

2023-04-22

## Load libraries

```
library(ggplot2)
library(plyr)
library(reshape2)
library(knitr)
library(binom)
library(purrr)
```

```
##
## Attaching package: "purrr"

## The following object is masked from "package:plyr":
##
##   compact
library(forcats)
library(dplyr)

##
## Attaching package: "dplyr"

## The following objects are masked from "package:plyr":
##
##   arrange, count, desc, failwith, id, mutate, rename, summarise,
##   summarize

## The following objects are masked from "package:stats":
##
##   filter, lag

## The following objects are masked from "package:base":
##
##   intersect, setdiff, setequal, union
```

## Load data

```
omega = read.csv("omega.csv")
omega_cardio = read.csv("omega_cardio.csv")
omega_ortho = read.csv("omega_ortho.csv")
omega_other = read.csv("omega_other.csv")
omega_serv = read.csv("omega_serv.csv")
crit = read.csv("crit_cleaned.csv")
ome_dx = read.csv("ome_dx_cleaned.csv")
ome_px = read.csv("ome_px_cleaned.csv")
```

## I. Assessment of the overall patient population and current facility services

### # cardiac

```
cardiac_top_disease = omega_cardio %>%
  group_by(DIAG_DESC) %>%
  dplyr::summarise(count = n(),
                    prop = n()/nrow(omega_cardio) * 100) %>%
  arrange(desc(count)) %>%
  top_n(10)
```

### Top (10) disease entities treated by each group and number of patients in each of these disease entities

```
## Selecting by prop
```

```
kable(cardiac_top_disease, digits = 2, col.names = c("Cardiac condition", "Number of patients", "Percentage of patients"))
```

Cardiac condition	Number of patients	Percentage of patients
INTERMED CORONARY SYND	452	15.41
CONGESTIVE HEART FAILURE	268	9.14
CORONARY ATHEROSCLEROSIS	243	8.29
CHEST PAIN NOS	232	7.91
CEREBR ART OCC NO INFARC	119	4.06
CHEST PAIN NEC	110	3.75
SUBENDO INFRCT-INIT EPISD	107	3.65
ATRIAL FIBRILLATION	102	3.48
INFER AMI NEC-INIT EPISD	81	2.76
SYNCOPE AND COLLAPSE	80	2.73

### # orthopedic

```
ortho_top_disease = omega_ortho %>%
  group_by(DIAG_DESC) %>%
  dplyr::summarise(count = n(),
                    prop = n()/nrow(omega_ortho) * 100) %>%
  arrange(desc(count)) %>%
  top_n(10)
```

```
## Selecting by prop
```

```
kable(ortho_top_disease, digits = 2, col.names = c("Orthopedic condition", "Number of patients", "Percentage of patients"))
```

Orthopedic condition	Number of patients	Percentage of patients
LUMBAR DISC DISPLACEMENT	134	11.19
INTERTROCHANTERIC FX-CL	42	3.51
SECONDARY MALIG NEO BONE	40	3.34
LUMBOSACRAL SPONDYLOSIS	37	3.09
OLD DISRUPT ANT CRUCIATE	37	3.09
CERVICAL DISC DISPLACMNT	28	2.34
DIFFICULT WALK-PELVIS	26	2.17
SPINAL STENOSIS-LUMBAR	26	2.17
SPRAIN ROTATOR CUFF	26	2.17
OSTEOARTHROS NOS-L/LEG	22	1.84

```

num_pat = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(count = n(),
                    perc = n()/nrow(omega) * 100)

num_pat_co = num_pat %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(num_pat_co, digits = 2, col.names = c("Service", "Number of patients", "Percentage of patients"))

