# FrequentFlyer_analysis

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*20 April 2015*

The CSV files exported from MIMIC2.6 include: - MIMIC26_subject_id.csv (427 subjects, neonates included) - Hadmit_frequency.csv - First_hadm.csv - Second_hadm.csv - Third_hadm.csv - 4orMore_hadm.csv (You will need to change filename to something without a number) - neonate_icustayDetail.csv - Demographics.csv (From first ICU/hospital admission) - Comorbidities.csv (From first ICU/hospital admission)

The CSV files are exported without column headers from Query Builder. The SQL codes and the column headers can be found in the WORD files shared in the group DropBox folder: https://www.dropbox.com/sh/ico2ey7bepmv19m/AAC6lw7I0rHkEZPFpjyqPXX6a?dl=0

First we will read in the data, assign column headers and join the various_hadm tables:

```
setwd("~/Documents/frequent flyer")

## ICU stay detail data (excluding neonates):
col_vec <- c("INDEX", "ICUSTAY_ID", "SUBJECT_ID", "GENDER", "DOB", "DOD", "EXPIRE_FLG", "SUBJECT_ICUSTA
First_hadm <- read.csv("First_hadm.csv", header = FALSE)
Second_hadm <- read.csv("Second_hadm.csv", header = FALSE)
Third_hadm <- read.csv("Third_hadm.csv", header = FALSE)
fourPlus_hadm <- read.csv("fourPlus_hadm.csv", header = FALSE)
##I had to change the file name for 4orMore_hadm.csv to fourPlus_hadm.csv. For some reason read.csv() d

com.dat <- as.data.frame(rbind(First_hadm, Second_hadm, Third_hadm, fourPlus_hadm))
colnames(com.dat) <- col_vec

## Demographics data at first hospital admission:
Demo <- read.csv("Demographics.csv", header = FALSE)
colnames(Demo) <- c("INDEX", "SUBJECT_ID", "HADM_ID", "ADMIT_AGE", "GENDER", "DOD", "MARITAL_STATUS", "

## Comorbidities data at first hospital admission:
Comorb <- read.csv("Comorbidities.csv", header = FALSE)
colnames(Comorb) <- c("INDEX", "SUBJECT_ID", "HADM_ID", "CATEGORY", "CONGESTIVE_HEART_FAILURE", "CARDIA

## Hospital admission frequency by admission order:
freq <- read.csv("Hadmit_frequency.csv", header = FALSE)
colnames(freq) <- c("HOSPITAL_SEQ", "NUMBER_OF_PATIENTS")

##Loading all libraries:
library(gridBase, gridExtra)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
##
## The following object is masked from 'package:stats':
##
##     filter
##
## The following objects are masked from 'package:base':
```

```
##
##     intersect, setdiff, setequal, union
```

```
library(lattice)
```

```
## Warning: package 'lattice' was built under R version 3.1.3
```

```
library(survival)
```

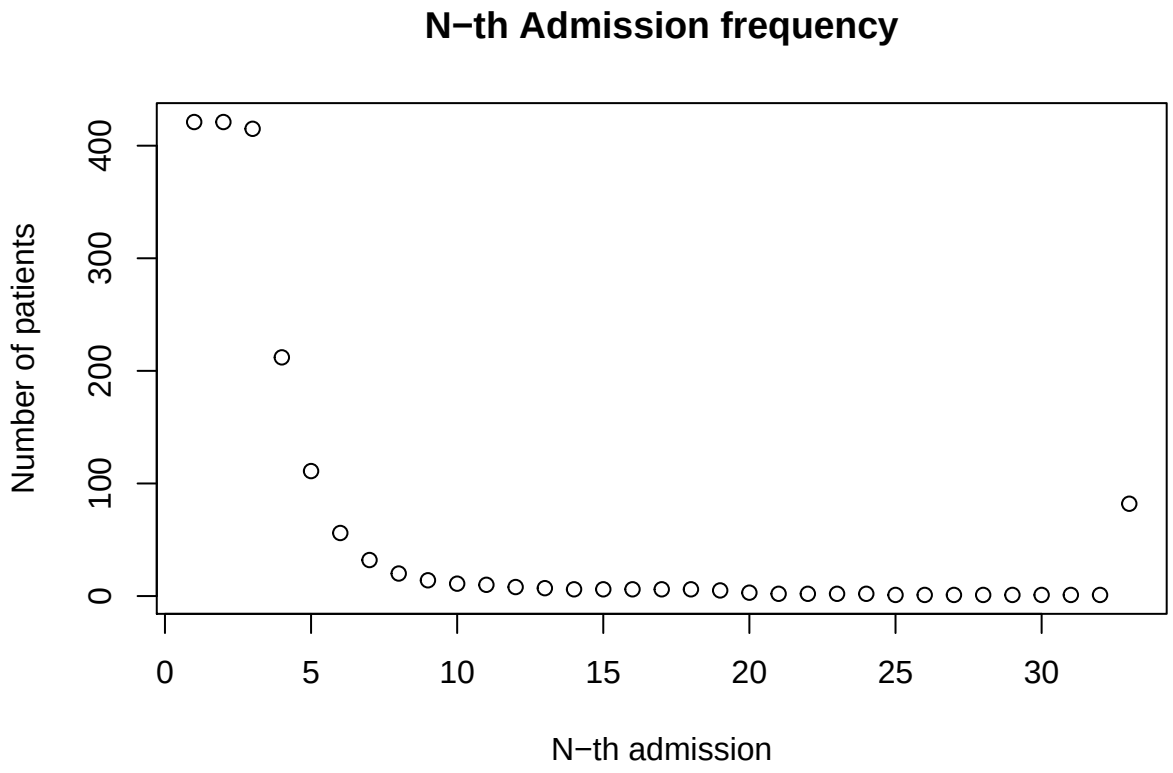
Total number of frequent flyer patients excluding neonates = 421

```
uniq_id <- unique(com.dat$SUBJECT_ID, na.rm = TRUE)
length(uniq_id)
```

```
## [1] 421
```

Hospital admission frequency by admission order:

```
plot(freq, main = "N-th Admission frequency", xlab = "N-th admission", ylab = "Number of patients")
```




First 10 rows and last 3 rows of table: The 1st, 2nd and 3rd admission should all have 421 patients by study selection criteria but the 3rd admission only has 415 patients. There are some (null) values in hospital_seq column (and in many other columns) so I think this is the most likely reason why.

```
head(freq, 10)
```

```
##    HOSPITAL_SEQ NUMBER_OF_PATIENTS
## 1             1                421
## 2             2                421
## 3             3                415
## 4             4                212
## 5             5                111
## 6             6                 56
## 7             7                 32
## 8             8                 20
## 9             9                 14
## 10           10                 11
```

```
## Unclear why there are 82 patients with 33 hospital admissions. Pulling the data for hospital_seq =33
tail(freq, 3)
```

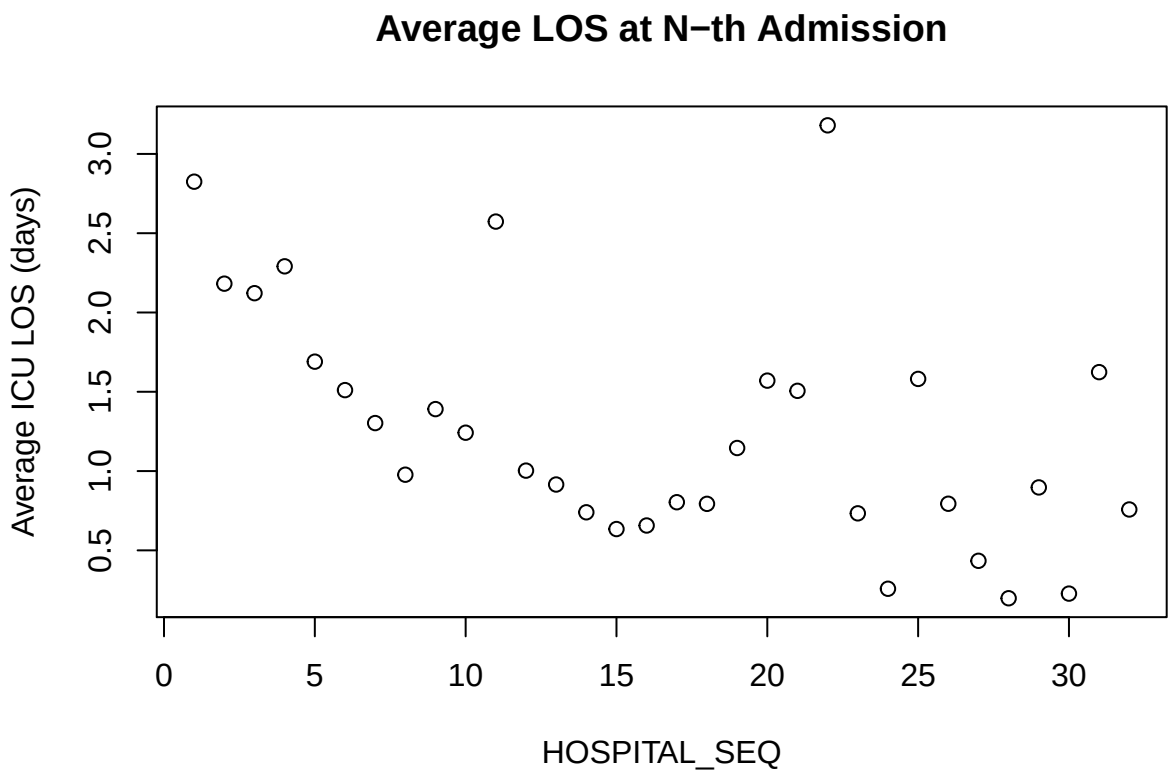
```
##    HOSPITAL_SEQ NUMBER_OF_PATIENTS
## 31           31                 1
## 32           32                 1
## 33           33                82
```

Average ICU LOS at N-th admission:

```
LOS <- aggregate(com.dat$ICUSTAY_LOS, by=list(com.dat$HOSPITAL_SEQ), FUN=mean)
LOS$mins <- 3600
colnames(LOS) <- c("HOSPITAL_SEQ", "LOS_min", "mins")
LOS$ICU_DAYS <- LOS$LOS_min/LOS$mins
head(LOS)
```

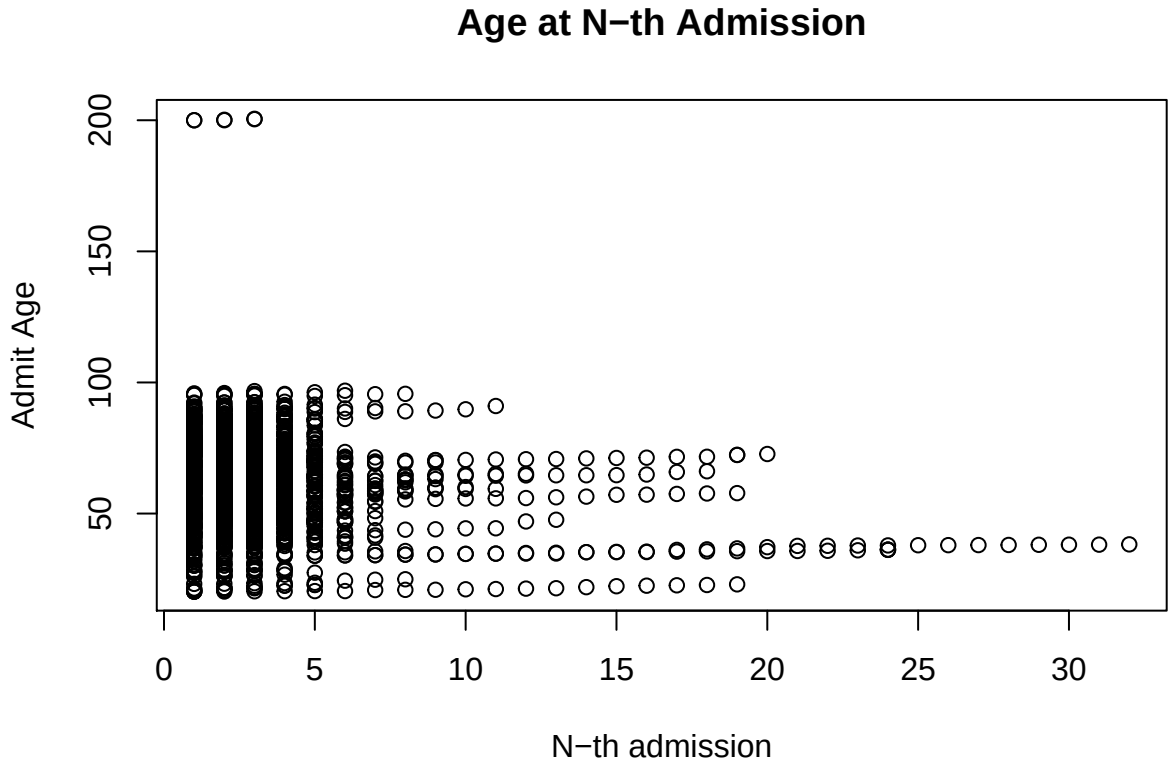
```
##   HOSPITAL_SEQ   LOS_min mins ICU_DAYS
## 1            1 10169.824 3600 2.824951
## 2            2  7854.462 3600 2.181795
## 3            3  7638.126 3600 2.121702
## 4            4  8248.087 3600 2.291135
## 5            5  6083.969 3600 1.689991
## 6            6  5437.790 3600 1.510497
```

```
plot(LOS$HOSPITAL_SEQ, LOS$ICU_DAYS, main = "Average LOS at N-th Admission", xlab = "HOSPITAL_SEQ", ylab
```




Frequent flyers by age:

```
plot(com.dat$HOSPITAL_SEQ, com.dat$ICUSTAY_ADMIT_AGE, main = "Age at N-th Admission", xlab = "N-th admi
```




There are probably better plots than this but this plot seems to show many 'ultra-frequent-flyer' middle age

ish.

