proph vs SCDs',
                'Pre-ICU proph vs Pharmacological',
                'Pre-ICU proph vs No proph',
                '> 61 years old vs SCDs',
                '> 61 years old vs Pharmacological',
                '> 61 years old vs No Proph')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_1a = matrix(c('507', '0.44', '1.20 (0.91 - 1.58)', '0.20',
                    '507', '0.19', '0.67 (0.48 - 0.92)', '0.01*',
                    '507', '0.20', '0.94 (0.67 - 1.31)', '0.70',
                    '355', '0.40', '0.84 (0.63 - 1.10)', '0.20',
                    '355', '0.26', '1.50 (1.09 - 2.08)', '0.01*',
                    '355', '0.21', '1.09 (0.76 - 1.49)', '0.70',
                    '496', '0.54', '3.23 (2.42 - 4.34)', '4.44e-16*',
                    '496', '0.09', '0.15 (0.10 - 0.21)', '2.13e-27 (Chi Square)*',
                    '496', '0.23', '1.30 (0.93 - 1.83)', '0.13',
                    '199', '0.37', '0.73 (0.52 - 1.01)', '0.06',
                    '199', '0.26', '1.32 (0.91 - 1.90)', '0.14',
                    '199', '0.22', '1.07 (0.72 - 1.57)', '0.73',
                    '457', '0.49', '1.71 (1.30 - 2.25)', '1.25e-4 (Chi Square)*',
                    '457', '0.14', '0.33 (0.24 - 0.47)', '6.74e-11*',
                    '457', '0.22', '1.22 (0.87 - 1.70)', '0.25',
                    '132', '0.41', '0.92 (0.63 - 1.34)', '0.67',
                    '132', '0.23', '1.08 (0.69 - 1.66)', '0.73',
                    '132', '0.15', '0.65 (0.38 - 1.05)', '0.08',
                    '451', '0.50', '1.88 (1.43 - 2.48)', '5.33e-6*',
                    '451', '0.13', '0.31 (0.22 - 0.43)', '2.69e-12*',
                    '451', '0.22', '1.20 (0.86 - 1.67)', '0.29',
                    '83', '0.24', '0.40 (0.23 - 0.66)', '2.58e-4*',
                    '83', '0.55', '5.37 (3.36 - 8.64)', '4.02e-12*',
                    '83', '0.14', '0.63 (0.32 - 1.14)', '0.13',
                    '442', '0.42', '0.96 (0.73 - 1.26)', '0.76',
                    '442', '0.24', '1.22 (0.89 - 1.69)', '0.22',
                    '442', '0.18', '0.74 (0.53 - 1.03)', '0.07'),
                  nrow = 27, ncol = 4, byrow = TRUE)
```

```r
dimnames(table_1a) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_1a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Biologically Male vs SCDs	507	0.44	1.20 (0.91 - 1.58)	0.20
Biologically Male vs Pharmacological	507	0.19	0.67 (0.48 - 0.92)	0.01*
Biologically Male vs No Proph	507	0.20	0.94 (0.67 - 1.31)	0.70
Biologically Female vs SCDs	355	0.40	0.84 (0.63 - 1.10)	0.20
Biologically Female vs Pharmacological	355	0.26	1.50 (1.09 - 2.08)	0.01*
Biologically Female vs No Proph	355	0.21	1.09 (0.76 - 1.49)	0.70
Plt<=20 vs SCDs	496	0.54	3.23 (2.42 - 4.34)	4.44e-16*
Plt<=20 vs Pharmacological	496	0.09	0.15 (0.10 - 0.21)	2.13e-27 (Chi Square)*
Plt<=20 vs No Proph	496	0.23	1.30 (0.93 - 1.83)	0.13
20<Plt<50 vs SCDs	199	0.37	0.73 (0.52 - 1.01)	0.06
20<Plt<50 vs Pharamcological	199	0.26	1.32 (0.91 - 1.90)	0.14
20<Plt<50 vs No Proph	199	0.22	1.07 (0.72 - 1.57)	0.73
Low HB vs SCDs	457	0.49	1.71 (1.30 - 2.25)	1.25e-4 (Chi Square)*
Low HB vs Pharmacological	457	0.14	0.33 (0.24 - 0.47)	6.74e-11*
Low HB vs No Proph	457	0.22	1.22 (0.87 - 1.70)	0.25
High WBC vs SCDs	132	0.41	0.92 (0.63 - 1.34)	0.67
High WBC vs Pharmacological	132	0.23	1.08 (0.69 - 1.66)	0.73
High WBC vs No Proph	132	0.15	0.65 (0.38 - 1.05)	0.08
Low WBC vs SCDs	451	0.50	1.88 (1.43 - 2.48)	5.33e-6*
Low WBC vs Pharmacological	451	0.13	0.31 (0.22 - 0.43)	2.69e-12*
Low WBC vs No Proph	451	0.22	1.20 (0.86 - 1.67)	0.29
Pre-ICU proph vs SCDs	83	0.24	0.40 (0.23 - 0.66)	2.58e-4*
Pre-ICU proph vs Pharmacological	83	0.55	5.37 (3.36 - 8.64)	4.02e-12*
Pre-ICU proph vs No proph	83	0.14	0.63 (0.32 - 1.14)	0.13
> 61 years old vs SCDs	442	0.42	0.96 (0.73 - 1.26)	0.76
> 61 years old vs Pharmacological	442	0.24	1.22 (0.89 - 1.69)	0.22
> 61 years old vs No Proph	442	0.18	0.74 (0.53 - 1.03)	0.07

b) Analysis of effectiveness of prophylaxis

In this section, I look into the effectiveness of prophylaxis in actually preventing the development of DVT, PE, or even both.

SCDs in ICU vs DVT in ICU

```r
type_and_result = df %>%
  count(dvt.icu.proph == 4 & dvt__icu != 0)
type_and_no_result = df %>%
  count(dvt.icu.proph == 4 & dvt__icu == 0)
no_type_and_result = df %>%
  count(dvt.icu.proph != 4 & dvt__icu != 0)
no_type_and_no_result = df %>%
  count(dvt.icu.proph != 4 & dvt__icu == 0)


type = c('SCD in ICU', 'No SCD in ICU')
result = c('DVT in ICU', 'No DVT in ICU')
```

```r
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                Result
## Type            DVT in ICU No DVT in ICU Total
##   SCD in ICU            13           354   367
##   No SCD in ICU         20           475   495
##   Total                 33           829   862
##
## $measure
##                odds ratio with 95% C.I.
## Type            estimate     lower   upper
##   SCD in ICU    1.000000        NA      NA
##   No SCD in ICU 0.875984 0.4173055 1.77616
##
## $p.value
##                two-sided
## Type            midp.exact fisher.exact chi.square
##   SCD in ICU            NA           NA         NA
##   No SCD in ICU  0.7163604    0.8578564  0.7062439
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

SCDs in ICU vs PE in ICU

```r
type_and_result = df %>%
  count(dvt.icu.proph == 4 & pe_icu == 1)
type_and_no_result = df %>%
  count(dvt.icu.proph == 4 & pe_icu == 0)
no_type_and_result = df %>%
  count(dvt.icu.proph != 4 & pe_icu == 1)
no_type_and_no_result = df %>%
  count(dvt.icu.proph != 4 & pe_icu == 0)


type = c('SCD in ICU', 'No SCD in ICU')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
```

```r
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                Result
## Type            PE in ICU No PE in ICU Total
##   SCD in ICU            3          364   367
##   No SCD in ICU        12          483   495
##   Total                15          847   862
##
## $measure
##                odds ratio with 95% C.I.
## Type            estimate      lower    upper
##   SCD in ICU    1.000000         NA       NA
##   No SCD in ICU 0.344871 0.07466863 1.111591
##
## $p.value
##                two-sided
## Type            midp.exact fisher.exact chi.square
##   SCD in ICU            NA           NA         NA
##   No SCD in ICU 0.07681002    0.1117108 0.07444375
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pharmacological Prophylaxis in ICU vs DVT in ICU

```r
type_and_result = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2)
        & dvt__icu != 0)
type_and_no_result = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2)
        & dvt__icu == 0)
no_type_and_result = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2)
        & dvt__icu != 0)
no_type_and_no_result = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2)
        & dvt__icu == 0)


type = c('Pharmacological Prophlaxis in ICU', 'No Pharmacological Prophylaxis in ICU')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)
```

```r
oddsratio(odds_test)
```

```
## $data
##                                       Result
## Type                                   DVT in ICU No DVT in ICU Total
##   Pharmacological Prophlaxis in ICU            12           180   192
##   No Pharmacological Prophylaxis in ICU        21           649   670
##   Total                                        33           829   862
##
## $measure
##                                       odds ratio with 95% C.I.
## Type                                   estimate     lower   upper
##   Pharmacological Prophlaxis in ICU    1.000000        NA      NA
##   No Pharmacological Prophylaxis in ICU 2.069533 0.9641121 4.24599
##
## $p.value
##                                       two-sided
## Type                                   midp.exact fisher.exact chi.square
##   Pharmacological Prophlaxis in ICU            NA           NA         NA
##   No Pharmacological Prophylaxis in ICU  0.061429   0.05535428  0.0472979
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pharmacological Prophylaxis in ICU vs PE in ICU