```

### Number of patients admitted for cardiac and orthopedic services

Service	Number of patients	Percentage of patients
Cardiology	2933	17.52
Orthopedic	1198	7.15

```

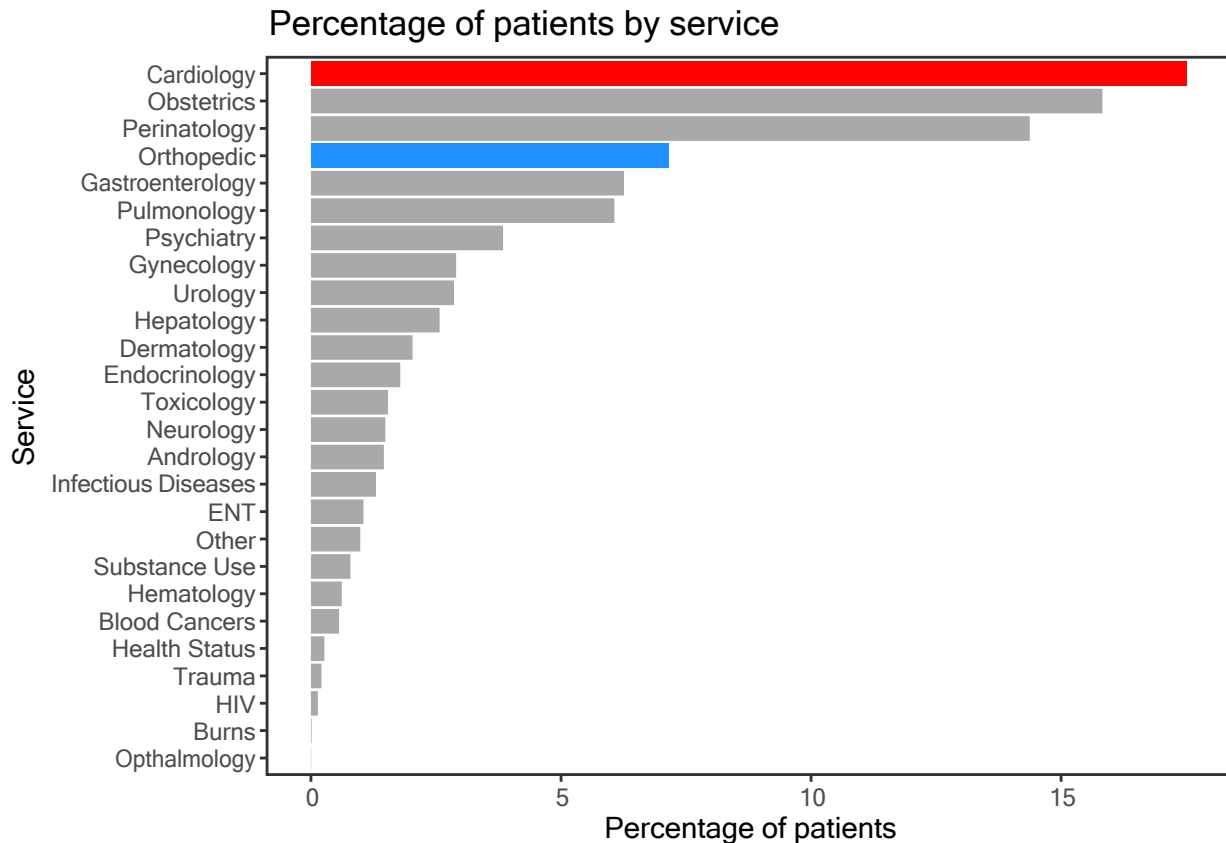
ggplot(data = num_pat,
       mapping = aes(x = reorder(SERVICE, perc), y = perc, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Percentage of patients