Demographics summary for first admission (Joy's codes):

```
demtab <- Demo[, c("SUBJECT_ID", "ADMIT_AGE", "GENDER", "MARITAL_STATUS", "ETHNICITY", "OVERALL_PAYOR_GI

#Clean Admit_age:
for (i in 1:nrow(demtab)) {
  if (demtab$ADMIT_AGE[i] > 199.00){
    demtab$ADMIT_AGE[i] = 92
  }
}

#Clean and split gender into separate column
demtab$GENDER <- as.character(demtab$GENDER)
demtab$Male <- NULL
demtab$Female <- NULL
for (i in 1:nrow(demtab)) {
  if (demtab$GENDER[i] == "M") {
    demtab$Male[i] <- 1
  }
  if (demtab$GENDER[i] == "F") {
    demtab$Male[i] <- 0
  }
  if (demtab$GENDER[i] == "M") {
    demtab$Female[i] <- 0
  }
  if (demtab$GENDER[i] == "F") {
    demtab$Female[i] <- 1
  }
}

#Clean Marital status into Married:
demtab$MARITAL_STATUS <- as.character(demtab$MARITAL_STATUS)
demtab$Married <- NULL
for (i in 1:nrow(demtab)) {
  if (demtab$MARITAL_STATUS[i] == "MARRIED") {
    demtab$Married[i] <- 1
  }
  else {
    demtab$Married[i] <- 0
  }
}

#Clean Ethnicity into Black, White, Other:
levels(demtab$ETHNICITY)[c(6, 7, 8, 9, 10)] <- "OTHER"
levels(demtab$ETHNICITY)[c(4, 5)] <- "HISPANIC"
levels(demtab$ETHNICITY)[c(2, 3)] <- "BLACK"
demtab$ETHNICITY <- as.character(demtab$ETHNICITY)
demtab$Black <- NULL
demtab$White <- NULL
demtab$Asian <- NULL
demtab$Hispanic <- NULL
demtab$OtherEth <- NULL
```

```
for (i in 1:nrow(demtab)) {
  if (demtab$ETHNICITY[i] == "BLACK") {
    demtab$Black[i] <- 1
  }
  else {
    demtab$Black[i] <- 0
  }
  if (demtab$ETHNICITY[i] == "WHITE") {
    demtab$White[i] <- 1
  }
  else {
    demtab$White[i] <- 0
  }
  if (demtab$ETHNICITY[i] == "ASIAN") {
    demtab$Asian[i] <- 1
  }
  else {
    demtab$Asian[i] <- 0
  }
  if (demtab$ETHNICITY[i] == "HISPANIC") {
    demtab$Hispanic[i] <- 1
  }
  else {
    demtab$Hispanic[i] <- 0
  }
  if (demtab$ETHNICITY[i] == "OTHER") {
    demtab$OtherEth[i] <- 1
  }
  else {
    demtab$OtherEth[i] <- 0
  }
}

#Clean payor group:
levels(demtab$OVERALL_PAYOR_GROUP)[8] <- "OTHER"
levels(demtab$OVERALL_PAYOR_GROUP)[c(3, 4, 5)] <- "MEDICARE/MEDICAID"
levels(demtab$OVERALL_PAYOR_GROUP)[c(1, 2)] <- "OTHER"
demtab$OVERALL_PAYOR_GROUP <- as.character(demtab$OVERALL_PAYOR_GROUP)
demtab$Medicare_Medicaid <- NULL
demtab$Private <- NULL
demtab$Other_Payor <- NULL
for (i in 1:nrow(demtab)) {
  if (demtab$OVERALL_PAYOR_GROUP[i] == "MEDICARE/MEDICAID") {
    demtab$Medicare_Medicaid[i] <- 1
  }
  else {
    demtab$Medicare_Medicaid[i] <- 0
  }
  if (demtab$OVERALL_PAYOR_GROUP[i] == "PRIVATE") {
    demtab$Private[i] <- 1
  }
  else {
    demtab$Private[i] <- 0
```

```
  }
  if (demtab$OVERALL_PAYOR_GROUP[i] == "OTHER") {
    demtab$Other_Payor[i] <- 1
  }
  else {
    demtab$Other_Payor[i] <- 0
  }
}

#Clean Expire_FLG to Died:
demtab$EXPIRE_FLG <- as.character(demtab$EXPIRE_FLG)
demtab$Died <- NULL
for (i in 1:nrow(demtab)) {
  if (demtab$EXPIRE_FLG[i] == "Y") {
    demtab$Died[i] <- 1
  }
  else {
    demtab$Died[i] <- 0
  }
}

clean.demo <- demtab[, c("ADMIT_AGE", "Male", "Female", "Married", "Black", "White", "Hispanic", "Other

dem.table <- do.call(data.frame,
           list(mean = apply(clean.demo, 2, mean),
                sd = apply(clean.demo, 2, sd),
                median = apply(clean.demo, 2, median),
                min = apply(clean.demo, 2, min),
                max = apply(clean.demo, 2, max),
                n = apply(clean.demo, 2, length)))

dem.table
```

```
##                          mean         sd   median      min      max   n
## ADMIT_AGE          62.54100189 16.3609021 62.71179 20.18045 95.82946 419
## Male                0.53221957  0.4995573  1.00000  0.00000  1.00000 419
## Female              0.46778043  0.4995573  0.00000  0.00000  1.00000 419
## Married             0.47732697  0.5000828  0.00000  0.00000  1.00000 419
## Black               0.16706444  0.3734793  0.00000  0.00000  1.00000 419
## White               0.70167064  0.4580718  1.00000  0.00000  1.00000 419
## Hispanic            0.02863962  0.1669908  0.00000  0.00000  1.00000 419
## OtherEth            0.07637232  0.2659104  0.00000  0.00000  1.00000 419
## Medicare_Medicaid   0.69689737  0.4601486  1.00000  0.00000  1.00000 419
## Private             0.25775656  0.4379222  0.00000  0.00000  1.00000 419
## Other_Payor         0.04534606  0.2083107  0.00000  0.00000  1.00000 419
## Died                0.64200477  0.4799838  1.00000  0.00000  1.00000 419
```

```
#Knitr doesn't like gridtable for some reason...
#<<setup>>=
#g = tableGrob(dem.table)
#<<draw-table, dev='png', dpi=150, fig.width=convertWidth(grobWidth(g), "in", value=TRUE), fig.height=c
#grid.draw(g)
#@
```

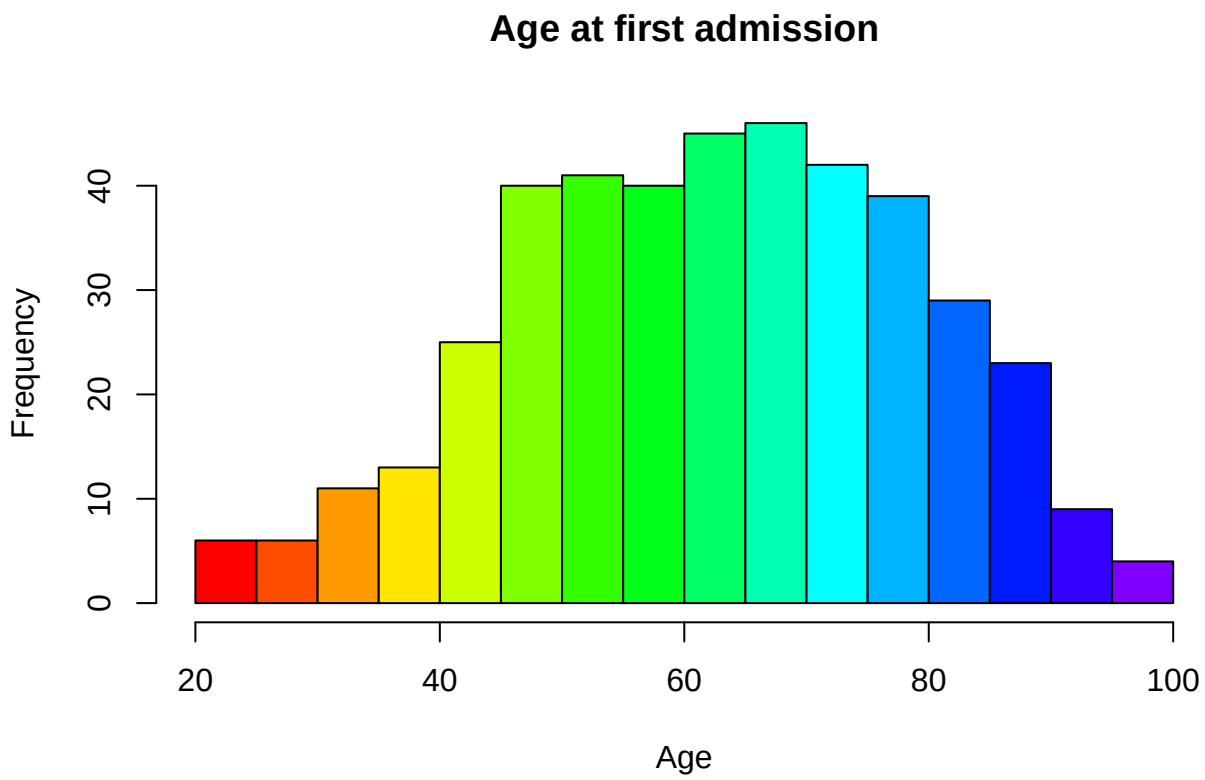
```
#pdf(file = "Dem_Table.pdf")
#grid.table(dem.table, core.just  = "center")
#dev.off()
```

Age groups at first admission:

```
age_adm1 <- Demo$ADMIT_AGE
for (i in 1:length(age_adm1)) {
  if (age_adm1[i] > 199.00){
    age_adm1[i] <- 92
  }
}
age_adm1 <- age_adm1[!is.na(age_adm1)]
summary(age_adm1)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   20.18   50.36   62.71   62.54   74.92   95.83
```

```
par(mar = c(5,4,4,1))
hist(age_adm1, main = "Age at first admission", xlab = "Age", breaks = 20, col = rainbow(20))
```




Gender proportions at first admission:

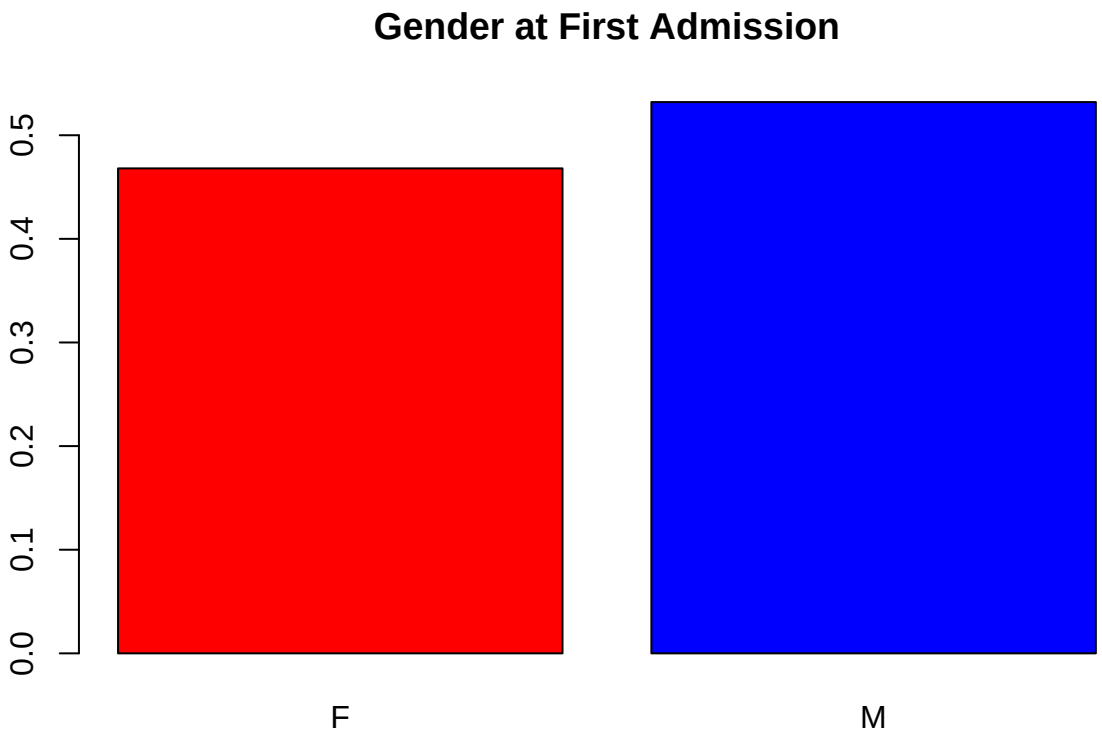
```
gender <- Demo$GENDER
gender <- factor(gender)
summary(gender)
```

```
##   F   M
## 196 223
```

```
prop.gender <- round(prop.table(table(gender)), 3)
prop.gender
```

```
## gender
##     F     M
## 0.468 0.532
```

```
par(mar = c(4,4,4,1))
barplot(prop.gender, main = "Gender at First Admission", col = c("red", "blue"))
```




Marital Status for first admission (Joy's codes):

```
MarS <- Demo$MARITAL_STATUS
MarS <- factor(MarS)
summary(MarS)
```

```
##            (null)          DIVORCED           MARRIED         SEPARATED
##                 8                31               200                10
##            SINGLE UNKNOWN (DEFAULT)           WIDOWED
##               109                 1                60
```

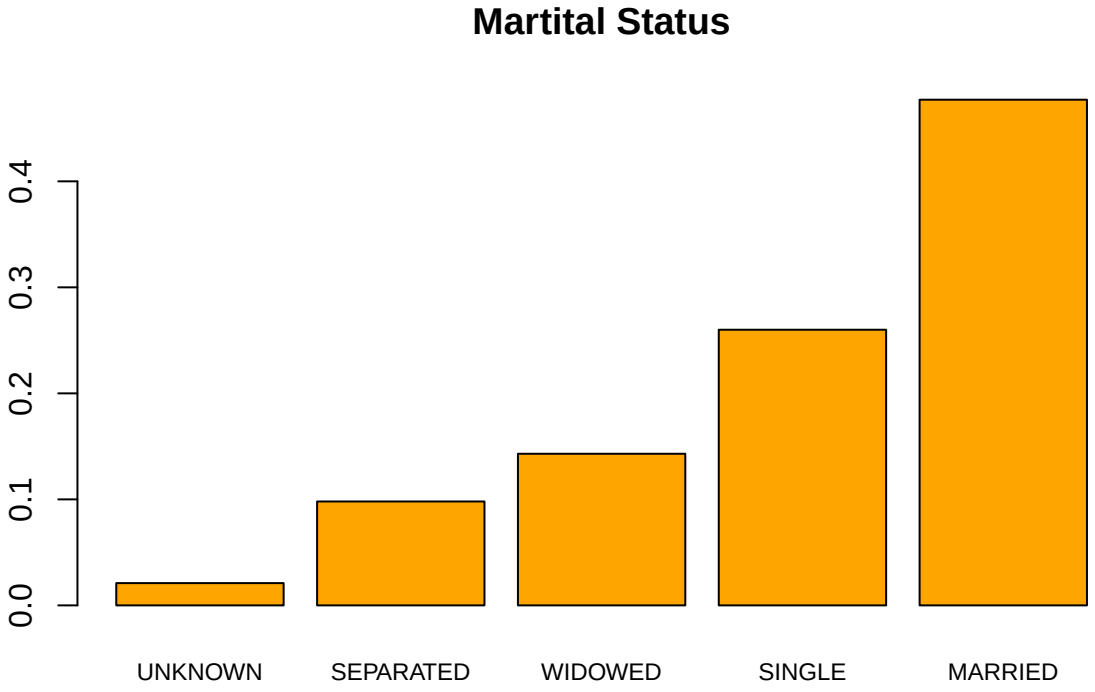
```
levels(MarS)[6] <- "UNKNOWN"
levels(MarS)[2] <- "SEPARATED"
levels(MarS)[1] <- "UNKNOWN"
summary(MarS)
```

```
##   UNKNOWN SEPARATED   MARRIED    SINGLE   WIDOWED
##         9        41       200       109        60
```

```
MarS.clean <- factor(MarS)

prop.MarS <- round(prop.table(table(MarS.clean)), 3)
prop.MarS
```

```
## MarS.clean
##   UNKNOWN SEPARATED   MARRIED    SINGLE   WIDOWED
##     0.021     0.098     0.477     0.260     0.143
```

```
par(mar = c(5, 4, 4, 1) + 0.1)
barplot(sort(prop.MarS), main = "Martital Status", col = "orange", cex.names=0.75)
```




Ethnicity breakdown for first admission (Ned's codes):