```r
type_and_result = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2)
        & pe_icu == 1)
type_and_no_result = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2)
        & pe_icu == 0)
no_type_and_result = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2)
        & pe_icu == 1)
no_type_and_no_result = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2)
        & pe_icu == 0)


type = c('Pharmacological Prophlaxis in ICU', 'No Pharmacological Prophylaxis in ICU')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##                                       Result
## Type                                   PE in ICU No PE in ICU Total
##   Pharmacological Prophlaxis in ICU            6          186   192
##   No Pharmacological Prophylaxis in ICU        9          661   670
##   Total                                       15          847   862
##
## $measure
##                                       odds ratio with 95% C.I.
## Type                                   estimate     lower    upper
##   Pharmacological Prophlaxis in ICU    1.000000        NA       NA
##   No Pharmacological Prophylaxis in ICU 2.386532 0.7747293 6.813532
##
## $p.value
##                                       two-sided
## Type                                   midp.exact fisher.exact chi.square
##   Pharmacological Prophlaxis in ICU            NA           NA         NA
##   No Pharmacological Prophylaxis in ICU  0.1237376    0.1152211 0.09600559
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

No prophylaxis in ICU vs DVT in ICU

```
type_and_result = df %>%
  count(dvt.icu.proph == 0 & dvt__icu != 0)
type_and_no_result = df %>%
  count(dvt.icu.proph == 0 & dvt__icu == 0)
no_type_and_result = df %>%
  count(dvt.icu.proph != 0 & dvt__icu != 0)
no_type_and_no_result = df %>%
  count(dvt.icu.proph != 0 & dvt__icu == 0)


type = c('No prophylaxis in ICU', 'Some prophylaxis in ICU')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                           Result
## Type                       DVT in ICU No DVT in ICU Total
##   No prophylaxis in ICU             4           175   179
```

```
##   Some prophylaxis in ICU         29           654   683
##   Total                           33           829   862
##
## $measure
##                           odds ratio with 95% C.I.
## Type                        estimate     lower    upper
##   No prophylaxis in ICU   1.0000000        NA       NA
##   Some prophylaxis in ICU 0.5330732 0.1529107 1.384407
##
## $p.value
##                           two-sided
## Type                       midp.exact fisher.exact chi.square
##   No prophylaxis in ICU           NA           NA         NA
##   Some prophylaxis in ICU  0.2133937    0.2756695   0.211898
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

No prophylaxis in ICU vs PE in ICU

```
type_and_result = df %>%
  count(dvt.icu.proph == 0 & pe_icu == 1)
type_and_no_result = df %>%
  count(dvt.icu.proph == 0 & pe_icu == 0)
no_type_and_result = df %>%
  count(dvt.icu.proph != 0 & pe_icu == 1)
no_type_and_no_result = df %>%
  count(dvt.icu.proph != 0 & pe_icu == 0)


type = c('No prophylaxis in ICU', 'Some prophylaxis in ICU')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##                           Result
## Type                       PE in ICU No PE in ICU Total
##   No prophylaxis in ICU            6          173   179
##   Some prophylaxis in ICU          9          674   683
##   Total                           15          847   862
##
## $measure
```

```
##                           odds ratio with 95% C.I.
## Type                       estimate     lower    upper
##   No prophylaxis in ICU    1.000000        NA       NA
##   Some prophylaxis in ICU 2.615839 0.8486262 7.474632
##
## $p.value
##                           two-sided
## Type                       midp.exact fisher.exact chi.square
##   No prophylaxis in ICU           NA           NA         NA
##   Some prophylaxis in ICU 0.09075632   0.09919536  0.0639253
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Plt>=50 vs DVT in ICU

```
type_and_result = df %>%
  count((low_plt == 0 & vlow_plt == 0) & dvt__icu != 0)
type_and_no_result = df %>%
  count((low_plt == 0 & vlow_plt == 0) & dvt__icu == 0)
no_type_and_result = df %>%
  count((low_plt == 1 | vlow_plt == 1) & dvt__icu != 0)
no_type_and_no_result = df %>%
  count((low_plt == 1 | vlow_plt == 1) & dvt__icu == 0)


type = c('Plt=>50', 'Plt<50')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##          Result
## Type      DVT in ICU No DVT in ICU Total
##   Plt=>50          8           159   167
##   Plt<50          25           670   695
##   Total           33           829   862
##
## $measure
##          odds ratio with 95% C.I.
## Type      estimate     lower    upper
##   Plt=>50 1.000000        NA       NA
##   Plt<50  1.365584 0.5617916 2.974152
##
## $p.value
```

```
##          two-sided
## Type      midp.exact fisher.exact chi.square
##   Plt=>50         NA           NA         NA
##   Plt<50   0.4689896    0.4996008  0.4705179
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Plt>=50 vs PE in ICU

```
type_and_result = df %>%
  count((low_plt == 0 & vlow_plt == 0) & pe_icu == 1)
type_and_no_result = df %>%
  count((low_plt == 0 & vlow_plt == 0) & pe_icu == 0)
no_type_and_result = df %>%
  count((low_plt == 1 | vlow_plt == 1) & pe_icu == 1)
no_type_and_no_result = df %>%
  count((low_plt == 1 | vlow_plt == 1) & pe_icu == 0)


type = c('Plt=>50', 'Plt<50')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##          Result
## Type      PE in ICU No PE in ICU Total
##   Plt=>50         3          164   167
##   Plt<50         12          683   695
##   Total          15          847   862
##
## $measure
##          odds ratio with 95% C.I.
## Type      estimate     lower    upper
##   Plt=>50 1.000000        NA       NA
##   Plt<50  1.080888 0.2332172 3.501806
##
## $p.value
##          two-sided
## Type      midp.exact fisher.exact chi.square
##   Plt=>50         NA           NA         NA
##   Plt<50   0.9075308            1  0.9506186
```

```
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

20<Plt<50 vs DVT in ICU

```
type_and_result = df %>%
  count(low_plt == 1 & dvt__icu != 0)
type_and_no_result = df %>%
  count(low_plt == 1 & dvt__icu == 0)
no_type_and_result = df %>%
  count(low_plt == 0 & dvt__icu != 0)
no_type_and_no_result = df %>%
  count(low_plt == 0 & dvt__icu == 0)


type = c('20<Plt<50', 'Plt<=20 or Plt>=50')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                     Result
## Type                 DVT in ICU No DVT in ICU Total
##   20<Plt<50                   8           191   199
##   Plt<=20 or Plt>=50         25           638   663
##   Total                      33           829   862
##
## $measure
##                     odds ratio with 95% C.I.
## Type                 estimate     lower    upper
##   20<Plt<50            1.0000        NA       NA
##   Plt<=20 or Plt>=50   1.0829 0.4464183 2.352455
##
## $p.value
##                     two-sided
## Type                 midp.exact fisher.exact chi.square
##   20<Plt<50                  NA           NA         NA
##   Plt<=20 or Plt>=50  0.8498564    0.8349424  0.8722667
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

20<Plt<50 vs PE in ICU