by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```

```

## Warning: The `<scale>` argument of `guides()` cannot be `FALSE`. Use "none" instead as
## of ggplot2 3.3.4.

```



### Demographics of patient groups Age

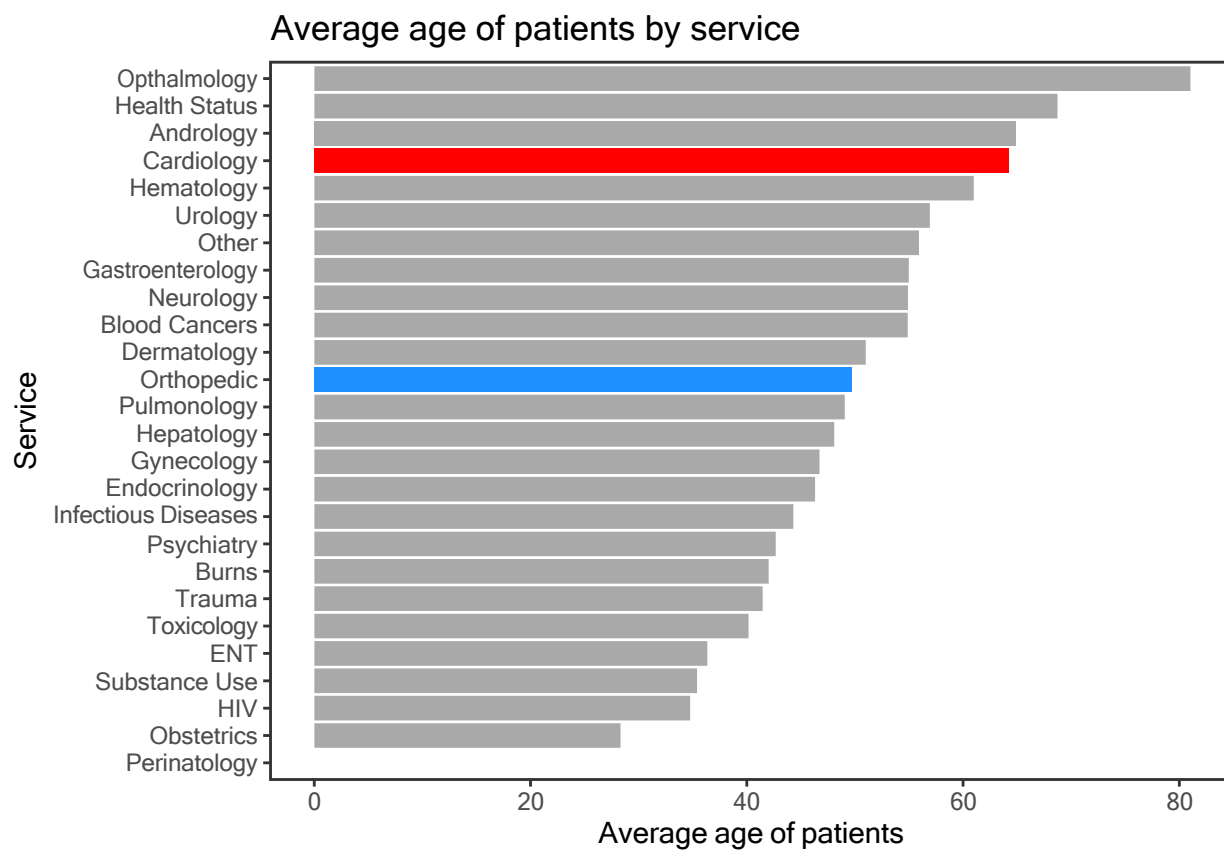
```
avg_age = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(avg_age = mean(AGE, na.rm = TRUE))