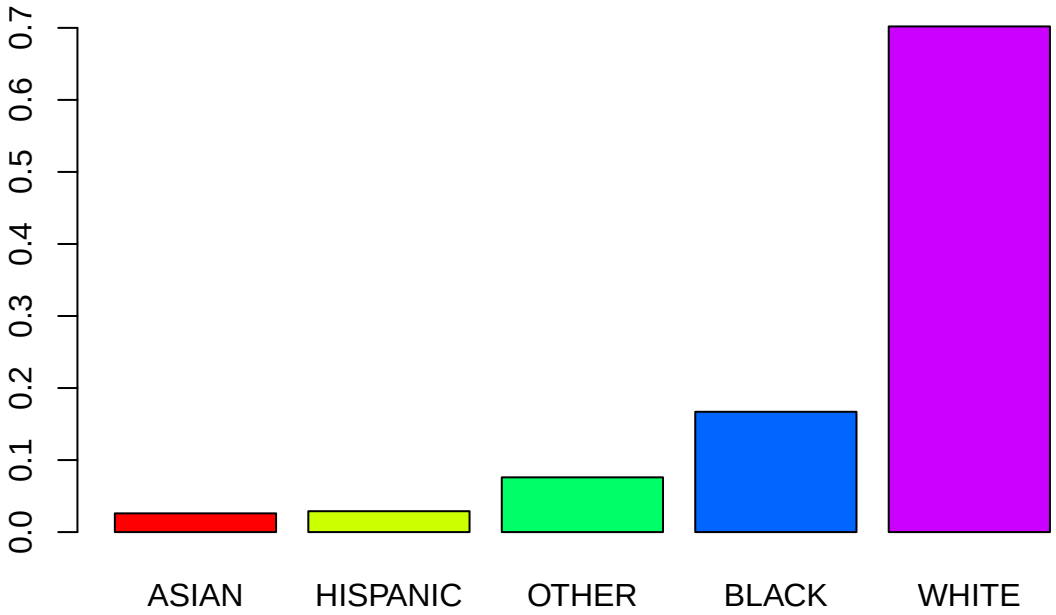
```
eth <- Demo$ETHNICITY
summary(eth)
```

```
##                         ASIAN       BLACK/AFRICAN AMERICAN
##                            11                           69
##            BLACK/CAPE VERDEAN           HISPANIC OR LATINO
##                             1                           11
## HISPANIC/LATINO - GUATEMALAN                MIDDLE EASTERN
##                             1                            1
##          MULTI RACE ETHNICITY                        OTHER
##                             1                            7
##   PATIENT DECLINED TO ANSWER         UNKNOWN/NOT SPECIFIED
##                             2                           21
##                         WHITE
##                           294
```

```
eth <- gsub("HISPANIC OR LATINO", "HISPANIC", eth)
eth <- gsub("BLACK/AFRICAN AMERICAN", "BLACK", eth)
eth <- gsub("MIDDLE EASTERN", "OTHER", eth)
eth <- as.factor(eth)

for (i in 1:length(eth)) {
  if (eth[i] == "UNKNOWN/NOT SPECIFIED"){
    eth[i] <- "OTHER"
  }
  if (eth[i] == "MULTI RACE ETHNICITY"){
    eth[i] <- "OTHER"
  }
  if (eth[i] == "PATIENT DECLINED TO ANSWER"){
    eth[i] <- "OTHER"
  }
  if (eth[i] == "HISPANIC OR LATINO"){
    eth[i] <- "HISPANIC"
  }
  if (eth[i] == "BLACK/CAPE VERDEAN"){
    eth[i] <- "BLACK"
  }
  if (eth[i] == "HISPANIC/LATINO - GUATEMALAN"){
    eth[i] <- "HISPANIC"
  }
}

eth.clean <- factor(eth)

prop_eth <- round(prop.table(table((eth.clean))), 3)
prop_eth
```

```
##
##    ASIAN    BLACK HISPANIC    OTHER    WHITE
##    0.026    0.167    0.029    0.076    0.702
```

```
barplot(sort(prop_eth), main = "Ethnicity", col = rainbow(5))
```




Payor groups on first admission (Joy's codes):

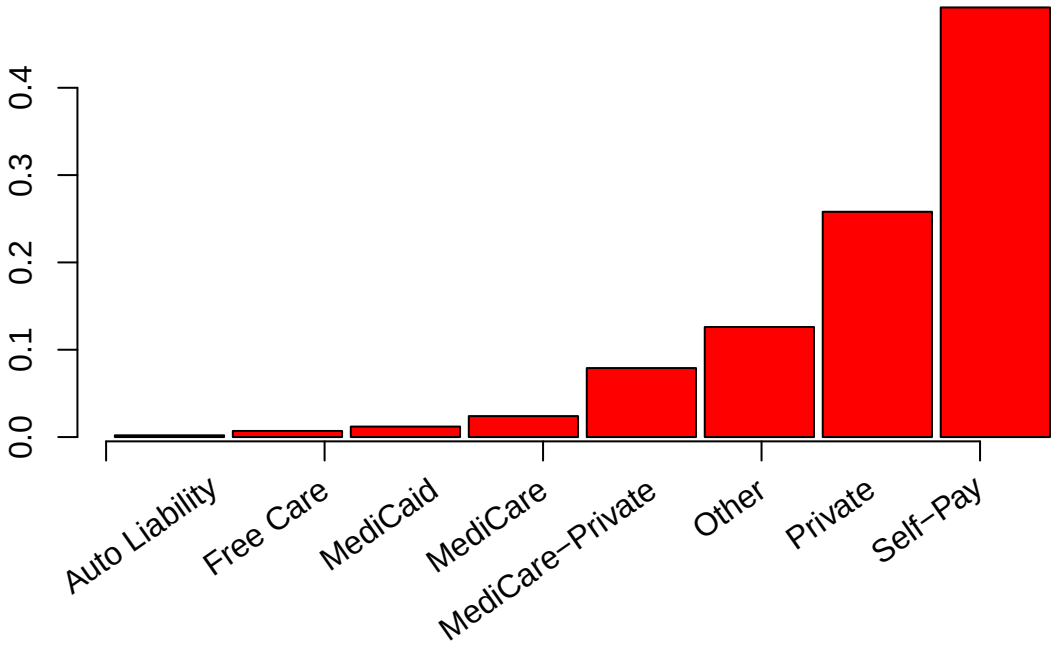
```
payor <- Demo$OVERALL_PAYOR_GROUP
summary(payor)
```

```
##   AUTO LIABILITY        FREE CARE         MEDICAID         MEDICARE
##                3               10               53              206
## MEDICARE-PRIVATE            OTHER          PRIVATE         SELF-PAY
##               33                5              108                1
```

```
payor_prop <- round(prop.table(table(payor)), 3)
payor_prop
```

```
## payor
##   AUTO LIABILITY        FREE CARE         MEDICAID         MEDICARE
##            0.007            0.024            0.126            0.492
## MEDICARE-PRIVATE            OTHER          PRIVATE         SELF-PAY
##            0.079            0.012            0.258            0.002
```

```
lablist <- as.vector(c("Auto Liability", "Free Care", "MediCaid", "MediCare", "MediCare-Private", "Othe
par(mar = c(7, 4, 4, 2) + 0.1)
barplot(sort(payor_prop), space = 0.08, main = "Overall Payor Group on 1st Hadm", xaxt = "n", beside =
axis(1, labels = FALSE)
text(1:8, par("usr")[3]- 0.05, srt = 35, adj = 1, labels = lablist, xpd = TRUE)
```




Religion at first admission (Jonathan's codes):

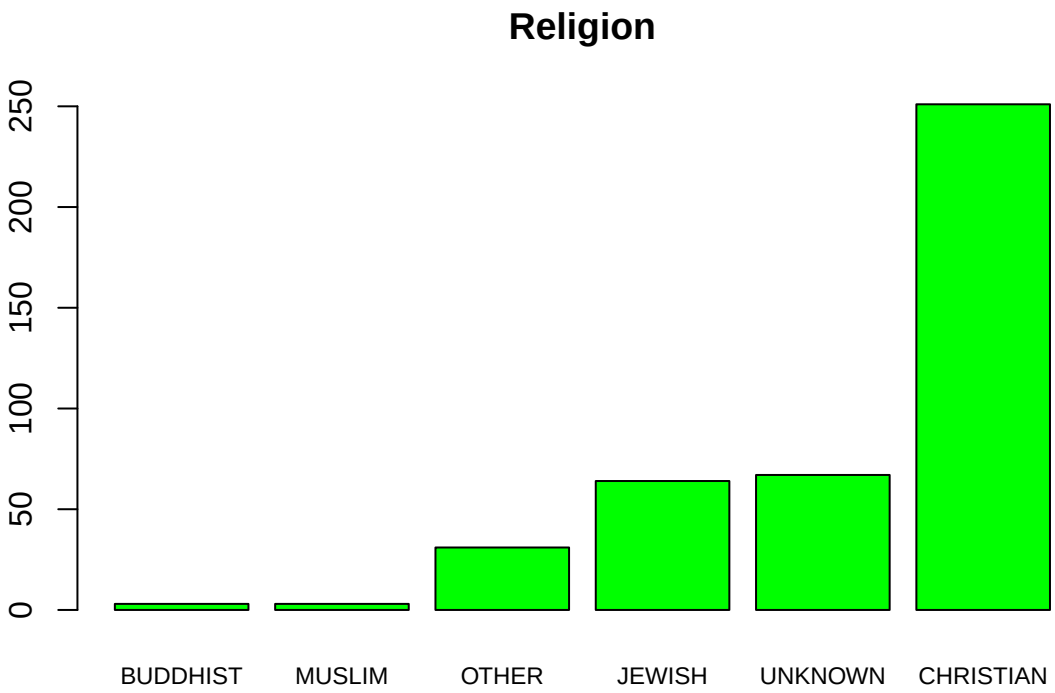
```
rel <- Demo$RELIGION
rel <- factor(rel)
summary(rel)
```

```
##                  (null)      7TH DAY ADVENTIST              BUDDHIST
##                       3                      1                     3
##               CATHOLIC    CHRISTIAN SCIENTIST          EPISCOPALIAN
##                     169                      3                     6
##         GREEK ORTHODOX      JEHOVAH'S WITNESS               JEWISH
##                       5                      3                    64
##                  MUSLIM          NOT SPECIFIED                OTHER
##                       3                     41                    30
##      PROTESTANT QUAKER UNITARIAN-UNIVERSALIST          UNOBTAINABLE
##                      64                      1                    23
```

```
levels(rel)[15] <- "UNKNOWN"
levels(rel)[14] <- "OTHER"
levels(rel)[13] <- "CHRISTIAN"
levels(rel)[12] <- "OTHER"
levels(rel)[11] <- "UNKNOWN"
levels(rel)[8] <- "CHRISTIAN"
levels(rel)[7] <- "CHRISTIAN"
levels(rel)[6] <- "CHRISTIAN"
levels(rel)[5] <- "CHRISTIAN"
levels(rel)[4] <- "CHRISTIAN"
levels(rel)[2] <- "CHRISTIAN"
levels(rel)[1] <- "UNKNOWN"
summary(rel)
```

```
##   UNKNOWN CHRISTIAN  BUDDHIST    JEWISH    MUSLIM     OTHER
##        67       251         3        64         3        31
```

```r
rel.clean <- factor(rel)

barplot(sort(table(rel.clean)), main = "Religion", col = "green", cex.names = 0.75)
```




Admission Type at first admission (Jonathan's codes):

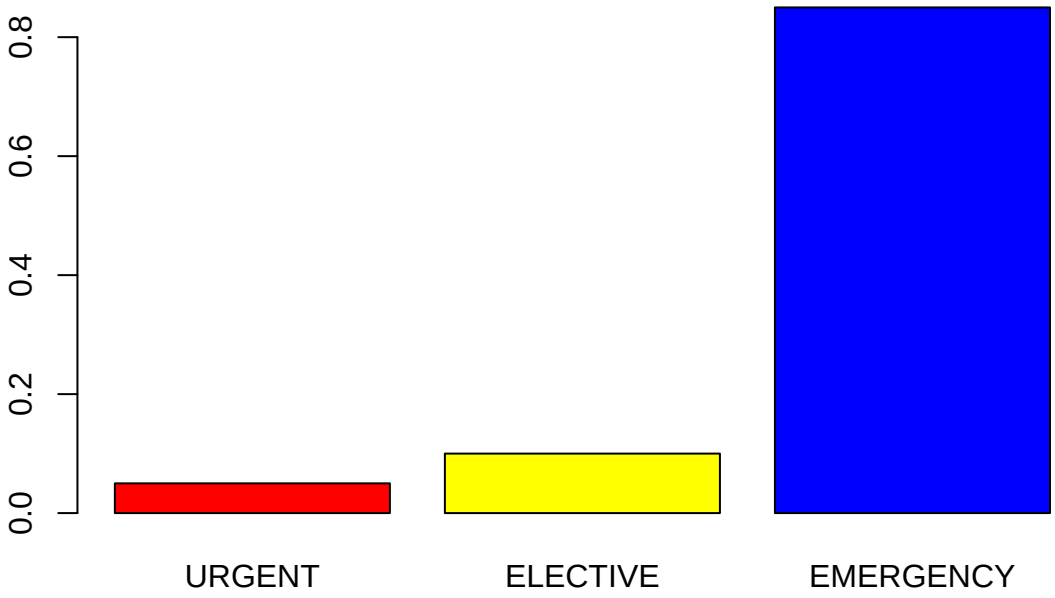
```r
adtyp <- Demo$ADMISSION_TYPE
adtyp <- factor(adtyp)

#adtyp <- adtyp[adtyp != "NEWBORN"]
#adtyp <- factor(adtyp)

summary(adtyp)
```

```
##  ELECTIVE EMERGENCY    URGENT
##        42       356        21
```

```r
prop.adtyp <- round(prop.table(table(adtyp)), 3)
prop.adtyp
```

```
## adtyp
##  ELECTIVE EMERGENCY    URGENT
##      0.10      0.85      0.05
```

```r
barplot(sort(prop.adtyp), main = "Admission Type", col = c("red", "yellow", "blue"))
```




Admission Source at first admission:

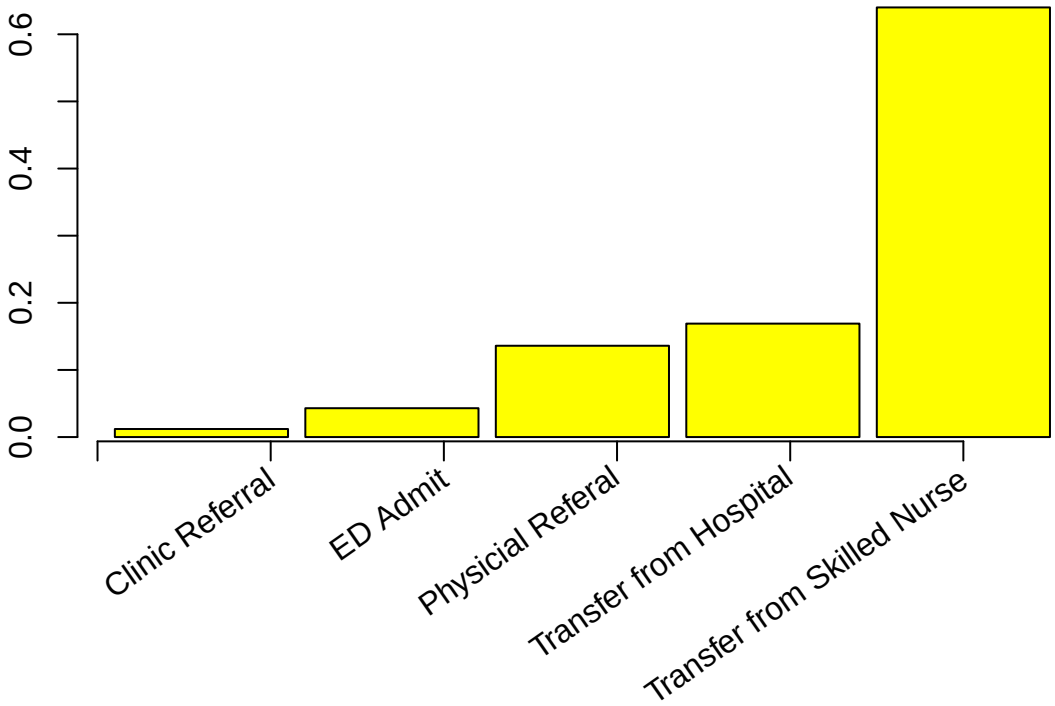
```
adsource <- Demo$ADMISSION_SOURCE
adsource <- factor(adsource)
summary(adsource)
```

```
## CLINIC REFERRAL/PREMATURE      EMERGENCY ROOM ADMIT
##                        18                       268
## PHYS REFERRAL/NORMAL DELI TRANSFER FROM HOSP/EXTRAM
##                        71                        57
## TRANSFER FROM SKILLED NUR
##                         5
```

```
prop.adsource <- round(prop.table(table(adsource)), 3)
prop.adsource
```

```
## adsource
## CLINIC REFERRAL/PREMATURE      EMERGENCY ROOM ADMIT
##                     0.043                     0.640
## PHYS REFERRAL/NORMAL DELI TRANSFER FROM HOSP/EXTRAM
##                     0.169                     0.136
## TRANSFER FROM SKILLED NUR
##                     0.012
```