```
type_and_result = df %>%
  count(low_plt == 1 & pe_icu == 1)
type_and_no_result = df %>%
  count(low_plt == 1 & pe_icu == 0)
no_type_and_result = df %>%
  count(low_plt == 0 & pe_icu == 1)
no_type_and_no_result = df %>%
  count(low_plt == 0 & pe_icu == 0)


type = c('20<Plt<50', 'Plt<=20 or Plt>=50')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##                      Result
## Type                  PE in ICU No PE in ICU Total
##   20<Plt<50                   5          194   199
##   Plt<=20 or Plt>=50         10          653   663
##   Total                      15          847   862
##
## $measure
##                      odds ratio with 95% C.I.
## Type                  estimate    lower    upper
##   20<Plt<50           1.000000       NA       NA
##   Plt<=20 or Plt>=50 1.707775 0.513823 4.944441
##
## $p.value
##                      two-sided
## Type                  midp.exact fisher.exact chi.square
##   20<Plt<50                   NA           NA         NA
##   Plt<=20 or Plt>=50  0.3583862    0.3560244  0.3420286
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Plt<20 vs DVT in ICU

```r
type_and_result = df %>%
  count(vlow_plt == 1 & dvt__icu != 0)
type_and_no_result = df %>%
  count(vlow_plt == 1 & dvt__icu == 0)
no_type_and_result = df %>%
  count(vlow_plt == 0 & dvt__icu != 0)
no_type_and_no_result = df %>%
  count(vlow_plt == 0 & dvt__icu == 0)


type = c('Plt<=20', 'Plt>20')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##          Result
## Type      DVT in ICU No DVT in ICU Total
##   Plt<=20         17           479   496
##   Plt>20          16           350   366
##   Total           33           829   862
##
## $measure
##          odds ratio with 95% C.I.
## Type      estimate     lower    upper
##   Plt<=20 1.000000        NA       NA
##   Plt>20  0.776117 0.3831973 1.579395
##
## $p.value
##          two-sided
## Type      midp.exact fisher.exact chi.square
##   Plt<=20         NA           NA         NA
##   Plt>20   0.4801287    0.4788124  0.4751757
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Plt<20 vs PE in ICU

```r
type_and_result = df %>%
  count(vlow_plt == 1 & pe_icu == 1)
type_and_no_result = df %>%
  count(vlow_plt == 1 & pe_icu == 0)
no_type_and_result = df %>%
```

```
  count(vlow_plt == 0 & pe_icu == 1)
no_type_and_no_result = df %>%
  count(vlow_plt == 0 & pe_icu == 0)


type = c('Plt<=20', 'Plt>20')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##          Result
## Type      PE in ICU No PE in ICU Total
##   Plt<=20         7          489   496
##   Plt>20          8          358   366
##   Total          15          847   862
##
## $measure
##          odds ratio with 95% C.I.
## Type       estimate     lower    upper
##   Plt<=20 1.0000000        NA       NA
##   Plt>20  0.6427168 0.2193449 1.837586
##
## $p.value
##          two-sided
## Type      midp.exact fisher.exact chi.square
##   Plt<=20         NA           NA         NA
##   Plt>20   0.4045892    0.4360985  0.3900381
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Section 1b) Findings

```
# Creating a table to summarize results
relationship = c('SCDs vs DVT', 'SCDs vs PE', 'Pharma Proph vs DVT', 'Pharma Proph vs PE',
                 'No prophylaxis vs DVT', 'No prophylaxis vs PE', 'Plt>=50 vs DVT',
                 'Plt>=50 vs PE', '20<Plt<50 vs DVT', '20<Plt<50 vs PE',
                 'Plt<=20 vs DVT', 'Plt<=20 vs PE')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_1b = matrix(c('367', '0.04', '0.88 (0.42 - 1.78)', '0.72',
                    '367', '0.01', '0.34 (0.07 - 1.11)', '0.08',
                    '192', '0.06', '2.07 (0.96 - 4.23)', '0.06',
                    '192', '0.03', '2.39 (0.77 - 6.81)', '0.12',
                    '179', '0.02', '0.53 (0.15 - 1.38)', '0.21',
```

```
                    '179', '0.03', '2.62 (0.85 - 7.47)', '0.09',
                    '167', '0.05', '1.36 (0.56 - 2.97)', '0.47',
                    '167', '0.02', '1.08 (0.23 - 3.50)', '0.91',
                    '199', '0.04', '1.08 (0.45 - 2.35)', '0.85',
                    '199', '0.03', '1.71 (0.51 - 4.94)', '0.36',
                    '496', '0.03', '0.78 (0.38 - 1.58)', '0.48',
                    '496', '0.01', '0.64 (0.22 - 1.84)', '0.40'),
                  nrow = 12, ncol = 4, byrow = TRUE)
dimnames(table_1b) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_1b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
SCDs vs DVT	367	0.04	0.88 (0.42 - 1.78)	0.72
SCDs vs PE	367	0.01	0.34 (0.07 - 1.11)	0.08
Pharma Proph vs DVT	192	0.06	2.07 (0.96 - 4.23)	0.06
Pharma Proph vs PE	192	0.03	2.39 (0.77 - 6.81)	0.12
No prophylaxis vs DVT	179	0.02	0.53 (0.15 - 1.38)	0.21
No prophylaxis vs PE	179	0.03	2.62 (0.85 - 7.47)	0.09
Plt>=50 vs DVT	167	0.05	1.36 (0.56 - 2.97)	0.47
Plt>=50 vs PE	167	0.02	1.08 (0.23 - 3.50)	0.91
20<Plt<50 vs DVT	199	0.04	1.08 (0.45 - 2.35)	0.85
20<Plt<50 vs PE	199	0.03	1.71 (0.51 - 4.94)	0.36
Plt<=20 vs DVT	496	0.03	0.78 (0.38 - 1.58)	0.48
Plt<=20 vs PE	496	0.01	0.64 (0.22 - 1.84)	0.40

2) Incidence rate for Catheter vs Non-Catheter related VTEs

a) Catheter and VTE

In this section, I checked out the relationship between patients with catheters and the development of VTE.

Catheter in ICU vs DVT in ICU

```
type_and_result = df %>%
  count(cvc_icu != 0 & dvt__icu != 0)
type_and_no_result = df %>%
  count(cvc_icu != 0 & dvt__icu == 0)
no_type_and_result = df %>%
  count(cvc_icu == 0 & dvt__icu != 0)
no_type_and_no_result = df %>%
  count(cvc_icu == 0 & dvt__icu == 0)


type = c('Catheter in ICU', 'No Catheter in ICU')
result = c('DVT in ICU', 'No DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)
```

```
oddsratio(odds_test)
```

```
## $data
##                      Result
## Type                  DVT in ICU No DVT in ICU Total
##   Catheter in ICU             12           239   251
##   No Catheter in ICU          21           590   611
##   Total                       33           829   862
##
## $measure
##                      odds ratio with 95% C.I.
## Type                  estimate     lower    upper
##   Catheter in ICU      1.00000        NA       NA
##   No Catheter in ICU   1.41785 0.6624622 2.898996
##
## $p.value
##                      two-sided
## Type                  midp.exact fisher.exact chi.square
##   Catheter in ICU             NA           NA         NA
##   No Catheter in ICU   0.3570168    0.3359449  0.3502007
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Those with catheters in ICU have a 42% higher chance of developing DVT compared to those without catheters. Furthermore, the incidence rate for those with catheters to develop DVT for the timeframe of this study is $\frac{12}{12+239} = 0.03$.

Let's check this with the distribution of catheter vs non-catheter related VTEs:

```
temp = df %>% count(dvt__icu)
  temp_total = colSums (temp[,c('n')], na.rm = FALSE, dims = 1)
  temp$percentage = round((temp$n)/(temp_total),3)
  print(temp)
```

```
## # A tibble: 4 x 3
##   dvt__icu     n percentage
##      <dbl> <int>      <dbl>
## 1        0   829      0.962
## 2        1    12      0.014
## 3        2    19      0.022
## 4        3     2      0.002
```

We can see here that there are actually more non-catheter related DVTs compared to catheter related DVTs. I'm not sure how to interpret this. UPDATE: We will look into the incidence rates and odds ratios of catheters vs catheter-related DVt and non-catheter related DVTs separately now to see if it can explain this discrepancy.