avg_age_co = avg_age %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(avg_age_co, digits = 2, col.names = c("Service", "Average age of patients"))
```

Service	Average age of patients
Cardiology	64.24
Orthopedic	49.72

```
ggplot(data = avg_age,
  mapping = aes(x = reorder(SERVICE, avg_age), y = avg_age, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Average age of patients by service") +
  xlab("Service") +
  ylab("Average age of patients") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 13))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
```

```
geom_hline(yintercept = mean(omega_serv$AGE), lty = 2, col = "black")
```



## Race

```
# cardio
cardio_race = omega_cardio %>%
  group_by(RACE) %>%
  dplyr::summarise(count = n())
cardio_race$perc = cardio_race$count/nrow(omega_cardio) * 100
kable(cardio_race, digits = 2, col.names = c("Race", "Number of patients", "Percentage of patients"))
```

Race	Number of patients	Percentage of patients
ASIATIC	5	0.17
BLACK	199	6.78
OTHER	2	0.07
UNKNOWN	294	10.02
WHITE	2433	82.95

```
# ortho
ortho_race = omega_ortho %>%
  group_by(RACE) %>%
  dplyr::summarise(count = n())
ortho_race$perc = ortho_race$count/nrow(omega_ortho) * 100
kable(ortho_race, digits = 2, col.names = c("Race", "Number of patients", "Percentage of patients"))
```

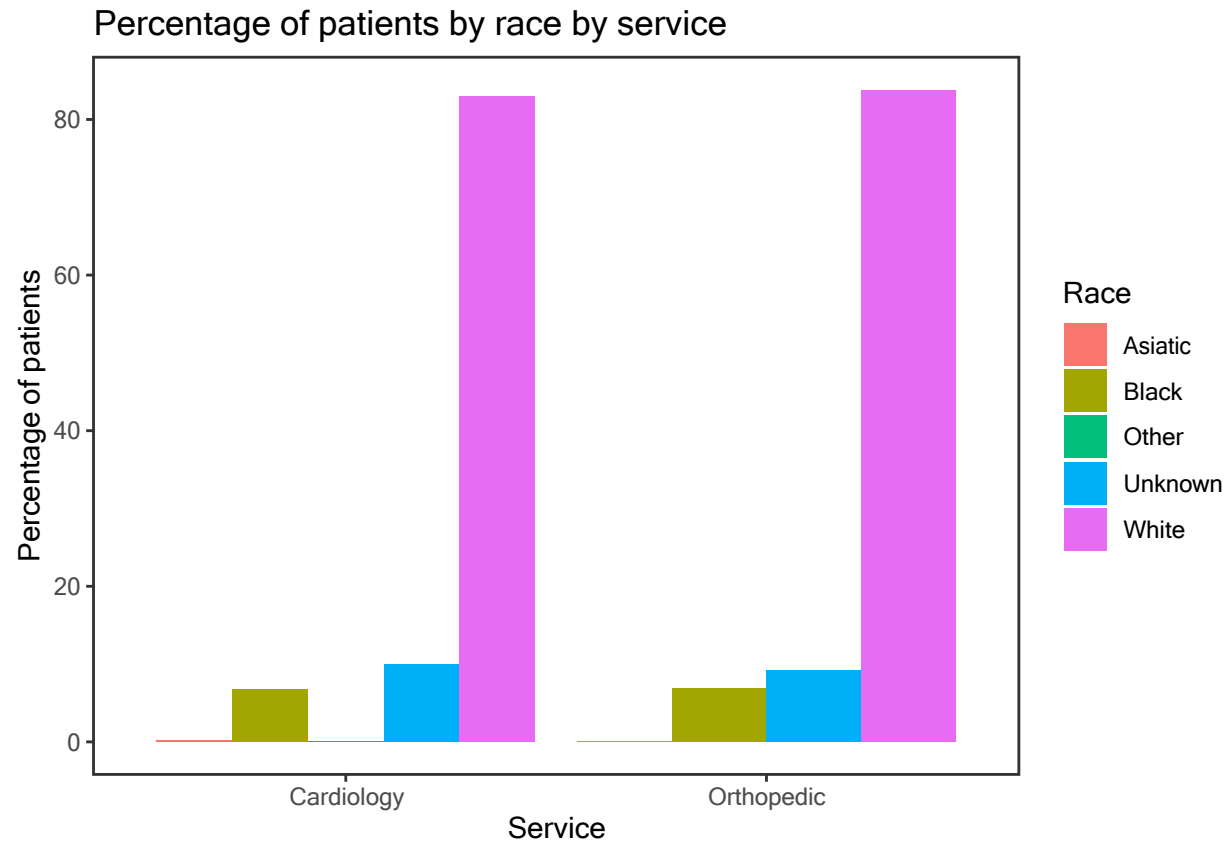
Race	Number of patients	Percentage of patients
ASIATIC	1	0.08
BLACK	83	6.93
UNKNOWN	110	9.18
WHITE	1004	83.81

```
race = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, RACE) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
race$perc = ifelse(race$SERVICE == "Cardiology", race$count/nrow(omega_cardio) * 100, race$count/nrow
```

```
ggplot(data = race,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(RACE))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by race by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Race", lab = c("Asiatic", "Black", "Other", "Unknown", "White")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



## Gender

### # cardio

```
cardio_gender = omega_cardio %>%
  group_by(SEX) %>%
  dplyr::summarise(count = n())
cardio_gender$perc = cardio_gender$count/nrow(omega_cardio) * 100
kable(cardio_gender, digits = 2, col.names = c("Gender", "Number of patients", "Percentage of patients"))
```

Gender	Number of patients	Percentage of patients
FEMALE	1307	44.56
MALE	1626	55.44

### # ortho

```
ortho_gender = omega_ortho %>%
  group_by(SEX) %>%
  dplyr::summarise(count = n())
ortho_gender$perc = ortho_gender$count/nrow(omega_ortho) * 100
kable(ortho_gender, digits = 2, col.names = c("Gender", "Number of patients", "Percentage of patients"))
```