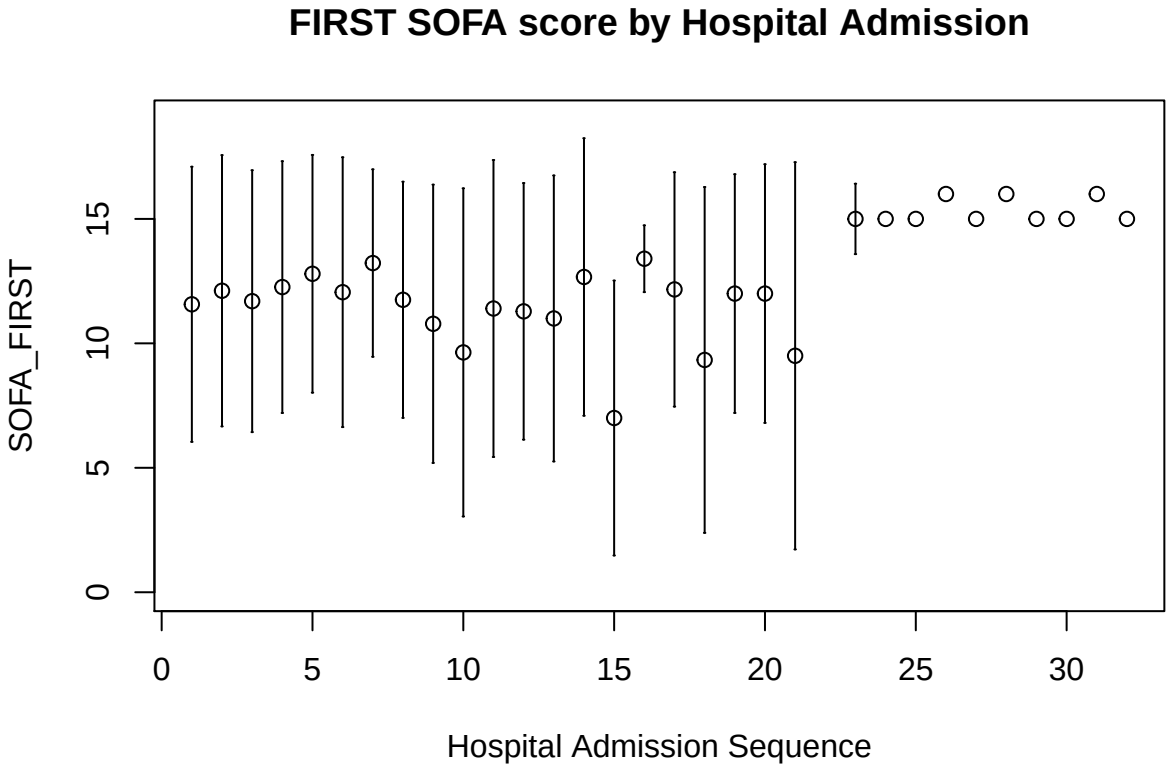
```
labs <- as.vector(c("Clinic Referral", "ED Admit", "Physicial Referal", "Transfer from Hospital", "Trans
par(mar = c(7, 4, 4, 2) + 0.1)
barplot(sort(prop.adsource), space = 0.1, main = "Admission Source", xaxt = "n", col = "yellow")
axis(1, labels = FALSE)
text(1:5, par("usr")[3]- 0.05, srt = 35, adj = 1, labels = labs, xpd = TRUE)
```




Charting, changes to severity scores, SAPS-I and SOFA, through admissions ordered by HOSPITAL_SEQ:

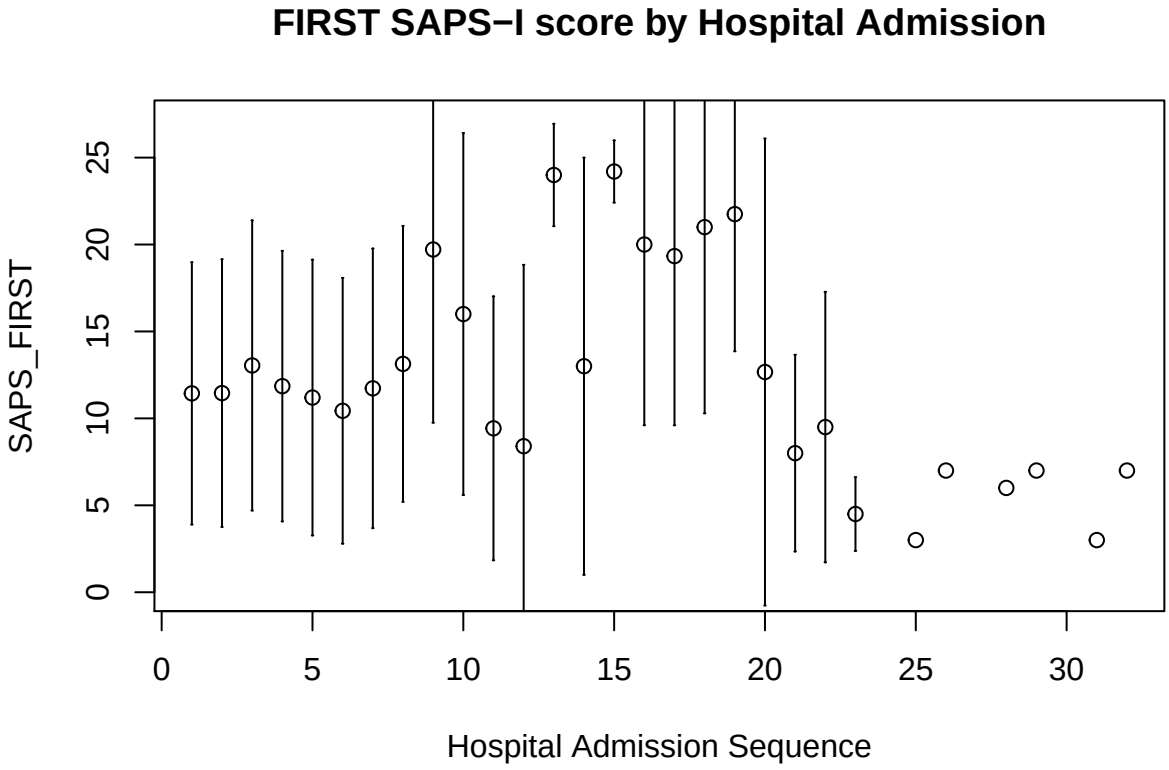
SOFA_FIRST scores by hospital admission sequence (group codes):

```
sofa <- com.dat[, c("HOSPITAL_SEQ", "SOFA_FIRST", "ICUSTAY_SEQ")]
sofa[sofa == "(null)"] <- NA
sofa <- sofa[complete.cases(sofa), ]
sofa$SOFA_FIRST <- as.numeric(sofa$SOFA_FIRST)
sofa <- filter(sofa, ICUSTAY_SEQ == 1)
sof.tab <- group_by(sofa, HOSPITAL_SEQ) %>% summarise(sofa_ave = mean(SOFA_FIRST), sd = sd(SOFA_FIRST))

x <- sof.tab$HOSPITAL_SEQ
y <- sof.tab$sofa_ave
sd <- sof.tab$sd

plot (x, y, main = "FIRST SOFA score by Hospital Admission", xlab = "Hospital Admission Sequence", ylab
epsilon = 0.025
for(i in 1:nrow(sof.tab)) {
    up = y[i] + sd[i]
    low = y[i] - sd[i]
    segments(x[i],low , x[i], up)
    segments(x[i]-epsilon, up , x[i]+epsilon, up)
    segments(x[i]-epsilon, low , x[i]+epsilon, low)
}
```




SAPS_FIRST scores by hospital admission sequence (group codes):

```
saps <- com.dat[, c("HOSPITAL_SEQ", "SAPSI_FIRST", "ICUSTAY_SEQ")]
saps[saps == "(null)"] <- NA
saps <- saps[complete.cases(saps), ]
saps$SAPSI_FIRST <- as.numeric(saps$SAPSI_FIRST)
saps <- filter(saps, ICUSTAY_SEQ == 1)
saps.tab <- group_by(saps, HOSPITAL_SEQ) %>% summarise(saps_ave = mean(SAPSI_FIRST), sd = sd(SAPSI_FIRS

x <- saps.tab$HOSPITAL_SEQ
y <- saps.tab$saps_ave
sd <- saps.tab$sd

plot (x, y, main = "FIRST SAPS-I score by Hospital Admission", xlab = "Hospital Admission Sequence", yla
epsilon = 0.025
for(i in 1:nrow(saps.tab)) {
    up = y[i] + sd[i]
    low = y[i] - sd[i]
    segments(x[i],low , x[i], up)
    segments(x[i]-epsilon, up , x[i]+epsilon, up)
    segments(x[i]-epsilon, low , x[i]+epsilon, low)
}
```

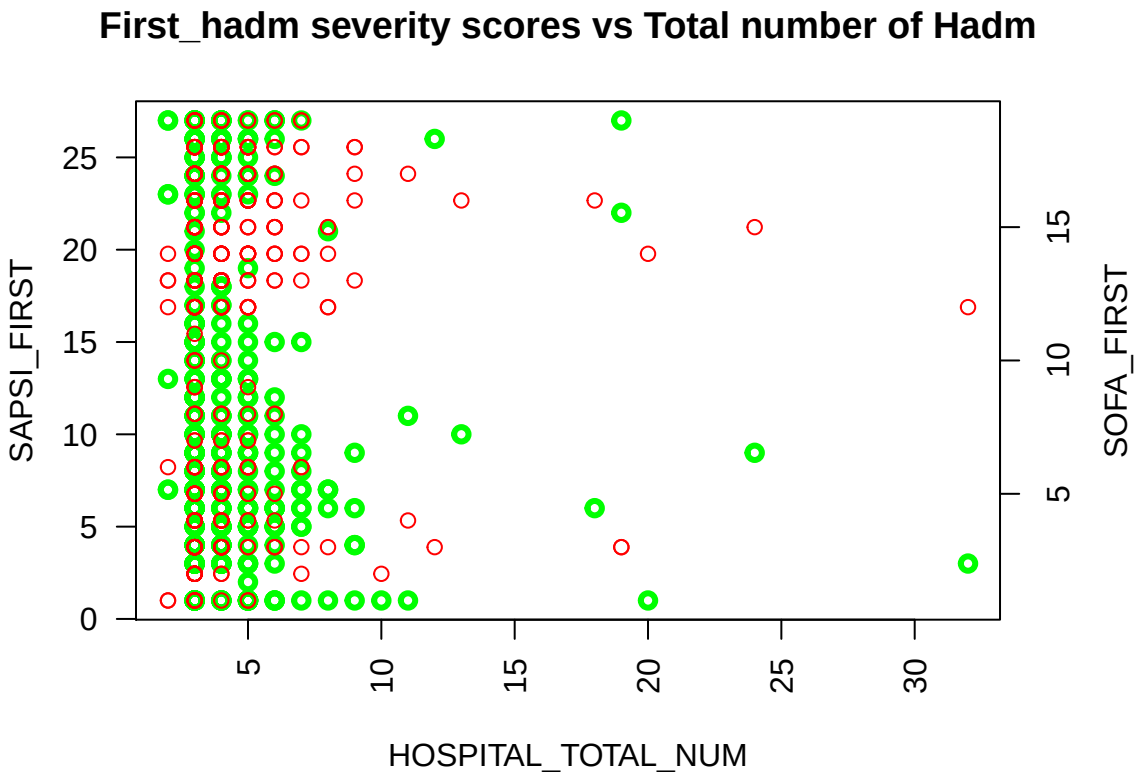



Severity score, SAPS-I and SOFA, on first admission versus total number of hospital admission, "HOSPITAL_TOTAL_NUM":

```
colnames(First_hadm) <- col_vec
severity <- First_hadm[, c("HOSPITAL_TOTAL_NUM", "SAPSI_FIRST", "SOFA_FIRST")]
str(severity)
```

```
## 'data.frame':    466 obs. of  3 variables:
##  $ HOSPITAL_TOTAL_NUM: num  3 5 5 5 3 3 4 3 3 5 ...
##  $ SAPSI_FIRST       : Factor w/ 27 levels "(null)","1.0",..: 1 6 1 1 12 11 7 23 15 12 ...
##  $ SOFA_FIRST        : Factor w/ 19 levels "(null)","0.0",..: 1 16 16 14 5 18 8 3 18 6 ...
```

```
par(mar=c(5, 5, 4, 5))
plot(severity$HOSPITAL_TOTAL_NUM, severity$SAPSI_FIRST, lwd=3, col="green", ann=FALSE, las=2,type='p')
mtext("SAPSI_FIRST", side=2, line=2.5)
par(new=TRUE)
plot(severity$HOSPITAL_TOTAL_NUM, severity$SOFA_FIRST, ann=FALSE, axes=FALSE,col='red',type='p')
mtext("SOFA_FIRST", side=4, line=2.5)
title(main = "First_hadm severity scores vs Total number of Hadm", xlab = "HOSPITAL_TOTAL_NUM")
axis(4)
```




Tracking individual patient's SAPS-I scores by hospital admission sequence (group codes):

```
track.dat <- com.dat[, c("SUBJECT_ID", "HOSPITAL_SEQ", "SAPSI_FIRST", "ICUSTAY_SEQ")]
track.dat[track.dat == "(null)"] <- NA
track.dat <- track.dat[complete.cases(track.dat), ]
track.dat$SAPSI_FIRST <- as.numeric(track.dat$SAPSI_FIRST)
track.dat <- filter(track.dat, ICUSTAY_SEQ == 1)
nrow(track.dat)
```

```
## [1] 1425
```

```
track.dat <-group_by(track.dat, SUBJECT_ID) %>% mutate(subj.max = max(HOSPITAL_SEQ))
nrow(track.dat)
```