Catheter in ICU vs Catheter-related DVT in ICU

```
type_and_result = df %>%
  count(cvc_icu != 0 & dvt__icu == 1)
```

```r
type_and_no_result = df %>%
  count(cvc_icu != 0 & dvt__icu == 1)
no_type_and_result = df %>%
  count(cvc_icu == 0 & dvt__icu != 1)
no_type_and_no_result = df %>%
  count(cvc_icu == 0 & dvt__icu != 1)


type = c('Catheter in ICU', 'No Catheter in ICU')
result = c('Catheter-related DVT in ICU', 'Not catheter-related DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                     Result
## Type                 Catheter-related DVT in ICU
##   Catheter in ICU                              5
##   No Catheter in ICU                         604
##   Total                                      609
##                     Result
## Type                 Not catheter-related DVT in ICU Total
##   Catheter in ICU                                  5    10
##   No Catheter in ICU                             604  1208
##   Total                                          609  1218
##
## $measure
##                     odds ratio with 95% C.I.
## Type                 estimate     lower    upper
##   Catheter in ICU           1        NA       NA
##   No Catheter in ICU        1 0.2677689 3.734563
##
## $p.value
##                     two-sided
## Type                 midp.exact fisher.exact chi.square
##   Catheter in ICU            NA           NA         NA
##   No Catheter in ICU          1            1          1
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Catheter in ICU vs Non catheter-related DVT in ICU

```r
type_and_result = df %>%
  count(cvc_icu != 0 & dvt__icu == 2)
```

```r
type_and_no_result = df %>%
  count(cvc_icu != 0 & dvt__icu == 2)
no_type_and_result = df %>%
  count(cvc_icu == 0 & dvt__icu != 2)
no_type_and_no_result = df %>%
  count(cvc_icu == 0 & dvt__icu != 2)


type = c('Catheter in ICU', 'No Catheter in ICU')
result = c('Non catheter-related DVT in ICU', 'Not non catheter-related DVT in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                     Result
## Type                 Non catheter-related DVT in ICU
##   Catheter in ICU                                  7
##   No Catheter in ICU                             599
##   Total                                          606
##                     Result
## Type                 Not non catheter-related DVT in ICU Total
##   Catheter in ICU                                     7    14
##   No Catheter in ICU                                599  1198
##   Total                                             606  1212
##
## $measure
##                     odds ratio with 95% C.I.
## Type                  estimate     lower    upper
##   Catheter in ICU    1.0000000        NA       NA
##   No Catheter in ICU 0.9999999 0.3337883 2.995911
##
## $p.value
##                     two-sided
## Type                 midp.exact fisher.exact chi.square
##   Catheter in ICU            NA           NA         NA
##   No Catheter in ICU          1            1          1
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Catheter in ICU vs PE in ICU

```r
type_and_result = df %>%
  count(cvc_icu != 0 & pe_icu == 1)
```

```
type_and_no_result = df %>%
  count(cvc_icu != 0 & pe_icu == 0)
no_type_and_result = df %>%
  count(cvc_icu == 0 & pe_icu == 1)
no_type_and_no_result = df %>%
  count(cvc_icu == 0 & pe_icu == 0)


type = c('Catheter in ICU', 'No Catheter in ICU')
result = c('PE in ICU', 'No PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##                      Result
## Type                  PE in ICU No PE in ICU Total
##   Catheter in ICU             6          245   251
##   No Catheter in ICU          9          602   611
##   Total                      15          847   862
##
## $measure
##                      odds ratio with 95% C.I.
## Type                  estimate     lower    upper
##   Catheter in ICU    1.000000        NA       NA
##   No Catheter in ICU 1.651145 0.5370117 4.703849
##
## $p.value
##                      two-sided
## Type                  midp.exact fisher.exact chi.square
##   Catheter in ICU             NA           NA         NA
##   No Catheter in ICU  0.3644459     0.391599  0.3493541
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Catheter in ICU vs DVT + PE in ICU

```
type_and_result = df %>%
  count(cvc_icu != 0 & dvtpe_icu == 1)
type_and_no_result = df %>%
  count(cvc_icu != 0 & dvtpe_icu == 0)
no_type_and_result = df %>%
```

```
  count(cvc_icu == 0 & dvtpe_icu == 1)
no_type_and_no_result = df %>%
  count(cvc_icu == 0 & dvtpe_icu == 0)


type = c('Catheter in ICU', 'No Catheter in ICU')
result = c('DVT+PE in ICU', 'No DVT+PE in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                     Result
## Type                 DVT+PE in ICU No DVT+PE in ICU Total
##   Catheter in ICU               18              233   251
##   No Catheter in ICU            26              585   611
##   Total                         44              818   862
##
## $measure
##                     odds ratio with 95% C.I.
## Type                 estimate     lower    upper
##   Catheter in ICU    1.000000        NA       NA
##   No Catheter in ICU 1.741501 0.9198488 3.228297
##
## $p.value
##                     two-sided
## Type                 midp.exact fisher.exact chi.square
##   Catheter in ICU            NA           NA         NA
##   No Catheter in ICU 0.08728679   0.08850743 0.07718843
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Section 2a) Findings

```
# Creating a table to summarize results
relationship = c('Catheter vs DVT', 'Catheter vs Catheter-related DVT',
                 'Catheter vs Non catheter-related DVT', 'Catheter vs PE',
                 'Catheter vs DVT+PE')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_2a = matrix(c('251', '0.03', '1.42 (0.66 - 2.90)', '0.36',
                    '10', '0.50', '1.00 (0.27 - 3.73)', '1.00',
                    '14', '0.50', '1.00 (0.33 - 3.00)', '1.00',
                    '251', '0.02', '1.65 (0.54 - 4.70)', '0.36',
                    '251', '0.07', '1.74 (0.92 - 3.23)', '0.09'),
                  nrow = 5, ncol = 4, byrow = TRUE)
```

```
dimnames(table_2a) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_2a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Catheter vs DVT	251	0.03	1.42 (0.66 - 2.90)	0.36
Catheter vs Catheter-related DVT	10	0.50	1.00 (0.27 - 3.73)	1.00
Catheter vs Non catheter-related DVT	14	0.50	1.00 (0.33 - 3.00)	1.00
Catheter vs PE	251	0.02	1.65 (0.54 - 4.70)	0.36
Catheter vs DVT+PE	251	0.07	1.74 (0.92 - 3.23)	0.09

b) Catheter and Death

In this section, I looked into the relationship between patients with catheters and death.

Catheter related DVT in ICU vs Death in ICU

```
type_and_result = df %>%
  count(dvt__icu == 1 & icu_disposition == 1)
type_and_no_result = df %>%
  count(dvt__icu == 1 & icu_disposition != 1)
no_type_and_result = df %>%
  count(dvt__icu != 1 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(dvt__icu != 1 & icu_disposition != 1)


type = c('Catheter related DVT in ICU', 'No Catheter related DVT in ICU')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##                                Result
## Type                            Death in ICU No Death in ICU Total
##   Catheter related DVT in ICU              1              11    12
##   No Catheter related DVT in ICU         294             556   850
##   Total                                  295             567   862
##
## $measure
##                                odds ratio with 95% C.I.
## Type                             estimate       lower    upper
##   Catheter related DVT in ICU    1.0000000          NA       NA
##   No Catheter related DVT in ICU 0.1943409 0.007879759 1.015841
```

```
##
## $p.value
##                                two-sided
## Type                            midp.exact fisher.exact chi.square
##   Catheter related DVT in ICU           NA           NA         NA
##   No Catheter related DVT in ICU 0.05272025   0.06781457 0.05697036
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Non-catheter related DVT vs Death in ICU

```
type_and_result = df %>%
  count(dvt__icu == 2 & icu_disposition == 1)
type_and_no_result = df %>%
  count(dvt__icu == 2 & icu_disposition != 1)
no_type_and_result = df %>%
  count(dvt__icu != 2 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(dvt__icu != 2 & icu_disposition != 1)


type = c('Non-catheter related DVT in ICU', 'No non-catheter related DVT in ICU')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                                  Result
## Type                              Death in ICU No Death in ICU Total
##   Non-catheter related DVT in ICU            5             14    19
##   No non-catheter related DVT in ICU       290            553   843
##   Total                                    295            567   862
##
## $measure
##                                  odds ratio with 95% C.I.
## Type                               estimate     lower    upper
##   Non-catheter related DVT in ICU 1.0000000        NA       NA
##   No non-catheter related DVT in ICU 0.6949546 0.2180825 1.856809
##
## $p.value
##                                  two-sided
## Type                              midp.exact fisher.exact chi.square
##   Non-catheter related DVT in ICU         NA           NA         NA
##   No non-catheter related DVT in ICU 0.4836969    0.6262865  0.4626044
```

```
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Section 2b) Findings

```
# Creating a table to summarize results
relationship = c('Catheter related DVT vs Death', 'Non-catheter related DVT vs Death')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_2b = matrix(c('12', '0.08', '0.19 (0.01 - 1.01)', '0.05',
                    '19', '0.26', '0.69 (0.22 - 1.86)', '0.48'),
                  nrow = 2, ncol = 4, byrow = TRUE)
dimnames(table_2b) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_2b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Catheter related DVT vs Death	12	0.08	0.19 (0.01 - 1.01)	0.05
Non-catheter related DVT vs Death	19	0.26	0.69 (0.22 - 1.86)	0.48

3) Incidence rates

a) Bleeding

In this section, I looked into the relationship between those with major bleeding and death.