Gender	Number of patients	Percentage of patients
FEMALE	565	47.16
MALE	633	52.84

```

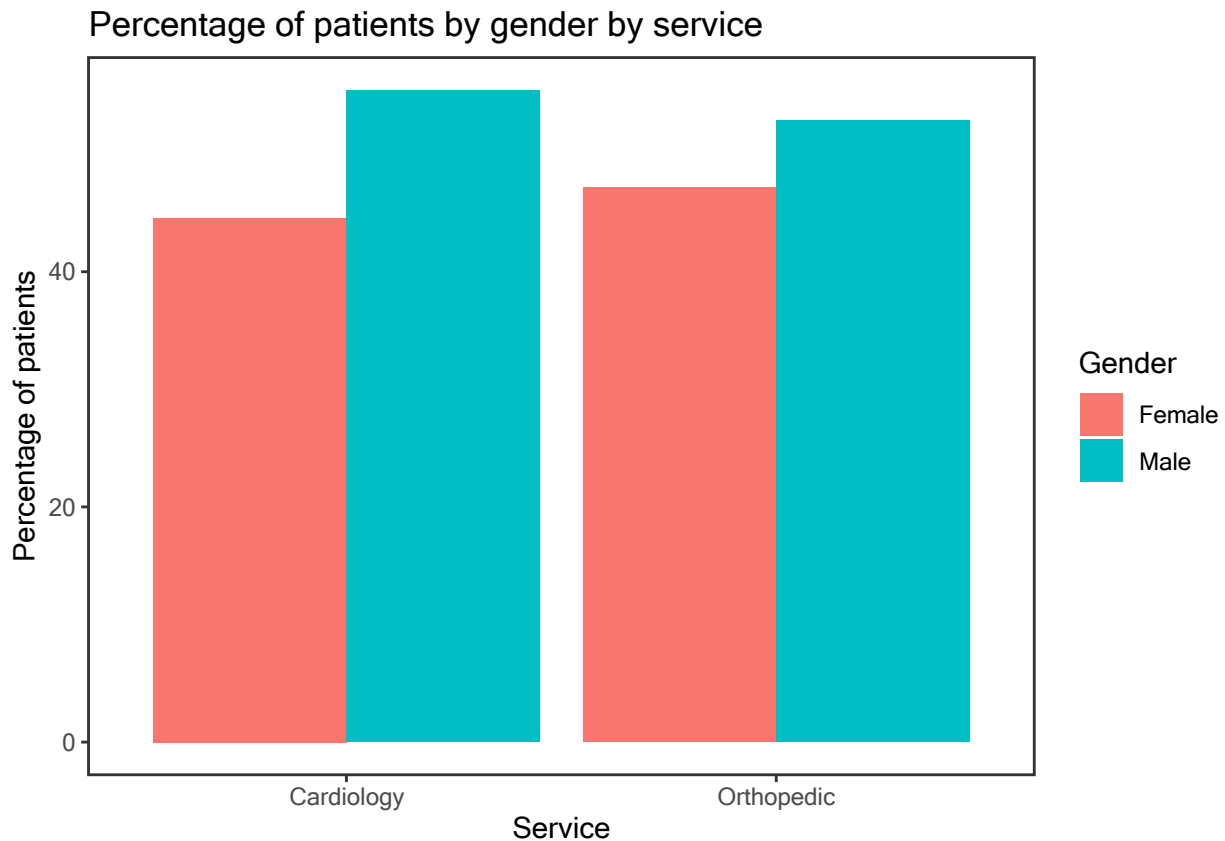
gender = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, SEX) %>%
  dplyr::summarise(count = n())

## `summarise()` has grouped output by "SERVICE". You can override using the
## `.groups` argument.

gender$perc = ifelse(gender$SERVICE == "Cardiology", gender$count/nrow(omega_cardio) * 100, gender$count/nrow(omega_ortho) * 100)

ggplot(data = gender,
       mapping = aes(x = SERVICE, y = perc, fill = as.factor(SEX))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by gender by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Gender", lab = c("Female", "Male")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```



### Distance

```

dist_filt = omega_serv %>% filter(DISTANCE < 65535)
avg_dist = omega_serv %>%
  filter(DISTANCE < 65535) %>%
  group_by(SERVICE) %>%
  dplyr::summarise(avg_dist = mean(DISTANCE, na.rm = TRUE))