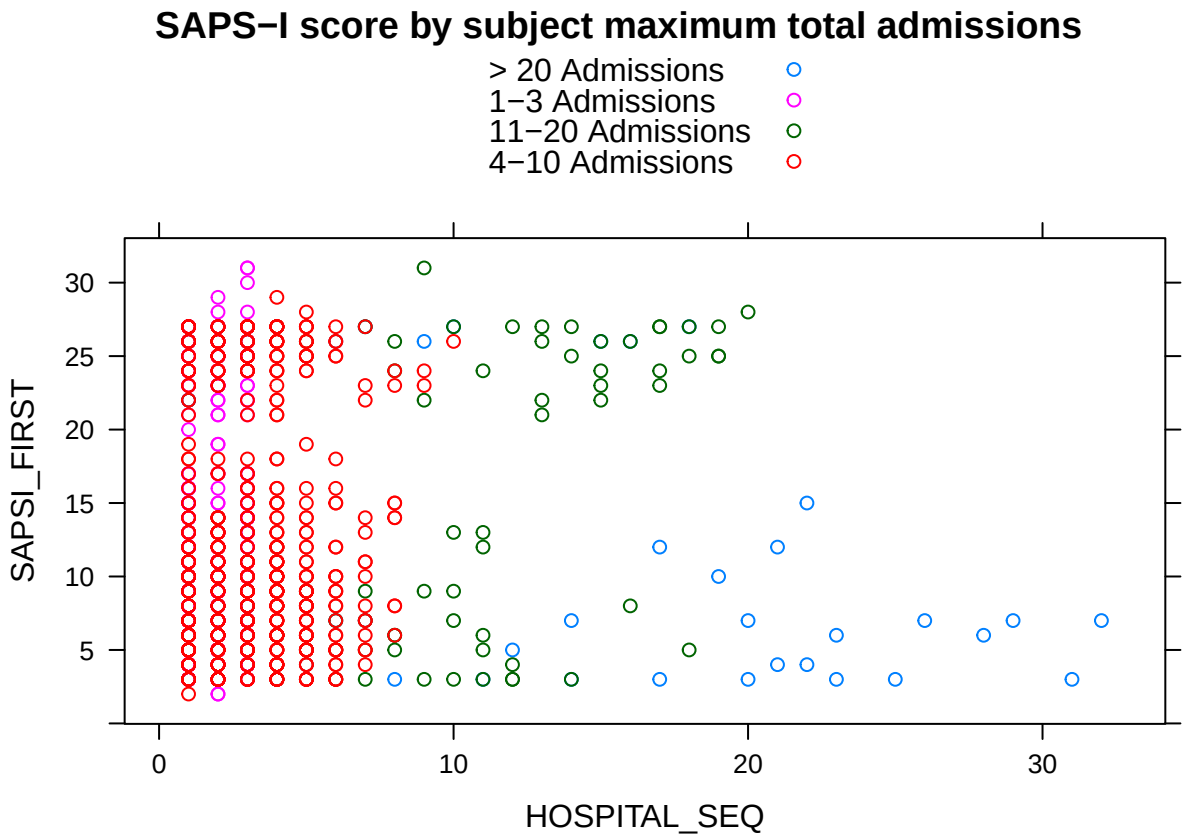
```
## [1] 1425
```

```
track.dat$color <- NULL
for (i in 1:nrow(track.dat)){
    if (track.dat$subj.max[i] <= 3){
      track.dat$color[i] <- "1-3 Admissions"
    }
    if (track.dat$subj.max[i] > 3 & track.dat$subj.max[i] <= 10){
      track.dat$color[i] <- "4-10 Admissions"
    }
    if (track.dat$subj.max[i] > 10 & track.dat$subj.max[i] <= 20){
      track.dat$color[i] <- "11-20 Admissions"
    }
    if (track.dat$subj.max[i] > 20){
```

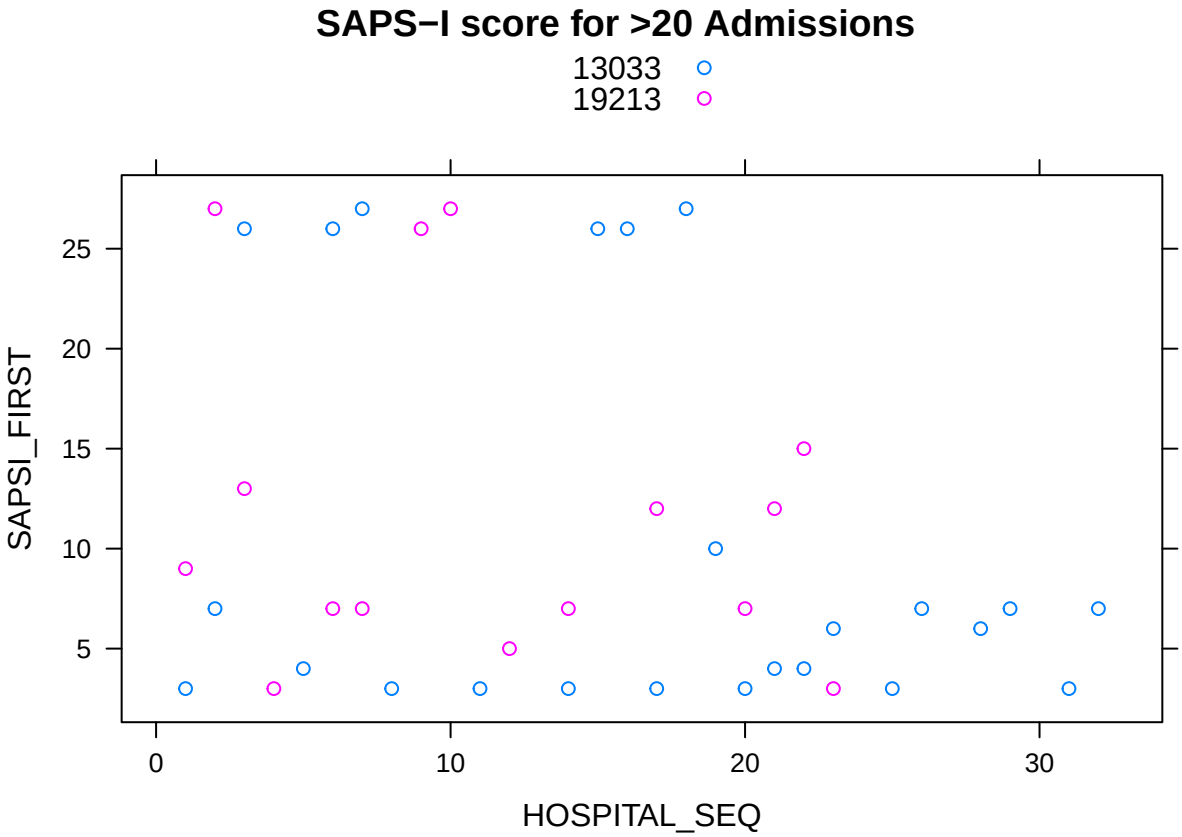
```
      track.dat$color[i] <- "> 20 Admissions"
    }
}
nrow(track.dat)
```

```
## [1] 1425
```

```
track.dat <- data.frame(track.dat)

with(track.dat, xyplot(track.dat$SAPSI_FIRST ~ track.dat$HOSPITAL_SEQ, group = track.dat$color, auto.ke
```




```
high_user <- filter(track.dat, subj.max > 20)
with(high_user, xyplot(high_user$SAPSI_FIRST ~ high_user$HOSPITAL_SEQ, group = high_user$SUBJECT_ID, au
```




Survival post first ICU admission (group codes):

```
survival <- com.dat[, c("ICUSTAY_ID", "SUBJECT_ID", "GENDER", "DOB", "DOD", "EXPIRE_FLG", "HOSPITAL_EXPI
survival <- arrange(survival, SUBJECT_ID, HOSPITAL_SEQ)

survival$DOD <- gsub("([^ ]*).*", "\\1", survival$DOD)
survival$DOB <- gsub("([^ ]*).*", "\\1", survival$DOB)
survival$HOSPITAL_ADMIT_DT <- gsub("([^ ]*).*", "\\1", survival$HOSPITAL_ADMIT_DT)

survival <- as.data.frame(survival)
survival$DOD <- as.numeric(as.Date(survival$DOD, "%Y-%m-%d"))
survival$DOB <- as.numeric(as.Date(survival$DOB, "%Y-%m-%d"))
survival$HOSPITAL_ADMIT_DT <- as.numeric(as.Date(survival$HOSPITAL_ADMIT_DT, "%Y-%m-%d"))
nrow(survival)
```

```
## [1] 1946
```

```
head(survival, 3)
```

```
##   ICUSTAY_ID SUBJECT_ID GENDER    DOB    DOD EXPIRE_FLG
## 1         77         68      F 261934 277257          Y
## 2         78         68      F 261934 277257          Y
## 3         79         68      F 261934 277257          Y
##   HOSPITAL_EXPIRE_FLG HOSPITAL_SEQ ICUSTAY_ADMIT_AGE HOSPITAL_ADMIT_DT
## 1                   N            1          41.45551            277071
## 2                   N            2          41.80141            277199
## 3                   N            2          41.84161            277199
```

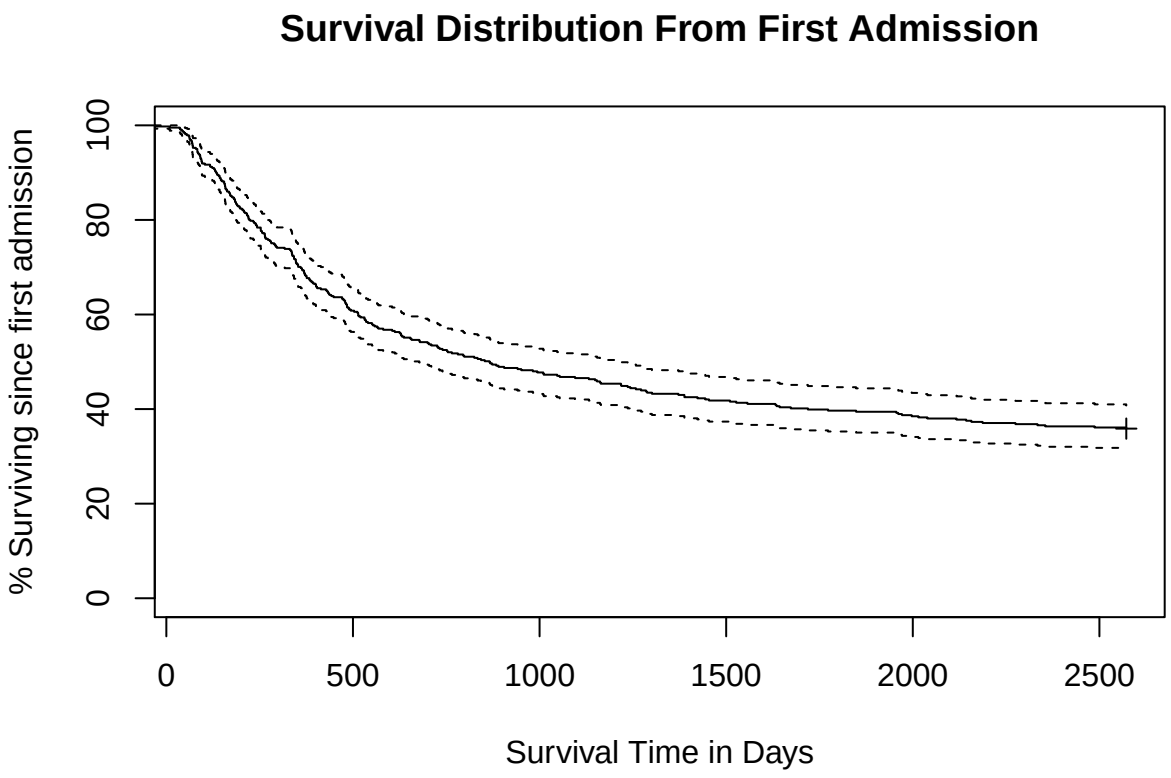
```
#scurf <- aggregate(survival$HOSPITAL_ADMIT_DT ~ survival$SUBJECT_ID, min, data = survival)

scurf <- survival %>% group_by(SUBJECT_ID) %>% filter(HOSPITAL_SEQ == min(HOSPITAL_SEQ)) %>% distinct(SU
scurf$days <- scurf$DOD - scurf$HOSPITAL_ADMIT_DT
scurf$EXPIRE_FLG <- as.numeric(scurf$EXPIRE_FLG)
nrow(scurf)
```

```
## [1] 421
```

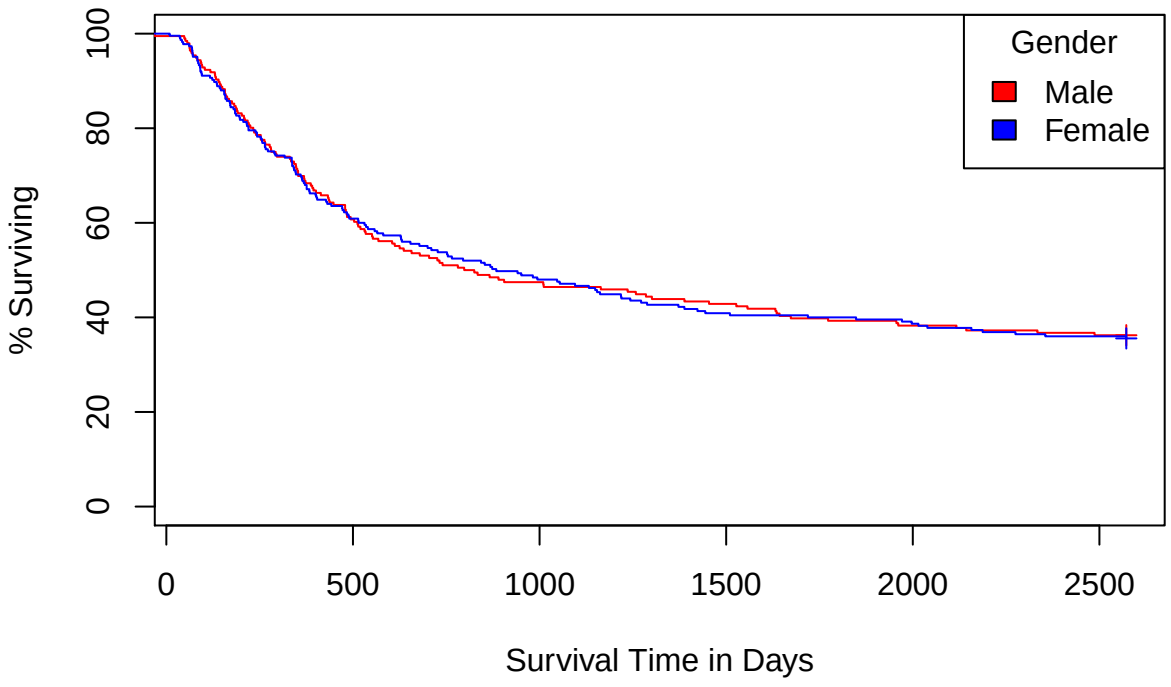
```
head(scurf)
```

```
## Source: local data frame [6 x 11]
## Groups: SUBJECT_ID
##
##   ICUSTAY_ID SUBJECT_ID GENDER    DOB    DOD EXPIRE_FLG
## 1         77         68      F 261934 277257          2
## 2        126        109      F 496918     NA          1
## 3        231        188      M 480729     NA          1
## 4        410        339      F 393980     NA          1
## 5        427        353      M 389594 412953          2
## 6        493        402      F 518184     NA          1
## Variables not shown: HOSPITAL_EXPIRE_FLG (fctr), HOSPITAL_SEQ (dbl),
##   ICUSTAY_ADMIT_AGE (dbl), HOSPITAL_ADMIT_DT (dbl), days (dbl)
```

```
#Suppose all patients who are still alive at end of MIMIC2.6 data collection have a survival equal to t
scurf$days[is.na(scurf$days)] <- max(na.omit(scurf$days))

#http://www.statmethods.net/advstats/glm.html
survobj <- with(scurf, Surv(days, EXPIRE_FLG))
fit0 <- survfit(survobj~1, data=scurf)
#summary(fit0)
plot(fit0, xlab="Survival Time in Days",
    ylab="% Surviving since first admission", yscale=100,
   main="Survival Distribution From First Admission")
```




```
scurf$GENDER <- as.numeric(scurf$GENDER)
fit1 <- survfit(survobj~GENDER,data=scurf)
plot(fit1, xlab="Survival Time in Days", ylab="% Surviving", yscale=100, col=c("red","blue"), main="Sur
legend("topright", title="Gender", c("Male", "Female"), fill=c("red", "blue"))
```



```
#Problem with above analysis is because the event times for each patient are randomly shifted into the
#An alternative assumption is the use the average survival time of people who died in the datacollectio
```