Major bleeding vs Death in ICU

```
type_and_result = df %>%
  count(bleed_type == 2 & icu_disposition == 1)
type_and_no_result = df %>%
  count(bleed_type == 2 & icu_disposition != 1)
no_type_and_result = df %>%
  count(bleed_type != 2 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(bleed_type != 2 & icu_disposition != 1)


type = c('Major bleeding', 'No Major bleeding')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
```

```
##                     Result
## Type                 Death in ICU No Death in ICU Total
##   Major bleeding              50              72   122
##   No Major bleeding          245             495   740
##   Total                      295             567   862
##
## $measure
##                     odds ratio with 95% C.I.
## Type                 estimate     lower upper
##   Major bleeding    1.000000        NA    NA
##   No Major bleeding 1.403628 0.9439231 2.074
##
## $p.value
##                     two-sided
## Type                 midp.exact fisher.exact chi.square
##   Major bleeding             NA           NA         NA
##   No Major bleeding 0.09339669   0.09944295 0.08936965
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

b) SCD-complications

In this section, I looked into the relationship between those with SCDs (mechnical prophylaxis) and death.

SCD in ICU vs Death in ICU

```
type_and_result = df %>%
  count(dvt.icu.proph == 4 & icu_disposition == 1)
type_and_no_result = df %>%
  count(dvt.icu.proph == 4 & icu_disposition != 1)
no_type_and_result = df %>%
  count(dvt.icu.proph != 4 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(dvt.icu.proph != 4 & icu_disposition != 1)


type = c('SCD in ICU', 'No SCD in ICU')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                 Result
## Type             Death in ICU No Death in ICU Total
```

```
##   SCD in ICU             128             239   367
##   No SCD in ICU          167             328   495
##   Total                  295             567   862
##
## $measure
##                odds ratio with 95% C.I.
## Type            estimate     lower    upper
##   SCD in ICU    1.000000        NA       NA
##   No SCD in ICU 1.051957 0.7909055 1.397715
##
## $p.value
##                two-sided
## Type            midp.exact fisher.exact chi.square
##   SCD in ICU            NA           NA         NA
##   No SCD in ICU  0.7272065    0.7715753   0.727228
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

c) VTE-complications

In this section, I looked into the relationship between VTE and death as well as patients with VTE and the development of major bleeding in those patients.

DVT in ICU vs Death in ICU

```
type_and_result = df %>%
  count(dvt__icu != 0 & icu_disposition == 1)
type_and_no_result = df %>%
  count(dvt__icu != 0 & icu_disposition != 1)
no_type_and_result = df %>%
  count(dvt__icu == 0 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(dvt__icu == 0 & icu_disposition != 1)


type = c('DVT in ICU', 'No DVT in ICU')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##                Result
## Type            Death in ICU No Death in ICU Total
##   DVT in ICU               6              27    33
```

```
##   No DVT in ICU          289             540   829
##   Total                  295             567   862
##
## $measure
##                odds ratio with 95% C.I.
## Type             estimate     lower     upper
##   DVT in ICU    1.0000000        NA        NA
##   No DVT in ICU 0.4240464 0.1547453 0.9775551
##
## $p.value
##                two-sided
## Type            midp.exact fisher.exact chi.square
##   DVT in ICU            NA           NA         NA
##   No DVT in ICU  0.0436846   0.06001014 0.04765122
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

PE in ICU vs Death in ICU

```
type_and_result = df %>%
  count(pe_icu != 0 & icu_disposition == 1)
type_and_no_result = df %>%
  count(pe_icu != 0 & icu_disposition != 1)
no_type_and_result = df %>%
  count(pe_icu == 0 & icu_disposition == 1)
no_type_and_no_result = df %>%
  count(pe_icu == 0 & icu_disposition != 1)


type = c('PE in ICU', 'No PE in ICU')
result = c('Death in ICU', 'No Death in ICU')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## $data
##               Result
## Type           Death in ICU No Death in ICU Total
##   PE in ICU               6               9    15
##   No PE in ICU          289             558   847
##   Total                 295             567   862
##
## $measure
##               odds ratio with 95% C.I.
## Type           estimate    lower    upper
```

```
##   PE in ICU    1.000000       NA       NA
##   No PE in ICU 1.297889 0.422492 3.693765
##
## $p.value
##               two-sided
## Type           midp.exact fisher.exact chi.square
##   PE in ICU            NA           NA         NA
##   No PE in ICU  0.6332297    0.5968383  0.6342482
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

VTE in ICU vs Major Bleeding

```
type_and_result = df %>%
  count(dvt__icu != 0 & bleed_type == 2)
type_and_no_result = df %>%
  count(dvt__icu != 0 & bleed_type != 2)
no_type_and_result = df %>%
  count(dvt__icu == 0 & bleed_type == 2)
no_type_and_no_result = df %>%
  count(dvt__icu == 0 & bleed_type != 2)


type = c('VTE', 'No VTE')
result = c('Major Bleeding', 'No Major Bleeding')
odds_test = matrix(c(type_and_result$n[2],
                     type_and_no_result$n[2],
                     no_type_and_result$n[2],
                     no_type_and_no_result$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=type, 'Result'=result)

oddsratio(odds_test)
```

```
## Warning in chisq.test(xx, correct = correction): Chi-squared approximation may
## be incorrect
```

```
## $data
##         Result
## Type     Major Bleeding No Major Bleeding Total
##   VTE                 5               28    33
##   No VTE            117              712   829
##   Total             122              740   862
##
## $measure
##         odds ratio with 95% C.I.
## Type     estimate     lower    upper
##   VTE    1.000000        NA       NA
##   No VTE 1.113984 0.3660907 2.725926
##
## $p.value
```

```
##         two-sided
## Type     midp.exact fisher.exact chi.square
##   VTE            NA           NA         NA
##   No VTE  0.8313313    0.8005562  0.8667558
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Section 3 Findings

```
# Creating a table to summarize results
relationship = c('Major bleeding vs Death', 'SCDs vs Death', 'DVT vs Death',
                 'PE vs Death', 'DVT vs Major bleeding')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_3 = matrix(c('122', '0.41', '1.40 (0.94 - 2.07)', '0.09',
                   '367', '0.35', '1.05 (0.79 - 1.40)', '0.73',
                   '33', '0.18', '0.42 (0.15 - 0.98)', '0.04*',
                   '15', '0.40', '1.30 (0.42 - 3.69)', '0.63',
                   '33', '0.15', '1.11 (0.37 - 2.73)', '0.83'),
                 nrow = 5, ncol = 4, byrow = TRUE)
dimnames(table_3) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_3, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Major bleeding vs Death	122	0.41	1.40 (0.94 - 2.07)	0.09
SCDs vs Death	367	0.35	1.05 (0.79 - 1.40)	0.73
DVT vs Death	33	0.18	0.42 (0.15 - 0.98)	0.04*
PE vs Death	15	0.40	1.30 (0.42 - 3.69)	0.63
DVT vs Major bleeding	33	0.15	1.11 (0.37 - 2.73)	0.83

4) Hypothesis

Hypothesis: In critically ill patients with hematologic malignancy (HM) who are thrombocytopenic, venous thromboembolism (VTE) is infrequent within the first 30 days following induction chemotherapy or hematopoietic cell transplant (HCT), rendering it possible to avoid the use of thromboprophylaxis (mechanical or pharmacological) and the associated risks (i.e. serious bleeding).

Step 1: Find the correlation between thromboprophylaxis and bleeding. This is to show that thromboprophylaxis does indeed lead to the patients developing bleeding symptoms.

Step 2: Filter the data to find the target demographic of critically ill patients with HM who are thrombocytopenic that either underwent chemo or HCT.

Step 3: Find the incidence rate of VTE of the patients from the filtered data within the first 30 days of the induction of either chemo or HCT.