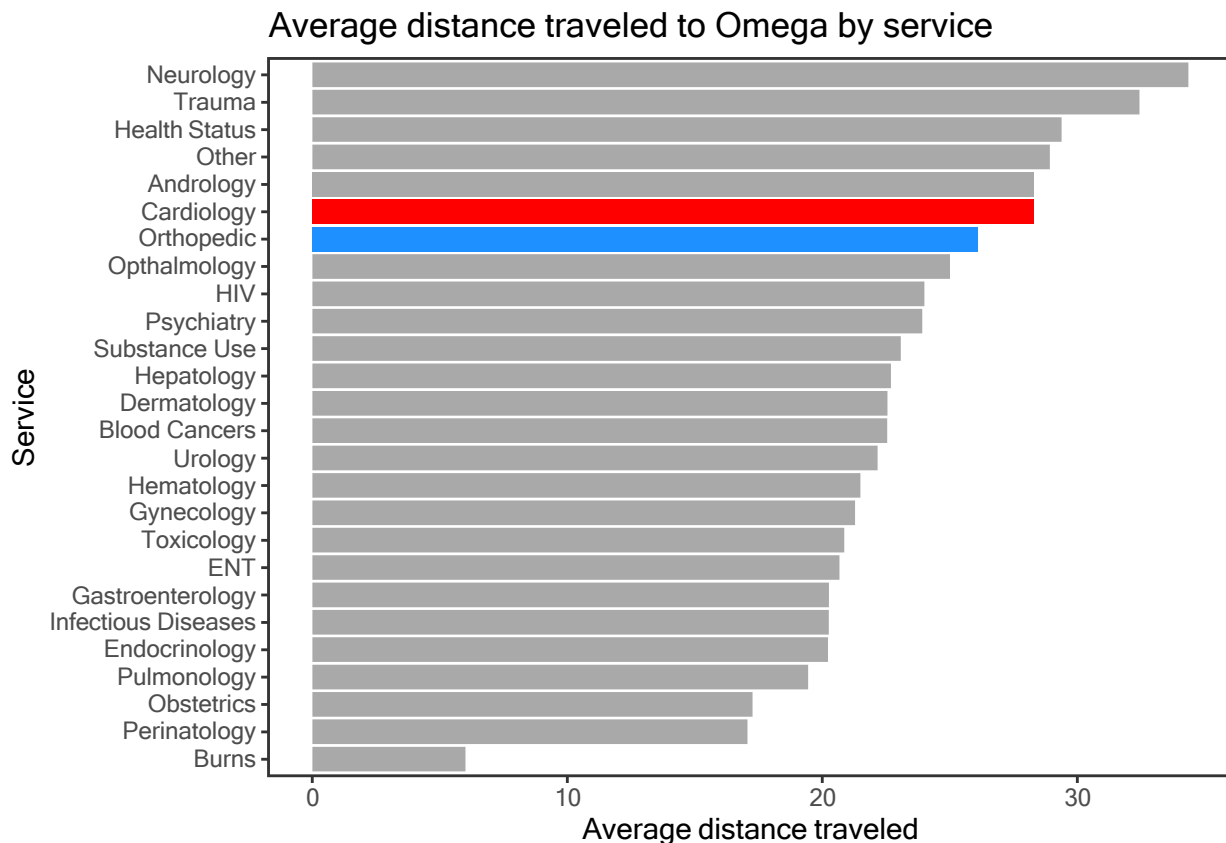
```



```
avg_dist_co = avg_dist %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(avg_dist_co, digits = 2, col.names = c("Service", "Average distance traveled to Omega"))
```

Service	Average distance traveled to Omega
Cardiology	28.30
Orthopedic	26.11

```
ggplot(data = avg_dist,
  mapping = aes(x = reorder(SERVICE, avg_dist), y = avg_dist, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Average distance traveled to Omega by service") +
  xlab("Service") +
  ylab("Average distance traveled") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 20))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = mean(dist_filt$DISTANCE), lty = 2, col = "black")
```



## Relevant admission/discharge data Admission

### # cardio

```
cardio_adm = omega_cardio %>%
  group_by(ADM_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
cardio_adm$perc = cardio_adm$count/nrow(omega_cardio) * 100
kable(cardio_adm, digits = 2, col.names = c("Admission description", "Number of patients", "Percentage of patients"))
```

Admission description	Number of patients	Percentage of patients
GENERAL SURGERY	314	10.71
GYNECOLOGY	1	0.03
INTERNAL MEDICINE	2602	88.71
PEDIATRICS	1	0.03
REHABILITATION	15	0.51

### # ortho