Inpatient death - Nth admission that patient died:

```
hosp_death <- com.dat[, c("SUBJECT_ID", "HOSPITAL_EXPIRE_FLG", "HOSPITAL_SEQ")]
str(hosp_death)
```

```
## 'data.frame':    1946 obs. of  3 variables:
##  $ SUBJECT_ID         : int  68 109 109 109 188 339 353 402 580 634 ...
##  $ HOSPITAL_EXPIRE_FLG: Factor w/ 2 levels "N","Y": 1 1 1 1 1 1 1 1 1 1 ...
##  $ HOSPITAL_SEQ       : num  1 1 1 1 1 1 1 1 1 1 ...
```

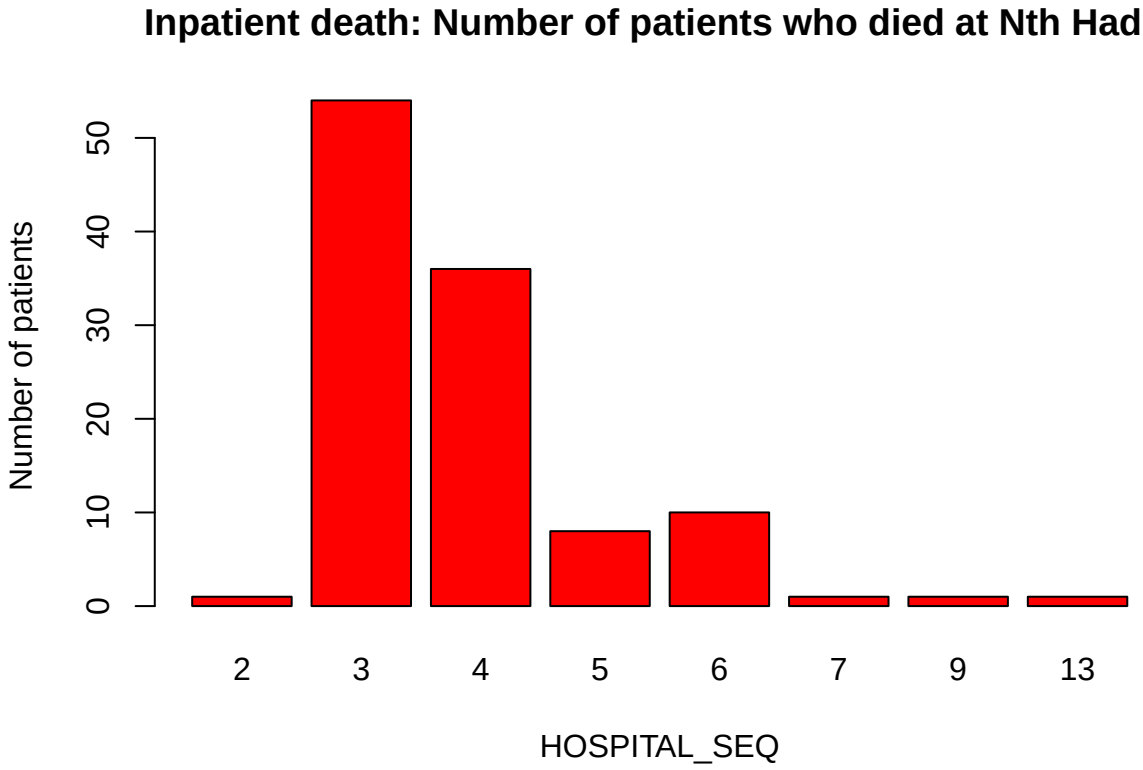
```
hosp_death <- filter(hosp_death, HOSPITAL_EXPIRE_FLG == "Y")
hosp_death$HOSPITAL_EXPIRE_FLG <- factor(hosp_death$HOSPITAL_EXPIRE_FLG)

#The this strange...The minimum hospital_seq should have been 3, not 2, by study selection criteria:
summary(hosp_death)
```

```
##    SUBJECT_ID    HOSPITAL_EXPIRE_FLG  HOSPITAL_SEQ
##  Min.   :  634   Y:112               Min.   : 2.000
##  1st Qu.: 6523                       1st Qu.: 3.000
##  Median :12252                       Median : 4.000
##  Mean   :13159                       Mean   : 3.902
##  3rd Qu.:18234                       3rd Qu.: 4.000
##  Max.   :26688                       Max.   :13.000
```

```
#The subject_id of the strange patient is:
filter(hosp_death, HOSPITAL_SEQ == 2)
```

```
##   SUBJECT_ID HOSPITAL_EXPIRE_FLG HOSPITAL_SEQ
## 1       9865                   Y            2
```

```
#We will plot this anyway:
death_tab <- table(hosp_death[, c("HOSPITAL_EXPIRE_FLG", "HOSPITAL_SEQ")])
barplot(death_tab, main = "Inpatient death: Number of patients who died at Nth Hadm", xlab = "HOSPITAL_
```

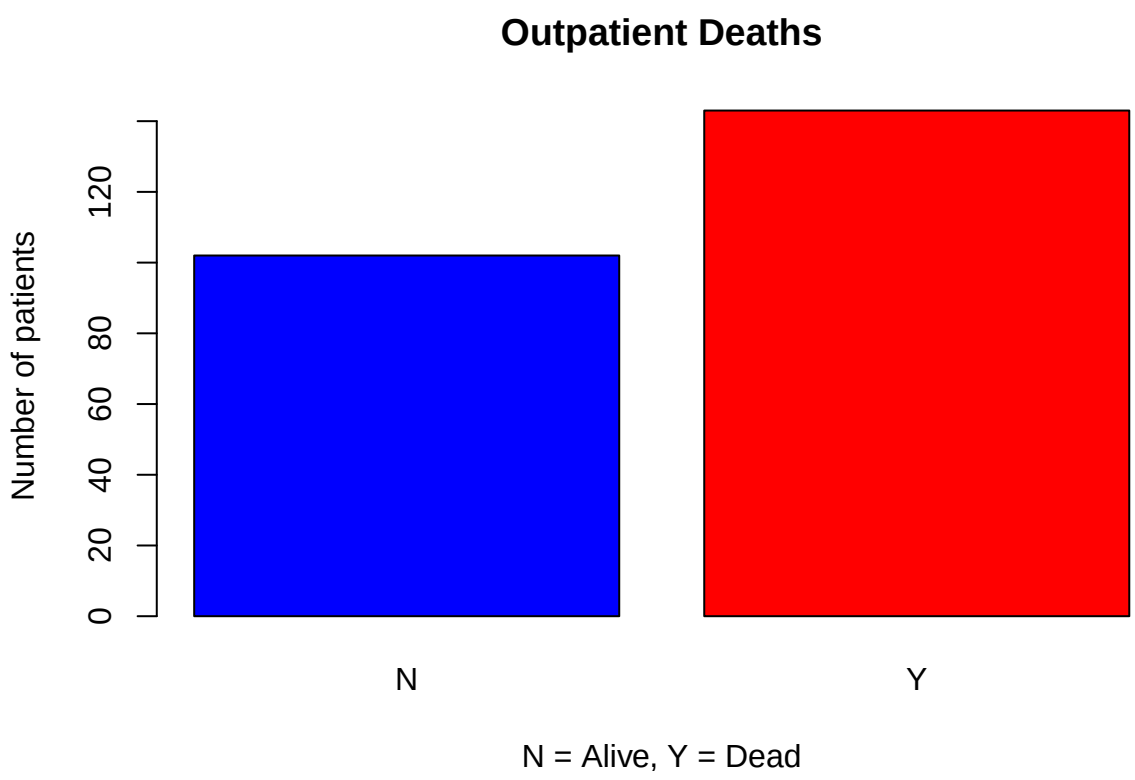



Outpatient survival and death - Time to death since last admission for patients who did not die in hospital:

```
opt_death <- filter(com.dat[, c("SUBJECT_ID", "DOD", "EXPIRE_FLG", "HADM_ID", "HOSPITAL_SEQ", "HOSPITAL_
summary(opt_death)
```

```
##    SUBJECT_ID                      DOD      EXPIRE_FLG    HADM_ID
##  Min.   :   68   (null)               :102   N:102      Min.   :   98
##  1st Qu.: 6828   2508-01-15 00:00:00.0:  1   Y:143      1st Qu.: 8808
##  Median :12984   2517-01-23 00:00:00.0:  1              Median :16860
##  Mean   :13361   2525-06-20 00:00:00.0:  1              Mean   :15713
##  3rd Qu.:20204   2525-10-02 00:00:00.0:  1              3rd Qu.:23228
##  Max.   :26523   2525-11-07 00:00:00.0:  1              Max.   :34632
##                  (Other)              :138
##   HOSPITAL_SEQ    HOSPITAL_LAST_FLG             HOSPITAL_DISCH_DT
##  Min.   : 2.000   N:  0             2525-06-08 00:00:00.0:  1
##  1st Qu.: 3.000   Y:245             3417-11-12 00:00:00.0:  1
##  Median : 3.000                     2516-12-17 00:00:00.0:  1
##  Mean   : 4.061                     2525-06-05 00:00:00.0:  1
##  3rd Qu.: 4.000                     2525-06-24 00:00:00.0:  1
##  Max.   :24.000                     2528-03-11 00:00:00.0:  1
##                                     (Other)              :239
##  HOSPITAL_EXPIRE_FLG  ICUSTAY_SEQ    ICUSTAY_LAST_FLG ICUSTAY_ADMIT_AGE
##  N:245                Min.   :1.000   N:  0            Min.   : 21.51
##  Y:  0                1st Qu.:1.000   Y:245            1st Qu.: 50.95
##                       Median :1.000                    Median : 63.57
##                       Mean   :1.114                    Mean   : 63.73
##                       3rd Qu.:1.000                    3rd Qu.: 75.64
##                       Max.   :3.000                    Max.   :200.40
##
```

```r
#Outpatient survival:
barplot(table(opt_death$EXPIRE_FLG), main = "Outpatient Deaths", xlab = "N = Alive, Y = Dead", ylab = "
```




```r
#Outpatient time/days to death from last admission:
#opt_death <- filter(opt_surv, EXPIRE_FLG == "Y")
opt_death$DOD <- gsub("([^ ]*).*", "\\1", opt_death$DOD)
opt_death$HOSPITAL_DISCH_DT <- gsub("([^ ]*).*", "\\1", opt_death$HOSPITAL_DISCH_DT)

opt_death <- as.data.frame(opt_death)
opt_death$DOD <- as.numeric(as.Date(opt_death$DOD, "%Y-%m-%d"))
opt_death$HOSPITAL_DISCH_DT <- as.numeric(as.Date(opt_death$HOSPITAL_DISCH_DT, "%Y-%m-%d"))
str(opt_death)
```

```
## 'data.frame':    245 obs. of  11 variables:
##  $ SUBJECT_ID         : int  18825 20140 68 188 339 402 781 805 849 1029 ...
##  $ DOD                : num  529057 202984 277257 NA NA ...
##  $ EXPIRE_FLG         : Factor w/ 2 levels "N","Y": 2 2 2 1 1 1 2 1 2 1 ...
##  $ HADM_ID            : int  26250 13455 26139 22644 27173 11173 20390 9952 21270 11730 ...
##  $ HOSPITAL_SEQ       : num  2 2 3 3 3 3 3 3 3 3 ...
##  $ HOSPITAL_LAST_FLG  : Factor w/ 2 levels "N","Y": 2 2 2 2 2 2 2 2 2 2 ...
##  $ HOSPITAL_DISCH_DT  : num  528821 202868 277234 499908 418727 ...
##  $ HOSPITAL_EXPIRE_FLG: Factor w/ 2 levels "N","Y": 1 1 1 1 1 1 1 1 1 1 ...
##  $ ICUSTAY_SEQ        : num  1 1 1 1 1 1 1 1 1 1 ...
##  $ ICUSTAY_LAST_FLG   : Factor w/ 2 levels "N","Y": 2 2 2 2 2 2 2 2 2 2 ...
##  $ ICUSTAY_ADMIT_AGE  : num  77.3 58.4 41.9 52.5 67.7 ...
```

```
summary(opt_death)
```

```
##    SUBJECT_ID         DOD         EXPIRE_FLG    HADM_ID
##  Min.   :   68   Min.   :196514   N:102      Min.   :   98
##  1st Qu.: 6828   1st Qu.:273645   Y:143      1st Qu.: 8808
##  Median :12984   Median :386027              Median :16860
##  Mean   :13361   Mean   :374437              Mean   :15713
##  3rd Qu.:20204   3rd Qu.:465426              3rd Qu.:23228
##  Max.   :26523   Max.   :560078              Max.   :34632
##                  NA's   :102
##   HOSPITAL_SEQ    HOSPITAL_LAST_FLG HOSPITAL_DISCH_DT HOSPITAL_EXPIRE_FLG
##  Min.   : 2.000   N:  0             Min.   :196470    N:245
##  1st Qu.: 3.000   Y:245             1st Qu.:277234    Y:  0
##  Median : 3.000                     Median :390571
##  Mean   : 4.061                     Mean   :383383
##  3rd Qu.: 4.000                     3rd Qu.:483099
##  Max.   :24.000                     Max.   :560054
##
##   ICUSTAY_SEQ    ICUSTAY_LAST_FLG ICUSTAY_ADMIT_AGE
##  Min.   :1.000   N:  0            Min.   : 21.51
##  1st Qu.:1.000   Y:245            1st Qu.: 50.95
##  Median :1.000                    Median : 63.57
##  Mean   :1.114                    Mean   : 63.73
##  3rd Qu.:1.000                    3rd Qu.: 75.64
##  Max.   :3.000                    Max.   :200.40
##
```

```
opt_death$days <- opt_death$DOD - opt_death$HOSPITAL_DISCH_DT
#Suppose all patients who are still alive at end of MIMIC2.6 data collection have a survival equal to t
opt_death$days[is.na(opt_death$days)] <- max(na.omit(opt_death$days))
summary(opt_death$days)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    -177      58     462    1118    2377    2377
```

```
#Another piece of strange data...this person was discharged 177 post mortem??
filter(opt_death, days < 0)
```