Step 1

I will calculate the odd ratios of the following combinations:
- Mechanical prophylaxis (SCDs, Compression Stockings) vs Major Bleeding

- Mechanical prophylaxis (SCDs, Compression Stockings) vs Minor Bleeding
- Pharmological prophylaxis (LMWH, Unfractioned heparin, Oral anticoagulants) vs Major Bleeding
- Pharmological prophylaxis (LMWH, Unfractioned heparin, Oral anticoagulants) vs Minor Bleeding

Mechanical vs Major Bleeding

```
mech_and_major = df %>%
  count((dvt.icu.proph == 4 | dvt.icu.proph == 5) & bleed_type == 2)
no_mech_and_major = df %>%
  count((dvt.icu.proph != 4 & dvt.icu.proph != 5) & bleed_type == 2)
mech_and_no_major = df %>%
  count((dvt.icu.proph == 4 | dvt.icu.proph == 5) & bleed_type != 2)
no_mech_and_no_major = df %>%
  count((dvt.icu.proph != 4 & dvt.icu.proph != 5) & bleed_type != 2)


mechanical = c('Mechanical Proph', 'No Mechanical Proph')
major_bleeding = c('Major bleeding', 'No major bleeding')
odds_test = matrix(c(mech_and_major$n[2],
                     mech_and_no_major$n[2],
                     no_mech_and_major$n[2],
                     no_mech_and_no_major$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=mechanical, 'Result'=major_bleeding)

oddsratio(odds_test)
```

```
## $data
##                      Result
## Type                  Major bleeding No major bleeding Total
##   Mechanical Proph                57               310   367
##   No Mechanical Proph             65               430   495
##   Total                          122               740   862
##
## $measure
##                      odds ratio with 95% C.I.
## Type                  estimate     lower    upper
##   Mechanical Proph    1.000000        NA       NA
##   No Mechanical Proph 1.216446 0.8259482 1.787545
##
## $p.value
##                      two-sided
## Type                  midp.exact fisher.exact chi.square
##   Mechanical Proph            NA           NA         NA
##   No Mechanical Proph  0.3198524    0.3246469  0.3175237
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pharmacological vs Major Bleeding

```
pharm_and_major = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) & bleed_type == 2)
no_pharm_and_major = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) & bleed_type == 2)
pharm_and_no_major = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) & bleed_type != 2)
no_pharm_and_no_major = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) & bleed_type != 2)


pharmacological = c('Pharmacological Proph', 'No Pharmcological Proph')
major_bleeding = c('Major bleeding', 'No major bleeding')
odds_test = matrix(c(pharm_and_major$n[2],
                     pharm_and_no_major$n[2],
                     no_pharm_and_major$n[2],
                     no_pharm_and_no_major$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=pharmacological, 'Result'=major_bleeding)

oddsratio(odds_test)
```

```
## $data
##                          Result
## Type                      Major bleeding No major bleeding Total
##   Pharmacological Proph               10               186   196
##   No Pharmcological Proph            112               554   666
##   Total                              122               740   862
##
## $measure
##                          odds ratio with 95% C.I.
## Type                       estimate     lower     upper
##   Pharmacological Proph   1.0000000        NA        NA
##   No Pharmcological Proph 0.2699482 0.1294948 0.5024616
##
## $p.value
##                          two-sided
## Type                        midp.exact fisher.exact   chi.square
##   Pharmacological Proph             NA           NA           NA
##   No Pharmcological Proph 7.730156e-06 1.193915e-05 3.537573e-05
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Mechanical vs Minor Bleeding

```
mech_and_minor = df %>%
  count((dvt.icu.proph == 4 | dvt.icu.proph == 5) & bleed_type == 1)
no_mech_and_minor = df %>%
  count((dvt.icu.proph != 4 & dvt.icu.proph != 5) & bleed_type == 1)
```

```
mech_and_no_minor = df %>%
  count((dvt.icu.proph == 4 | dvt.icu.proph == 5) & bleed_type != 1)
no_mech_and_no_minor = df %>%
  count((dvt.icu.proph != 4 & dvt.icu.proph != 5) & bleed_type != 1)


mechanical = c('Mechanical Proph', 'No Mechanical Proph')
minor_bleeding = c('Minor bleeding', 'No minor bleeding')
odds_test = matrix(c(mech_and_minor$n[2],
                     no_mech_and_minor$n[2],
                     mech_and_no_minor$n[2],
                     no_mech_and_no_minor$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=mechanical, 'Result'=minor_bleeding)

oddsratio(odds_test)
```

```
## $data
##                      Result
## Type                  Minor bleeding No minor bleeding Total
##   Mechanical Proph                32               30    62
##   No Mechanical Proph            335              465   800
##   Total                          367              495   862
##
## $measure
##                      odds ratio with 95% C.I.
## Type                  estimate     lower    upper
##   Mechanical Proph    1.000000        NA       NA
##   No Mechanical Proph 1.479428 0.8789747 2.496442
##
## $p.value
##                      two-sided
## Type                  midp.exact fisher.exact chi.square
##   Mechanical Proph            NA           NA         NA
##   No Mechanical Proph  0.1398513    0.1439969  0.1351993
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Pharmacological vs Minor Bleeding

```
pharm_and_minor = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) & bleed_type == 1)
no_pharm_and_minor = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) & bleed_type == 1)
pharm_and_no_minor = df %>%
  count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) & bleed_type != 1)
no_pharm_and_no_minor = df %>%
  count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) & bleed_type != 1)
```

```
pharmacological = c('Pharmacological Proph', 'No Pharmcological Proph')
minor_bleeding = c('Minor bleeding', 'No minor bleeding')
odds_test = matrix(c(pharm_and_minor$n[2],
                     no_mech_and_minor$n[2],
                     mech_and_no_minor$n[2],
                     no_mech_and_no_minor$n[2]),
                   nrow=2, ncol=2, byrow=TRUE)
dimnames(odds_test) <- list('Type'=pharmacological, 'Result'=minor_bleeding)

oddsratio(odds_test)
```

```
## $data
##                          Result
## Type                      Minor bleeding No minor bleeding Total
##   Pharmacological Proph                9                30    39
##   No Pharmcological Proph            335               465   800
##   Total                              344               495   839
##
## $measure
##                          odds ratio with 95% C.I.
## Type                       estimate     lower     upper
##   Pharmacological Proph   1.0000000        NA        NA
##   No Pharmcological Proph 0.4218948 0.1851388 0.8690681
##
## $p.value
##                          two-sided
## Type                      midp.exact fisher.exact chi.square
##   Pharmacological Proph           NA           NA         NA
##   No Pharmcological Proph 0.01820552    0.0198013 0.01976819
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "median-unbiased estimate & mid-p exact CI"
```

Summary

```
# Creating a table to summarize results
relationship = c('Mechanical vs Major Bleeding', 'Pharma Proph vs Major bleeding',
                 'Mechanical vs Minor Bleeding', 'Pharma Proph vs Minor bleeding')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_4a = matrix(c('367', '0.16', '1.21 (0.83 - 1.79)', '0.32',
                    '196', '0.05', '0.27 (0.13 - 0.50)', '7.73e-06*',
                    '62', '0.52', '1.48 (0.88 - 2.50)', '0.14',
                    '39', '0.23', '0.42 (0.19 - 0.87)', '0.02*'),
                  nrow = 4, ncol = 4, byrow = TRUE)
dimnames(table_4a) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_4a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Mechanical vs Major Bleeding	367	0.16	1.21 (0.83 - 1.79)	0.32

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Pharma Proph vs Major bleeding	196	0.05	0.27 (0.13 - 0.50)	7.73e-06*
Mechanical vs Minor Bleeding	62	0.52	1.48 (0.88 - 2.50)	0.14
Pharma Proph vs Minor bleeding	39	0.23	0.42 (0.19 - 0.87)	0.02*

As we can see, if thromboprophylaxis were to be implemented, it is better to go with the pharmacological route rather that the mechanical route. This is because those who underwent pharmacological treatment display a significant decrease in developing serious bleeding while the opposite holds true for those who underwent the mechanical thromboprophylaxis route by either using SCDs or compression stocking.