```
ortho_adm = omega_ortho %>%
  group_by(ADM_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
ortho_adm$perc = ortho_adm$count/nrow(omega_ortho) * 100
kable(ortho_adm, digits = 2, col.names = c("Admission description", "Number of patients", "Percentage of patients"))
```

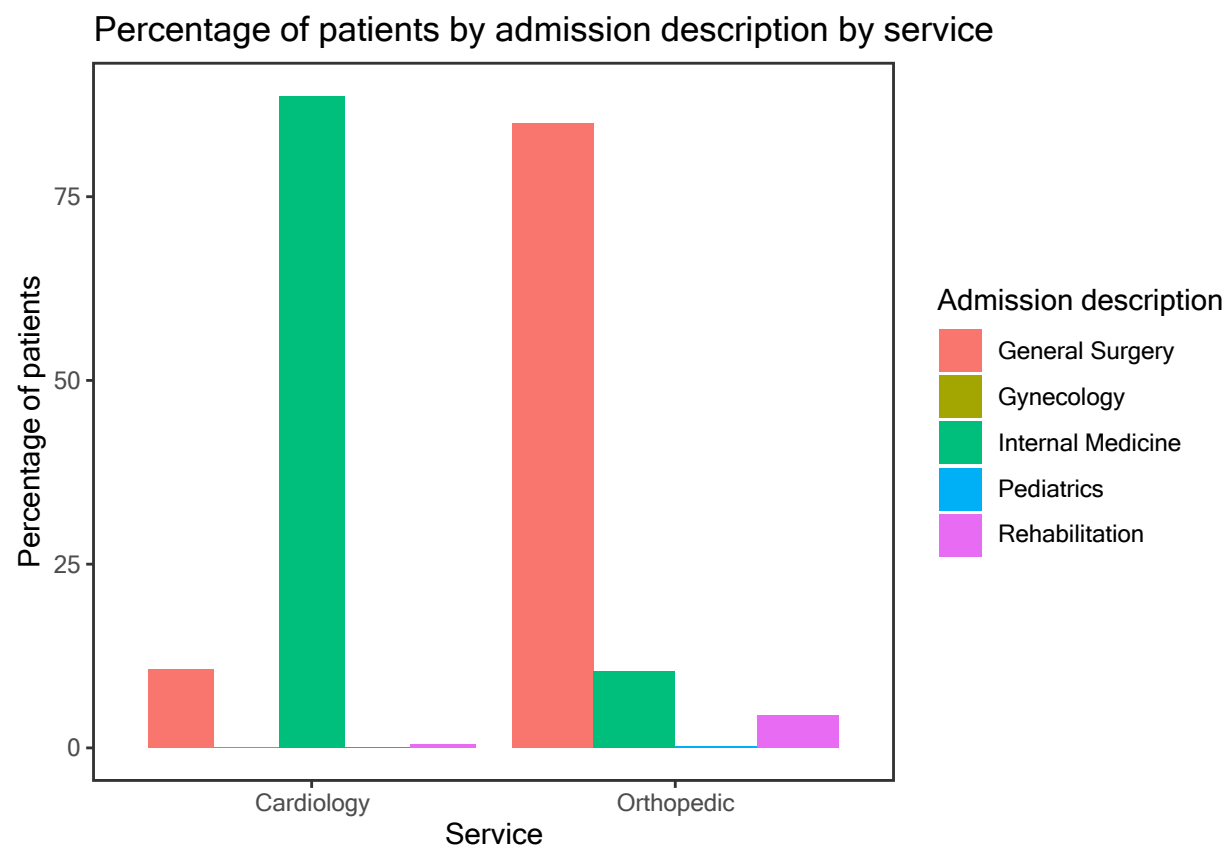
Admission description	Number of patients	Percentage of patients
GENERAL SURGERY	1018	84.97
INTERNAL MEDICINE	125	10.43
PEDIATRICS	2	0.17
REHABILITATION	53	4.42

```
adm = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, ADM_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
adm$perc = ifelse(adm$SERVICE == "Cardiology", adm$count/nrow(omega_cardio) * 100, adm$count/nrow(omega_ortho) * 100)

ggplot(data = adm,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(ADM_SVC_DESCRIPTOR))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by admission description by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Admission description", lab = c("General Surgery", "Gynecology", "Internal Medicine", "Pediatrics", "Rehabilitation")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



## Discharge

### # cardio

```
cardio_disch = omega_cardio %>%
  group_by(DIS_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
cardio_disch$perc = cardio_disch$count/nrow(omega_cardio) * 100
kable(cardio_disch, digits = 2, col.names = c("Discharge description", "Number of patients", "Percentage of patients"))
```

Discharge description	Number of patients	Percentage of patients
GENERAL SURGERY	313	10.67
GYNECOLOGY	1	0.03
INTERNAL MEDICINE	2603	88.75
PEDIATRICS	1	0.03
REHABILITATION	15	0.51