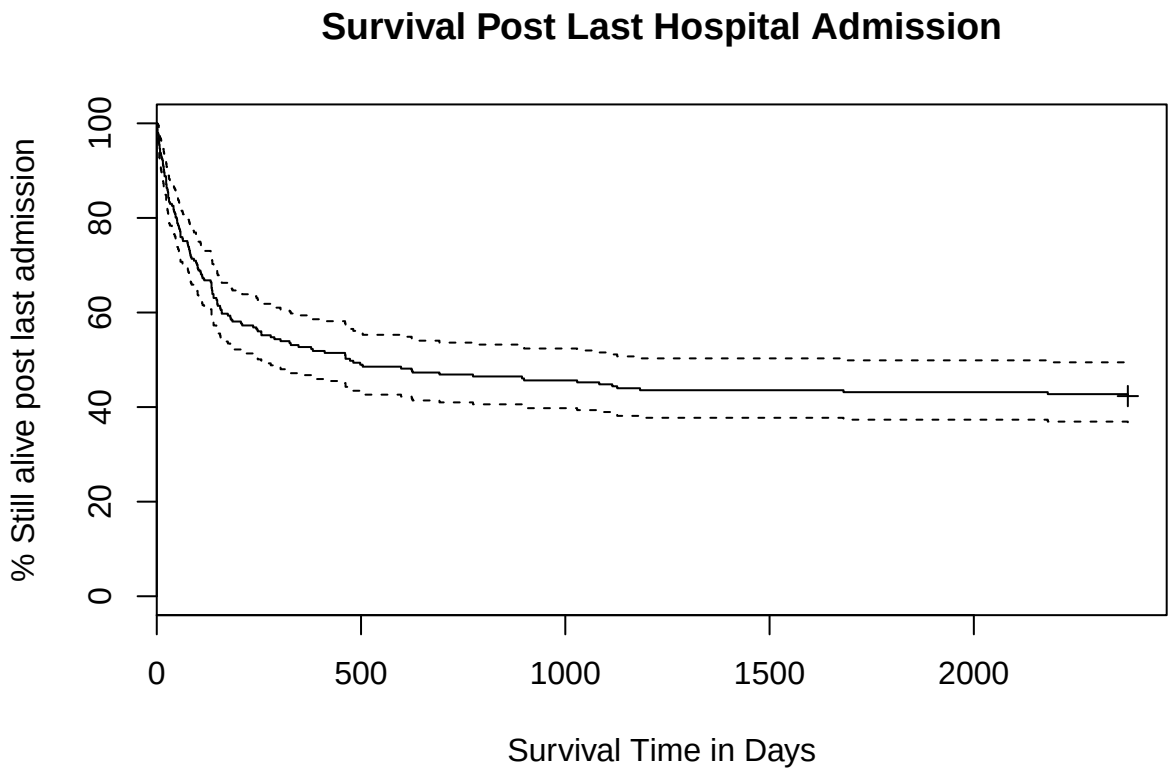
```
##   SUBJECT_ID    DOD EXPIRE_FLG HADM_ID HOSPITAL_SEQ HOSPITAL_LAST_FLG
## 1      22751 290631          Y    8335            3                 Y
##   HOSPITAL_DISCH_DT HOSPITAL_EXPIRE_FLG ICUSTAY_SEQ ICUSTAY_LAST_FLG
## 1            290808                   N           1                Y
##   ICUSTAY_ADMIT_AGE days
## 1          87.10149 -177
```

```
#Excluding this strange person:
opt_death <- filter(opt_death, days > 0)
summary(opt_death)
```

```
##    SUBJECT_ID         DOD         EXPIRE_FLG    HADM_ID
##  Min.   :   68   Min.   :196514   N:102      Min.   :   98
```

```
##  1st Qu.: 6828   1st Qu.:272463   Y:139      1st Qu.: 8848
##  Median :12984   Median :386770              Median :16860
##  Mean   :13341   Mean   :375754              Mean   :15751
##  3rd Qu.:20181   3rd Qu.:469644              3rd Qu.:23270
##  Max.   :26523   Max.   :560078              Max.   :34632
##                  NA's   :102
##   HOSPITAL_SEQ    HOSPITAL_LAST_FLG HOSPITAL_DISCH_DT HOSPITAL_EXPIRE_FLG
##  Min.   : 2.000   N:  0             Min.   :196470    N:241
##  1st Qu.: 3.000   Y:241             1st Qu.:275647    Y:  0
##  Median : 3.000                     Median :391873
##  Mean   : 4.075                     Mean   :384290
##  3rd Qu.: 4.000                     3rd Qu.:486407
##  Max.   :24.000                     Max.   :560054
##
##   ICUSTAY_SEQ    ICUSTAY_LAST_FLG ICUSTAY_ADMIT_AGE      days
##  Min.   :1.000   N:  0            Min.   : 21.51    Min.   :   1
##  1st Qu.:1.000   Y:241            1st Qu.: 50.55    1st Qu.:  75
##  Median :1.000                    Median : 63.53    Median : 473
##  Mean   :1.116                    Mean   : 63.46    Mean   :1137
##  3rd Qu.:1.000                    3rd Qu.: 75.35    3rd Qu.:2377
##  Max.   :3.000                    Max.   :200.40    Max.   :2377
##
```

```r
#Strange, not 1 but 4 people got removed after this filter...not sure why but I think this is probably

opt_death$EXPIRE_FLG <- as.numeric(opt_death$EXPIRE_FLG)
#http://www.statmethods.net/advstats/glm.html
survobj <- with(opt_death, Surv(days, EXPIRE_FLG))
fit0 <- survfit(survobj~1, data=opt_death)
#summary(fit0)
plot(fit0, xlab="Survival Time in Days",
    ylab="% Still alive post last admission", yscale=100,
   main="Survival Post Last Hospital Admission")
```