Step 2

Now we want to filter data to find the desired patient demographic.
NOTE: Only run the following code on date reformatting **once** because if you run it again it'll reformat it again to 100 years prior which would make the data inaccurate.

```
# *********************************
# ******ONLY RUN ONCE!!!!**********
# *********************************

# induction_date, SCT_date, US_date, cta_date reformatting

# # Converting induction_date into date format
#  df <- df %>%
#    mutate(induction_date = openxlsx::convertToDate(induction_date))
#
# # Converting sct_date into date format
#  df <- df %>%
#    mutate(sct_date = openxlsx::convertToDate(sct_date))
#
# # Converting US_date into date format
#  df <- df %>%
#    mutate(US_date = openxlsx::convertToDate(US_date))
#
# # Converting cta_date into date format
#  df <- df %>%
#    mutate(cta_date = openxlsx::convertToDate(cta_date))
```

```
# Creating the targeted sample
target = df %>%
  filter(hem_malig != 0) %>%
  filter(vlow_plt == 1 | low_plt == 1) # both moderate and severe thrombocytopenia
  #filter(hospital_ad_dx == 4)

target
```

```
## # A tibble: 695 x 95
##    study_id first~1  Male   age hem_m~2 year_~3 dxtime dx1y     mv o2    dialy~4
##       <dbl>   <dbl> <dbl> <dbl>   <dbl> <chr>   <chr>  <chr> <dbl> <chr> <chr>
##  1        1       1     0  76.6       2 2014    0      0         1 0     0
##  2        2       1     1  33.0       2 2012    2      1         1 0     0
##  3        3       1     1  67.1       2 2007    9      1         2 2     0
##  4        4       1     0  69.1       7 2018    0      0         1 0     0
##  5        6       1     1  59.3       9 2017    0      0         1 0     1
```

```
##  6        8       1     1  64.0       2 2018    1      1         0 2     0
##  7        9       1     0  75.6       2 2021    0      0         0 3     0
##  8       10       1     0  67.4       2 2015    0      0         0 0     0
##  9       11       1     1  70.9       2 2017    1      1         1 1     0
## 10       12       1     1  67.8       7 2015    0      0         1 0     0
## # ... with 685 more rows, 84 more variables: pressors <chr>,
## #   hospital_admission_date <dttm>, icu_admission_date <dttm>,
## #   icu_discharge_date <dttm>, icu_disposition <dbl>,
## #   hospital_discharge_date <chr>, hospital_disposition <chr>, dnr_icu <dbl>,
## #   dnr_ward <chr>, pre_icu_los <dbl>, icu_los <dbl>, hospital_los <chr>,
## #   hospital_ad_dx <dbl>, icu_diag <dbl>, weight <chr>, height <chr>,
## #   bmi <chr>, covid <dbl>, cmbd_htn <dbl>, cmbd_cad <dbl>, cmbd_chf <dbl>, ...
```

Step 3

Note: The code for incidence rates found below are commented out because R could not knit this rmd file if they were to actually run. Instead, to see what the code produces, please simply run the code in RStudio without knitting it.

Missing values

```
# Checking for missing values
print(paste('induction_date missing values:',
            sum(is.na(target$induction_date))))
```

```
## [1] "induction_date missing values: 3"
```

```
print(paste('sct_date missing values:',
            sum(is.na(target$sct_date))))
```

```
## [1] "sct_date missing values: 0"
```

```
print(paste('US_date missing values:',
            sum(is.na(target$US_date))))
```

```
## [1] "US_date missing values: 0"
```

```
print(paste('cta_date missing values:',
            sum(is.na(target$cta_date))))
```

```
## [1] "cta_date missing values: 0"
```

Incidence rates for chemotherapy and SCT

```
# chemo_patients = target
# chemo_vte_in_30 = chemo_patients %>%
#   filter((US_date < induction_date + 30) | (cta_date < induction_date + 30))
# chemo_no_vte_in_30 = chemo_patients %>%
#   filter((US_date > induction_date + 30) & (cta_date > induction_date + 30))
#
# chemo_vte_result = matrix(c(nrow(chemo_vte_in_30), nrow(chemo_no_vte_in_30)),
#                           nrow = 1, ncol = 2)
# dimnames(chemo_vte_result) <- list(c('Number of observations'),
#                                    c('VTE Within 30 days', 'NO VTE Within 30 days'))
# chemo_vte_result
```

Incidence rate (for chemo) $= \frac{207}{207+46} = 0.82$ in 30 days.

```
# sct_patients = target
# sct_vte_in_30 = sct_patients %>%
#   filter((US_date < sct_date + 30) | (cta_date < sct_date + 30))
# sct_no_vte_in_30 = sct_patients %>%
#   filter((US_date > sct_date + 30) & (cta_date > sct_date + 30))
#
# sct_vte_result = matrix(c(nrow(sct_vte_in_30), nrow(sct_no_vte_in_30)),
#                           nrow = 1, ncol = 2)
# dimnames(sct_vte_result) <- list(c('Number of observations'),
#                                  c('VTE Within 30 days', 'NO VTE Within 30 days'))
# sct_vte_result
```

Incidence rate (for SCT) = $\frac{62}{62+24} = 0.72$ in 30 days.

Incidence rate (for both) = $\frac{207+62}{207+62+46+24} = 0.79$ in 30 days.

As we can see, for those who underwent chemotherapy, 81.82% of them developed VTE within 30 days of the induction chemotherapy. Similarly, for those who underwent HSCT, 72.09% of them developed VTE within 30 days of the HSCT operation.

Next, I will also be looking at the relationship between prophylaxis and VTE for these patients within the first 30 days.

SCDs vs VTE in 30 days

```
# ************************************
# ***Comment this out when knitting***
# ************************************

# type_and_result = target %>%
#   count(dvt.icu.proph == 4 &
#           ((US_date < sct_date + 30) | (cta_date < sct_date + 30) |
#              (US_date < induction_date + 30) | (cta_date < induction_date + 30)))
# type_and_no_result = target %>%
#   count(dvt.icu.proph == 4 &
#           ((US_date > sct_date + 30) & (cta_date > sct_date + 30) &
#              (US_date > induction_date + 30) & (cta_date > induction_date + 30)))
# no_type_and_result = target %>%
#   count(dvt.icu.proph != 4 &
#           ((US_date < sct_date + 30) | (cta_date < sct_date + 30) |
#              (US_date < induction_date + 30) | (cta_date < induction_date + 30)))
# no_type_and_no_result = target %>%
#   count(dvt.icu.proph != 4 &
#           ((US_date > sct_date + 30) & (cta_date > sct_date + 30) &
#              (US_date > induction_date + 30) & (cta_date > induction_date + 30)))
#
#
# type = c('SCD in ICU', 'No SCD in ICU')
# result = c('VTE in ICU within 30 days', 'No VTE in ICU within 30 days')
# odds_test = matrix(c(type_and_result$n[2],
#                      type_and_no_result$n[2],
#                      no_type_and_result$n[2],
#                      no_type_and_no_result$n[2]),
#                    nrow=2, ncol=2, byrow=TRUE)
# dimnames(odds_test) <- list('Type'=type, 'Result'=result)
```

```
#
# oddsratio(odds_test)
```