Linear Regressions on first admission (Ned's codes):

```
d.dat <- merge(Demo, Comorb, by = "SUBJECT_ID")
dod <- as.character(d.dat$EXPIRE_FLG)

for (i in 1:length(dod)){
  if (dod[i] == "Y"){
    dod[i] <- 1
  }
  else {
    dod [i] <- 0
  }
}

d.dat$dod <- as.numeric(dod)
d.dat <- as.data.frame(d.dat)

for (i in 1:length(colnames(d.dat))){
  if (is.integer(d.dat[,i])){
    d.dat[,i] <- as.numeric(d.dat[,i])
  }
}

attach(d.dat)
```

```
## The following object is masked _by_ .GlobalEnv:
##
##     dod
```

```r
lin.reg <- glm(d.dat$dod ~ AIDS + ALCOHOL_ABUSE + BLOOD_LOSS_ANEMIA + CARDIAC_ARRHYTHMIAS + CHRONIC_PULM

summary(lin.reg)
```

```
##
## Call:
## glm(formula = d.dat$dod ~ AIDS + ALCOHOL_ABUSE + BLOOD_LOSS_ANEMIA +
##     CARDIAC_ARRHYTHMIAS + CHRONIC_PULMONARY + COAGULOPATHY +
##     CONGESTIVE_HEART_FAILURE + DEFICIENCY_ANEMIAS + DEPRESSION +
##     DIABETES_COMPLICATED + DIABETES_UNCOMPLICATED + DRUG_ABUSE +
##     FLUID_ELECTROLYTE + HYPERTENSION + HYPOTHYROIDISM + LIVER_DISEASE +
##     LYMPHOMA + METASTATIC_CANCER + OBESITY + OTHER_NEUROLOGICAL +
##     PARALYSIS + PEPTIC_ULCER + PERIPHERAL_VASCULAR + PSYCHOSES +
##     PULMONARY_CIRCULATION + RENAL_FAILURE + RHEUMATOID_ARTHRITIS +
##     SOLID_TUMOR + VALVULAR_DISEASE + WEIGHT_LOSS, data = d.dat)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.9486  -0.4960   0.1938   0.3676   0.9279
##
## Coefficients: (1 not defined because of singularities)
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                0.540243   0.048095  11.233  < 2e-16 ***
## AIDS                       0.362260   0.200013   1.811  0.07089 .
## ALCOHOL_ABUSE             -0.255973   0.112533  -2.275  0.02347 *
## BLOOD_LOSS_ANEMIA               NA         NA      NA       NA
## CARDIAC_ARRHYTHMIAS        0.157904   0.063444   2.489  0.01323 *
## CHRONIC_PULMONARY          0.156834   0.060309   2.600  0.00966 **
## COAGULOPATHY              -0.028709   0.083692  -0.343  0.73177
## CONGESTIVE_HEART_FAILURE   0.003281   0.056402   0.058  0.95365
## DEFICIENCY_ANEMIAS        -0.045921   0.074939  -0.613  0.54038
## DEPRESSION                -0.150944   0.113899  -1.325  0.18587
## DIABETES_COMPLICATED       0.074881   0.077318   0.968  0.33341
## DIABETES_UNCOMPLICATED    -0.029751   0.062597  -0.475  0.63486
## DRUG_ABUSE                -0.011370   0.141956  -0.080  0.93620
## FLUID_ELECTROLYTE          0.090359   0.048867   1.849  0.06520 .
## HYPERTENSION              -0.048980   0.055314  -0.885  0.37644
## HYPOTHYROIDISM             0.096396   0.093259   1.034  0.30195
## LIVER_DISEASE             -0.040274   0.089319  -0.451  0.65231
## LYMPHOMA                  -0.035143   0.170633  -0.206  0.83693
## METASTATIC_CANCER          0.380053   0.160713   2.365  0.01853 *
## OBESITY                   -0.318738   0.183537  -1.737  0.08324 .
## OTHER_NEUROLOGICAL        -0.035444   0.139990  -0.253  0.80026
## PARALYSIS                 -0.112880   0.340644  -0.331  0.74054
## PEPTIC_ULCER              -0.215844   0.333435  -0.647  0.51780
## PERIPHERAL_VASCULAR       -0.007144   0.090916  -0.079  0.93741
## PSYCHOSES                  0.070416   0.122230   0.576  0.56489
## PULMONARY_CIRCULATION     -0.032972   0.129574  -0.254  0.79927
## RENAL_FAILURE              0.024778   0.074950   0.331  0.74113
## RHEUMATOID_ARTHRITIS       0.221515   0.141701   1.563  0.11881
## SOLID_TUMOR                0.127668   0.074285   1.719  0.08648 .
## VALVULAR_DISEASE           0.012191   0.088541   0.138  0.89056
## WEIGHT_LOSS                0.088770   0.115231   0.770  0.44155
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 0.2168436)
##
##     Null deviance: 96.172  on 417  degrees of freedom
## Residual deviance: 84.135  on 388  degrees of freedom
## AIC: 578.16
##
## Number of Fisher Scoring iterations: 2
```

```
lin.reg <- glm(d.dat$dod ~ AIDS*ALCOHOL_ABUSE*DEPRESSION*DRUG_ABUSE*LIVER_DISEASE*OBESITY*PSYCHOSES, da
summary(lin.reg)
```

```
##
## Call:
## glm(formula = d.dat$dod ~ AIDS * ALCOHOL_ABUSE * DEPRESSION *
##     DRUG_ABUSE * LIVER_DISEASE * OBESITY * PSYCHOSES, data = d.dat)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.7500  -0.6737   0.3263   0.3263   0.8000
##
## Coefficients: (106 not defined because of singularities)
##                                                                  Estimate
## (Intercept)                                                       0.67372
## AIDS                                                              0.32628
## ALCOHOL_ABUSE                                                    -0.38800
## DEPRESSION                                                       -0.36602
## DRUG_ABUSE                                                        0.32628
## LIVER_DISEASE                                                    -0.04214
## OBESITY                                                          -0.47372
## PSYCHOSES                                                         0.07628
## AIDS:ALCOHOL_ABUSE                                                0.38800
## AIDS:DEPRESSION                                                   0.80816
## ALCOHOL_ABUSE:DEPRESSION                                          1.00000
## AIDS:DRUG_ABUSE                                                  -0.32628
## ALCOHOL_ABUSE:DRUG_ABUSE                                         -0.61200
## DEPRESSION:DRUG_ABUSE                                             0.36602
## AIDS:LIVER_DISEASE                                               -0.40000
## ALCOHOL_ABUSE:LIVER_DISEASE                                       0.13142
## DEPRESSION:LIVER_DISEASE                                               NA
## DRUG_ABUSE:LIVER_DISEASE                                         -0.55786
## AIDS:OBESITY                                                           NA
## ALCOHOL_ABUSE:OBESITY                                                  NA
## DEPRESSION:OBESITY                                                1.16602
## DRUG_ABUSE:OBESITY                                                     NA
## LIVER_DISEASE:OBESITY                                            -0.15786
## AIDS:PSYCHOSES                                                         NA
## ALCOHOL_ABUSE:PSYCHOSES                                          -0.36200
## DEPRESSION:PSYCHOSES                                              0.11602
## DRUG_ABUSE:PSYCHOSES                                                   NA
## LIVER_DISEASE:PSYCHOSES                                           0.29214
## OBESITY:PSYCHOSES                                                      NA
```

```
## AIDS:ALCOHOL_ABUSE:DEPRESSION                                    NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE                                    NA
## AIDS:DEPRESSION:DRUG_ABUSE                                       NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                              NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE                                 NA
## AIDS:DEPRESSION:LIVER_DISEASE                                    NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                           NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE                                    NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                           NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                              NA
## AIDS:ALCOHOL_ABUSE:OBESITY                                       NA
## AIDS:DEPRESSION:OBESITY                                          NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY                                 NA
## AIDS:DRUG_ABUSE:OBESITY                                          NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                                 NA
## DEPRESSION:DRUG_ABUSE:OBESITY                                    NA
## AIDS:LIVER_DISEASE:OBESITY                                       NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                              NA
## DEPRESSION:LIVER_DISEASE:OBESITY                                 NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY                                 NA
## AIDS:ALCOHOL_ABUSE:PSYCHOSES                                     NA
## AIDS:DEPRESSION:PSYCHOSES                                        NA
## ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                               NA
## AIDS:DRUG_ABUSE:PSYCHOSES                                        NA
## ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                               NA
## DEPRESSION:DRUG_ABUSE:PSYCHOSES                                  NA
## AIDS:LIVER_DISEASE:PSYCHOSES                                     NA
## ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                            NA
## DEPRESSION:LIVER_DISEASE:PSYCHOSES                               NA
## DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                               NA
## AIDS:OBESITY:PSYCHOSES                                           NA
## ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                  NA
## DEPRESSION:OBESITY:PSYCHOSES                                     NA
## DRUG_ABUSE:OBESITY:PSYCHOSES                                     NA
## LIVER_DISEASE:OBESITY:PSYCHOSES                                  NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                      NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                      NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                         NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY                            NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                            NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY                               NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                      NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                         NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY                            NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                   NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY                            NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                   NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                      NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                          NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                          NA
## AIDS:DEPRESSION:DRUG_ABUSE:PSYCHOSES                             NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                    NA
```

```
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                                    NA
## AIDS:DEPRESSION:LIVER_DISEASE:PSYCHOSES                                       NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                              NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                       NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                              NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                 NA
## AIDS:ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                          NA
## AIDS:DEPRESSION:OBESITY:PSYCHOSES                                             NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                                    NA
## AIDS:DRUG_ABUSE:OBESITY:PSYCHOSES                                             NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                                    NA
## DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                       NA
## AIDS:LIVER_DISEASE:OBESITY:PSYCHOSES                                          NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                 NA
## DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                                    NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                        NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                           NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                           NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                              NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                     NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                            NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                            NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                   NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                               NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                               NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                            NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                      NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                      NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                    NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES           NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES      NA
##                                                                         Std. Error
## (Intercept)                                                                0.02591
## AIDS                                                                       0.33435
## ALCOHOL_ABUSE                                                              0.18005
## DEPRESSION                                                                 0.13329
## DRUG_ABUSE                                                                 0.33435
## LIVER_DISEASE                                                              0.11121
## OBESITY                                                                    0.21241
## PSYCHOSES                                                                  0.13853
```

```
## AIDS:ALCOHOL_ABUSE                                    0.60479
## AIDS:DEPRESSION                                       0.98228
## ALCOHOL_ABUSE:DEPRESSION                              0.81652
## AIDS:DRUG_ABUSE                                       0.66719
## ALCOHOL_ABUSE:DRUG_ABUSE                              0.50463
## DEPRESSION:DRUG_ABUSE                                 0.59255
## AIDS:LIVER_DISEASE                                    0.77462
## ALCOHOL_ABUSE:LIVER_DISEASE                           0.26813
## DEPRESSION:LIVER_DISEASE                                   NA
## DRUG_ABUSE:LIVER_DISEASE                              0.40980
## AIDS:OBESITY                                               NA
## ALCOHOL_ABUSE:OBESITY                                      NA
## DEPRESSION:OBESITY                                    0.53334
## DRUG_ABUSE:OBESITY                                         NA
## LIVER_DISEASE:OBESITY                                 0.52825
## AIDS:PSYCHOSES                                             NA
## ALCOHOL_ABUSE:PSYCHOSES                               0.52266
## DEPRESSION:PSYCHOSES                                  0.38393
## DRUG_ABUSE:PSYCHOSES                                       NA
## LIVER_DISEASE:PSYCHOSES                               0.50311
## OBESITY:PSYCHOSES                                          NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION                              NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE                              NA
## AIDS:DEPRESSION:DRUG_ABUSE                                 NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                        NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE                           NA
## AIDS:DEPRESSION:LIVER_DISEASE                              NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                     NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE                              NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                     NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                        NA
## AIDS:ALCOHOL_ABUSE:OBESITY                                 NA
## AIDS:DEPRESSION:OBESITY                                    NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY                           NA
## AIDS:DRUG_ABUSE:OBESITY                                    NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                           NA
## DEPRESSION:DRUG_ABUSE:OBESITY                              NA
## AIDS:LIVER_DISEASE:OBESITY                                 NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                        NA
## DEPRESSION:LIVER_DISEASE:OBESITY                           NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY                           NA
## AIDS:ALCOHOL_ABUSE:PSYCHOSES                               NA
## AIDS:DEPRESSION:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                         NA
## AIDS:DRUG_ABUSE:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                         NA
## DEPRESSION:DRUG_ABUSE:PSYCHOSES                            NA
## AIDS:LIVER_DISEASE:PSYCHOSES                               NA
## ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                      NA
## DEPRESSION:LIVER_DISEASE:PSYCHOSES                         NA
## DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:OBESITY:PSYCHOSES                                     NA
## ALCOHOL_ABUSE:OBESITY:PSYCHOSES                            NA
## DEPRESSION:OBESITY:PSYCHOSES                               NA
```

```
## DRUG_ABUSE:OBESITY:PSYCHOSES                                                    NA
## LIVER_DISEASE:OBESITY:PSYCHOSES                                                 NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                                        NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                                     NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                                     NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                                        NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                               NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY                                           NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                                           NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY                                              NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                                     NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                                        NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY                                           NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                                  NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY                                           NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                                  NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                                     NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                                         NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                                         NA
## AIDS:DEPRESSION:DRUG_ABUSE:PSYCHOSES                                            NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                                   NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                                      NA
## AIDS:DEPRESSION:LIVER_DISEASE:PSYCHOSES                                         NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                                NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                         NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                   NA
## AIDS:ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                            NA
## AIDS:DEPRESSION:OBESITY:PSYCHOSES                                               NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                                      NA
## AIDS:DRUG_ABUSE:OBESITY:PSYCHOSES                                               NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                                      NA
## DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                         NA
## AIDS:LIVER_DISEASE:OBESITY:PSYCHOSES                                            NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                   NA
## DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                                      NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                      NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                          NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                                NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                             NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                             NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                                NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                       NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                           NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                           NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                              NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                     NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                                 NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                                 NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                    NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                           NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                              NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                                 NA
```

```
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                          NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                   NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                          NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                             NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                  NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                        NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                     NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                     NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                        NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES               NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES          NA
##                                                                              t value
## (Intercept)                                                                   26.001
## AIDS                                                                           0.976
## ALCOHOL_ABUSE                                                                 -2.155
## DEPRESSION                                                                    -2.746
## DRUG_ABUSE                                                                     0.976
## LIVER_DISEASE                                                                 -0.379
## OBESITY                                                                       -2.230
## PSYCHOSES                                                                      0.551
## AIDS:ALCOHOL_ABUSE                                                             0.642
## AIDS:DEPRESSION                                                                0.823
## ALCOHOL_ABUSE:DEPRESSION                                                       1.225
## AIDS:DRUG_ABUSE                                                               -0.489
## ALCOHOL_ABUSE:DRUG_ABUSE                                                      -1.213
## DEPRESSION:DRUG_ABUSE                                                          0.618
## AIDS:LIVER_DISEASE                                                            -0.516
## ALCOHOL_ABUSE:LIVER_DISEASE                                                    0.490
## DEPRESSION:LIVER_DISEASE                                                          NA
## DRUG_ABUSE:LIVER_DISEASE                                                      -1.361
## AIDS:OBESITY                                                                      NA
## ALCOHOL_ABUSE:OBESITY                                                             NA
## DEPRESSION:OBESITY                                                             2.186
## DRUG_ABUSE:OBESITY                                                                NA
## LIVER_DISEASE:OBESITY                                                         -0.299
## AIDS:PSYCHOSES                                                                    NA
## ALCOHOL_ABUSE:PSYCHOSES                                                       -0.693
## DEPRESSION:PSYCHOSES                                                           0.302
## DRUG_ABUSE:PSYCHOSES                                                              NA
## LIVER_DISEASE:PSYCHOSES                                                        0.581
## OBESITY:PSYCHOSES                                                                 NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION                                                     NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE                                                     NA
## AIDS:DEPRESSION:DRUG_ABUSE                                                        NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                                               NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE                                                  NA
## AIDS:DEPRESSION:LIVER_DISEASE                                                     NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                                            NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE                                                     NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                                            NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                                               NA
## AIDS:ALCOHOL_ABUSE:OBESITY                                                        NA
## AIDS:DEPRESSION:OBESITY                                                           NA
```

```
## ALCOHOL_ABUSE:DEPRESSION:OBESITY                                    NA
## AIDS:DRUG_ABUSE:OBESITY                                             NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                                    NA
## DEPRESSION:DRUG_ABUSE:OBESITY                                       NA
## AIDS:LIVER_DISEASE:OBESITY                                          NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                                 NA
## DEPRESSION:LIVER_DISEASE:OBESITY                                    NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY                                    NA
## AIDS:ALCOHOL_ABUSE:PSYCHOSES                                        NA
## AIDS:DEPRESSION:PSYCHOSES                                           NA
## ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                                  NA
## AIDS:DRUG_ABUSE:PSYCHOSES                                           NA
## ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                                  NA
## DEPRESSION:DRUG_ABUSE:PSYCHOSES                                     NA
## AIDS:LIVER_DISEASE:PSYCHOSES                                        NA
## ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                               NA
## DEPRESSION:LIVER_DISEASE:PSYCHOSES                                  NA
## DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                  NA
## AIDS:OBESITY:PSYCHOSES                                              NA
## ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                     NA
## DEPRESSION:OBESITY:PSYCHOSES                                        NA
## DRUG_ABUSE:OBESITY:PSYCHOSES                                        NA
## LIVER_DISEASE:OBESITY:PSYCHOSES                                     NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                            NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                         NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                         NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                            NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                   NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY                               NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                               NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY                                  NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                         NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                            NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY                               NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                      NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY                               NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                      NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                             NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                             NA
## AIDS:DEPRESSION:DRUG_ABUSE:PSYCHOSES                                NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                       NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                          NA
## AIDS:DEPRESSION:LIVER_DISEASE:PSYCHOSES                             NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                    NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                             NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                    NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                       NA
## AIDS:ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                NA
## AIDS:DEPRESSION:OBESITY:PSYCHOSES                                   NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                          NA
## AIDS:DRUG_ABUSE:OBESITY:PSYCHOSES                                   NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                          NA
## DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                             NA
```

```
## AIDS:LIVER_DISEASE:OBESITY:PSYCHOSES                                          NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                 NA
## DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                                    NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                        NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                           NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                           NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                              NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                     NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                            NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                            NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                   NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                               NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                               NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                            NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                      NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                      NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                    NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES           NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES      NA
##                                                                          Pr(>|t|)
## (Intercept)                                                               < 2e-16
## AIDS                                                                      0.32972
## ALCOHOL_ABUSE                                                             0.03177
## DEPRESSION                                                                0.00631
## DRUG_ABUSE                                                                0.32972
## LIVER_DISEASE                                                             0.70497
## OBESITY                                                                   0.02629
## PSYCHOSES                                                                 0.58218
## AIDS:ALCOHOL_ABUSE                                                        0.52154
## AIDS:DEPRESSION                                                           0.41115
## ALCOHOL_ABUSE:DEPRESSION                                                  0.22141
## AIDS:DRUG_ABUSE                                                           0.62508
## ALCOHOL_ABUSE:DRUG_ABUSE                                                  0.22595
## DEPRESSION:DRUG_ABUSE                                                     0.53712
## AIDS:LIVER_DISEASE                                                        0.60588
## ALCOHOL_ABUSE:LIVER_DISEASE                                               0.62431
## DEPRESSION:LIVER_DISEASE                                                      NA
## DRUG_ABUSE:LIVER_DISEASE                                                  0.17419
## AIDS:OBESITY                                                                  NA
## ALCOHOL_ABUSE:OBESITY                                                         NA
```

```
## DEPRESSION:OBESITY                                                0.02938
## DRUG_ABUSE:OBESITY                                                     NA
## LIVER_DISEASE:OBESITY                                             0.76522
## AIDS:PSYCHOSES                                                         NA
## ALCOHOL_ABUSE:PSYCHOSES                                           0.48896
## DEPRESSION:PSYCHOSES                                              0.76266
## DRUG_ABUSE:PSYCHOSES                                                   NA
## LIVER_DISEASE:PSYCHOSES                                           0.56180
## OBESITY:PSYCHOSES                                                      NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION                                          NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE                                          NA
## AIDS:DEPRESSION:DRUG_ABUSE                                             NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                                    NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE                                       NA
## AIDS:DEPRESSION:LIVER_DISEASE                                          NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                                 NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE                                          NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                                 NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                                    NA
## AIDS:ALCOHOL_ABUSE:OBESITY                                             NA
## AIDS:DEPRESSION:OBESITY                                                NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY                                       NA
## AIDS:DRUG_ABUSE:OBESITY                                                NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                                       NA
## DEPRESSION:DRUG_ABUSE:OBESITY                                          NA
## AIDS:LIVER_DISEASE:OBESITY                                             NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                                    NA
## DEPRESSION:LIVER_DISEASE:OBESITY                                       NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY                                       NA
## AIDS:ALCOHOL_ABUSE:PSYCHOSES                                           NA
## AIDS:DEPRESSION:PSYCHOSES                                              NA
## ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                                     NA
## AIDS:DRUG_ABUSE:PSYCHOSES                                              NA
## ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                                     NA
## DEPRESSION:DRUG_ABUSE:PSYCHOSES                                        NA
## AIDS:LIVER_DISEASE:PSYCHOSES                                           NA
## ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                                  NA
## DEPRESSION:LIVER_DISEASE:PSYCHOSES                                     NA
## DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                     NA
## AIDS:OBESITY:PSYCHOSES                                                 NA
## ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                        NA
## DEPRESSION:OBESITY:PSYCHOSES                                           NA
## DRUG_ABUSE:OBESITY:PSYCHOSES                                           NA
## LIVER_DISEASE:OBESITY:PSYCHOSES                                        NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE                               NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE                            NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE                            NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                               NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                      NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY                                  NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY                                  NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY                                     NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                            NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY                               NA
```

```
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY                                    NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                           NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY                                    NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                           NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES                                  NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES                                  NA
## AIDS:DEPRESSION:DRUG_ABUSE:PSYCHOSES                                     NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                            NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES                               NA
## AIDS:DEPRESSION:LIVER_DISEASE:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                         NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                                  NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                         NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                            NA
## AIDS:ALCOHOL_ABUSE:OBESITY:PSYCHOSES                                     NA
## AIDS:DEPRESSION:OBESITY:PSYCHOSES                                        NA
## ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                               NA
## AIDS:DRUG_ABUSE:OBESITY:PSYCHOSES                                        NA
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                               NA
## DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                                  NA
## AIDS:LIVER_DISEASE:OBESITY:PSYCHOSES                                     NA
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                            NA
## DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                               NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE                   NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY                         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY                      NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY                      NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                         NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY                NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES                       NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES                    NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                    NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES                       NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES              NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES                          NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES                          NA
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                             NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES                    NA
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                       NA
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                          NA
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                          NA
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                 NA
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES                    NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY           NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES         NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES               NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES            NA
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES            NA
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES               NA
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES      NA
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES NA
```

```
##
## (Intercept)                                                    ***
## AIDS
## ALCOHOL_ABUSE                                                  *
## DEPRESSION                                                     **
## DRUG_ABUSE
## LIVER_DISEASE
## OBESITY                                                        *
## PSYCHOSES
## AIDS:ALCOHOL_ABUSE
## AIDS:DEPRESSION
## ALCOHOL_ABUSE:DEPRESSION
## AIDS:DRUG_ABUSE
## ALCOHOL_ABUSE:DRUG_ABUSE
## DEPRESSION:DRUG_ABUSE
## AIDS:LIVER_DISEASE
## ALCOHOL_ABUSE:LIVER_DISEASE
## DEPRESSION:LIVER_DISEASE
## DRUG_ABUSE:LIVER_DISEASE
## AIDS:OBESITY
## ALCOHOL_ABUSE:OBESITY
## DEPRESSION:OBESITY                                             *
## DRUG_ABUSE:OBESITY
## LIVER_DISEASE:OBESITY
## AIDS:PSYCHOSES
## ALCOHOL_ABUSE:PSYCHOSES
## DEPRESSION:PSYCHOSES
## DRUG_ABUSE:PSYCHOSES
## LIVER_DISEASE:PSYCHOSES
## OBESITY:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DEPRESSION
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE
## AIDS:DEPRESSION:DRUG_ABUSE
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE
## AIDS:DEPRESSION:LIVER_DISEASE
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE
## AIDS:DRUG_ABUSE:LIVER_DISEASE
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE
## AIDS:ALCOHOL_ABUSE:OBESITY
## AIDS:DEPRESSION:OBESITY
## ALCOHOL_ABUSE:DEPRESSION:OBESITY
## AIDS:DRUG_ABUSE:OBESITY
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY
## DEPRESSION:DRUG_ABUSE:OBESITY
## AIDS:LIVER_DISEASE:OBESITY
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY
## DEPRESSION:LIVER_DISEASE:OBESITY
## DRUG_ABUSE:LIVER_DISEASE:OBESITY
## AIDS:ALCOHOL_ABUSE:PSYCHOSES
## AIDS:DEPRESSION:PSYCHOSES
## ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES
## AIDS:DRUG_ABUSE:PSYCHOSES
```

```
## ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES
## DEPRESSION:DRUG_ABUSE:PSYCHOSES
## AIDS:LIVER_DISEASE:PSYCHOSES
## ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES
## DEPRESSION:LIVER_DISEASE:PSYCHOSES
## DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
## AIDS:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:OBESITY:PSYCHOSES
## DEPRESSION:OBESITY:PSYCHOSES
## DRUG_ABUSE:OBESITY:PSYCHOSES
## LIVER_DISEASE:OBESITY:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY
## AIDS:DEPRESSION:DRUG_ABUSE:OBESITY
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## AIDS:ALCOHOL_ABUSE:DEPRESSION:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:PSYCHOSES
## AIDS:DEPRESSION:DRUG_ABUSE:PSYCHOSES
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:PSYCHOSES
## AIDS:DEPRESSION:LIVER_DISEASE:PSYCHOSES
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES
## AIDS:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
## DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:OBESITY:PSYCHOSES
## AIDS:DEPRESSION:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES
## AIDS:DRUG_ABUSE:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:DRUG_ABUSE:OBESITY:PSYCHOSES
## DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES
## AIDS:LIVER_DISEASE:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES
## DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES
## DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## AIDS:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY
## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:PSYCHOSES
```

```
## AIDS:ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
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## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:DEPRESSION:OBESITY:PSYCHOSES
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## ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:OBESITY:PSYCHOSES
## AIDS:ALCOHOL_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES
## AIDS:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:DEPRESSION:LIVER_DISEASE:OBESITY:PSYCHOSES
## AIDS:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES
## ALCOHOL_ABUSE:DRUG_ABUSE:LIVER_DISEASE:OBESITY:PSYCHOSES
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## AIDS:ALCOHOL_ABUSE:DEPRESSION:DRUG_ABUSE:LIVER_DISEASE:OBESITY
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## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for gaussian family taken to be 0.2222353)
##
##     Null deviance: 96.172  on 417  degrees of freedom
## Residual deviance: 88.005  on 396  degrees of freedom
## AIC: 580.95
##
## Number of Fisher Scoring iterations: 2
```

Still to describe:

ICU first and last careunit and service

Comorbidities - BMI (too many missing values), break down and sum of comorbidities