Pharmacological prophylaxis vs VTE in 30 days

```
# ***********************************
# ***Comment this out when knitting***
# ***********************************

# type_and_result = df %>%
#   count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) &
#           ((US_date < sct_date + 30) | (cta_date < sct_date + 30) |
#              (US_date < induction_date + 30) | (cta_date < induction_date + 30)))
# type_and_no_result = df %>%
#   count((dvt.icu.proph == 1 | dvt.icu.proph == 2 | dvt.icu.proph == 3) &
#           ((US_date > sct_date + 30) & (cta_date > sct_date + 30) &
#              (US_date > induction_date + 30) & (cta_date > induction_date + 30)))
# no_type_and_result = df %>%
#   count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) &
#           ((US_date < sct_date + 30) | (cta_date < sct_date + 30) |
#              (US_date < induction_date + 30) | (cta_date < induction_date + 30)))
# no_type_and_no_result = df %>%
#   count((dvt.icu.proph != 1 & dvt.icu.proph != 2 & dvt.icu.proph != 3) &
#           ((US_date > sct_date + 30) & (cta_date > sct_date + 30) &
#              (US_date > induction_date + 30) & (cta_date > induction_date + 30)))
#
#
# type = c('Pharmacological Prophlaxis in ICU', 'No Pharmacological Prophylaxis in ICU')
# result = c('VTE in ICU within 30 days', 'No VTE in ICU within 30 days')
# odds_test = matrix(c(type_and_result$n[2],
#                      type_and_no_result$n[2],
#                      no_type_and_result$n[2],
#                      no_type_and_no_result$n[2]),
#                    nrow=2, ncol=2, byrow=TRUE)
# dimnames(odds_test) <- list('Type'=type, 'Result'=result)
#
# oddsratio(odds_test)
```

```
# Creating a table to summarize results
relationship = c('SCDs vs VTE within 30 days', 'Pharma Proph vs VTE within 30 days')
metric = c('n', 'Incidence Rate', 'Odds Ratio (95% CI)', 'p-value')
table_4b = matrix(c('171', '0.92', '0.57 (0.17 - 1.58)', '0.29',
                    '65', '0.98', '4.37 (0.88 - 105.99)', '0.08'),
                  nrow = 2, ncol = 4, byrow = TRUE)
dimnames(table_4b) <- list('Relationship'=relationship, 'Metric'=metric)

knitr::kable(table_4b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
SCDs vs VTE within 30 days	171	0.92	0.57 (0.17 - 1.58)	0.29
Pharma Proph vs VTE within 30 days	65	0.98	4.37 (0.88 - 105.99)	0.08

Conclusion

Prophylaxis analysis

We found in Section 1b that:
- SCDs lower the development of DVT by 12% [0.04 incidence rate].
- SCDs lower the development of PE by 66% [0.01 incidence rate].
- LMWH (and others) increases the development of DVT by 201% [0.06 incidence rate].
- LMWH (and others) increases the development of PE by 232% [0.03 incidence rate].

But we saw in Step 1 of Section 4 that:
- SCDs increase the development of major bleeding by 21% [0.16 incidence rate]
- LMWH (and others) lower the development of major bleeding by 74% [0.05 incidence rate].

Incidence rates

For patients with HM and thrombocytopenia, here are the incidence rates for VTE for those who either received chemotherapy or stem-cell transplantation (SCT):
- 0.82 within first 30 days of chemotherapy induction
- 0.72 within first 30 days of SCT.
- 0.79 within first 30 days for either.

Note:
- These numbers do **not** account for overlaps between chemotherapy and SCT.
- I did not conduct odds ratio on chemo or SCT vs VTE because I'm unsure how to filter those that did not receive chemo or SCT

Odds ratio with respect to prophylaxis

We found in Step 3 of Section 4 that:
- SCDs lower development of VTE within 30 days of chemotherapy induction or SCT by 43% [0.92 incidence rate].
- LMWH (and others) increases development of VTE within 30 days of chemotherapy induction or SCT by 437% [0.98 incidence rate].

Tables

```
knitr::kable(table_1a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Biologically Male vs SCDs	507	0.44	1.20 (0.91 - 1.58)	0.20
Biologically Male vs Pharmacological	507	0.19	0.67 (0.48 - 0.92)	0.01*
Biologically Male vs No Proph	507	0.20	0.94 (0.67 - 1.31)	0.70
Biologically Female vs SCDs	355	0.40	0.84 (0.63 - 1.10)	0.20
Biologically Female vs Pharmacological	355	0.26	1.50 (1.09 - 2.08)	0.01*
Biologically Female vs No Proph	355	0.21	1.09 (0.76 - 1.49)	0.70
Plt<=20 vs SCDs	496	0.54	3.23 (2.42 - 4.34)	4.44e-16*
Plt<=20 vs Pharmacological	496	0.09	0.15 (0.10 - 0.21)	2.13e-27 (Chi Square)*
Plt<=20 vs No Proph	496	0.23	1.30 (0.93 - 1.83)	0.13
20<Plt<50 vs SCDs	199	0.37	0.73 (0.52 - 1.01)	0.06
20<Plt<50 vs Pharamcological	199	0.26	1.32 (0.91 - 1.90)	0.14
20<Plt<50 vs No Proph	199	0.22	1.07 (0.72 - 1.57)	0.73
Low HB vs SCDs	457	0.49	1.71 (1.30 - 2.25)	1.25e-4 (Chi Square)*
Low HB vs Pharmacological	457	0.14	0.33 (0.24 - 0.47)	6.74e-11*
Low HB vs No Proph	457	0.22	1.22 (0.87 - 1.70)	0.25

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
High WBC vs SCDs	132	0.41	0.92 (0.63 - 1.34)	0.67
High WBC vs Pharmacological	132	0.23	1.08 (0.69 - 1.66)	0.73
High WBC vs No Proph	132	0.15	0.65 (0.38 - 1.05)	0.08
Low WBC vs SCDs	451	0.50	1.88 (1.43 - 2.48)	5.33e-6*
Low WBC vs Pharmacological	451	0.13	0.31 (0.22 - 0.43)	2.69e-12*
Low WBC vs No Proph	451	0.22	1.20 (0.86 - 1.67)	0.29
Pre-ICU proph vs SCDs	83	0.24	0.40 (0.23 - 0.66)	2.58e-4*
Pre-ICU proph vs Pharmacological	83	0.55	5.37 (3.36 - 8.64)	4.02e-12*
Pre-ICU proph vs No proph	83	0.14	0.63 (0.32 - 1.14)	0.13
> 61 years old vs SCDs	442	0.42	0.96 (0.73 - 1.26)	0.76
> 61 years old vs Pharmacological	442	0.24	1.22 (0.89 - 1.69)	0.22
> 61 years old vs No Proph	442	0.18	0.74 (0.53 - 1.03)	0.07

```
knitr::kable(table_1b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
SCDs vs DVT	367	0.04	0.88 (0.42 - 1.78)	0.72
SCDs vs PE	367	0.01	0.34 (0.07 - 1.11)	0.08
Pharma Proph vs DVT	192	0.06	2.07 (0.96 - 4.23)	0.06
Pharma Proph vs PE	192	0.03	2.39 (0.77 - 6.81)	0.12
No prophylaxis vs DVT	179	0.02	0.53 (0.15 - 1.38)	0.21
No prophylaxis vs PE	179	0.03	2.62 (0.85 - 7.47)	0.09
Plt>=50 vs DVT	167	0.05	1.36 (0.56 - 2.97)	0.47
Plt>=50 vs PE	167	0.02	1.08 (0.23 - 3.50)	0.91
20<Plt<50 vs DVT	199	0.04	1.08 (0.45 - 2.35)	0.85
20<Plt<50 vs PE	199	0.03	1.71 (0.51 - 4.94)	0.36
Plt<=20 vs DVT	496	0.03	0.78 (0.38 - 1.58)	0.48
Plt<=20 vs PE	496	0.01	0.64 (0.22 - 1.84)	0.40

```
knitr::kable(table_2a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Catheter vs DVT	251	0.03	1.42 (0.66 - 2.90)	0.36
Catheter vs Catheter-related DVT	10	0.50	1.00 (0.27 - 3.73)	1.00
Catheter vs Non catheter-related DVT	14	0.50	1.00 (0.33 - 3.00)	1.00
Catheter vs PE	251	0.02	1.65 (0.54 - 4.70)	0.36
Catheter vs DVT+PE	251	0.07	1.74 (0.92 - 3.23)	0.09

```
knitr::kable(table_2b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Catheter related DVT vs Death	12	0.08	0.19 (0.01 - 1.01)	0.05
Non-catheter related DVT vs Death	19	0.26	0.69 (0.22 - 1.86)	0.48

```
knitr::kable(table_3, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Major bleeding vs Death	122	0.41	1.40 (0.94 - 2.07)	0.09
SCDs vs Death	367	0.35	1.05 (0.79 - 1.40)	0.73
DVT vs Death	33	0.18	0.42 (0.15 - 0.98)	0.04*
PE vs Death	15	0.40	1.30 (0.42 - 3.69)	0.63
DVT vs Major bleeding	33	0.15	1.11 (0.37 - 2.73)	0.83

```
knitr::kable(table_4a, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
Mechanical vs Major Bleeding	367	0.16	1.21 (0.83 - 1.79)	0.32
Pharma Proph vs Major bleeding	196	0.05	0.27 (0.13 - 0.50)	7.73e-06*
Mechanical vs Minor Bleeding	62	0.52	1.48 (0.88 - 2.50)	0.14
Pharma Proph vs Minor bleeding	39	0.23	0.42 (0.19 - 0.87)	0.02*

```
knitr::kable(table_4b, "simple")
```

	n	Incidence Rate	Odds Ratio (95% CI)	p-value
SCDs vs VTE within 30 days	171	0.92	0.57 (0.17 - 1.58)	0.29
Pharma Proph vs VTE within 30 days	65	0.98	4.37 (0.88 - 105.99)	0.08