### # ortho

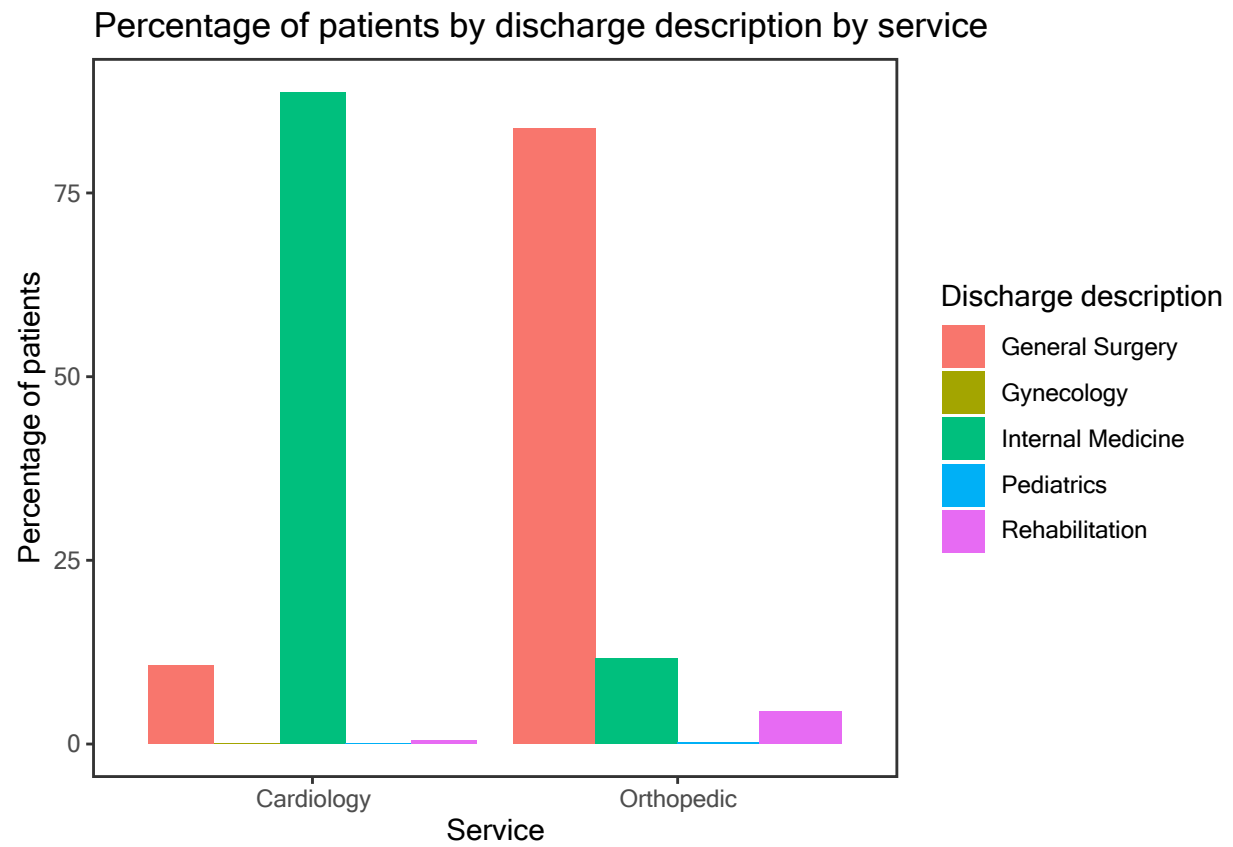
```
ortho_disch = omega_ortho %>%
  group_by(DIS_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
ortho_disch$perc = ortho_disch$count/nrow(omega_ortho) * 100
kable(ortho_disch, digits = 2, col.names = c("Discharge description", "Number of patients", "Percentage of patients"))
```

Discharge description	Number of patients	Percentage of patients
GENERAL SURGERY	1003	83.72
INTERNAL MEDICINE	140	11.69
PEDIATRICS	2	0.17
REHABILITATION	53	4.42

```
disch = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, DIS_SVC_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
disch$perc = ifelse(disch$SERVICE == "Cardiology", disch$count/nrow(omega_cardio) * 100, disch$count/nr  
ggplot(data = disch,  
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(DIS_SVC_DESCRIPTOR))) +  
  geom_bar(stat = "identity", position = "dodge") +  
  ggtitle("Percentage of patients by discharge description by service") +  
  xlab("Service") +  
  ylab("Percentage of patients") +  
  scale_fill_discrete(name = "Discharge description", lab = c("General Surgery", "Gynecology", "Internal Medicine", "Pediatrics", "Rehabilitation")) +  
  theme_bw() +  
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



## Disposition

### # cardio

```
cardio_disp = omega_cardio %>%
  group_by(DISPOSTN_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
cardio_disp$perc = cardio_disp$count/nrow(omega_cardio) * 100
kable(cardio_disp, digits = 2, col.names = c("Disposition description", "Number of patients", "Percentage of patients"))
```

Disposition description	Number of patients	Percentage of patients
ADULT FOSTER CARE/GROUP HOME	9	0.31
AGAINST MEDICAL ADVICE	10	0.34
DIED	99	3.38
HOME HEALTH CARE OR HOME HOSPICE CARE	228	7.77
HOME/ROUTINE	2401	81.86
INTERMEDIATE CARE FACILITY	29	0.99
OTHER FACILITY (EG PRISON)	7	0.24
SKILLED NURSING FACILITY	67	2.28
TRANSFERRED TO ANOTHER ACUTE SHORT TERM HOSPITAL	9	0.31
TRANSFERRED TO LT PSYCH FROM OTHER SYSTEM FACILITY	10	0.34
TRANSFERRED TO OMEGA FROM OTHER SYSTEM FACILITY	1	0.03
TRANSFERRED TO PHYSICIAN REHAB OTHER THAN OMEGA	3	0.10
TRANSFERRED TO REHAB FROM OTHER SYSTEM FACILITY	60	2.05

### # ortho

```
ortho_disp = omega_ortho %>%
  group_by(DISPOSTN_DESCRIPTOR) %>%
  dplyr::summarise(count = n())
ortho_disp$perc = ortho_disp$count/nrow(omega_ortho) * 100
kable(ortho_disp, digits = 2, col.names = c("Disposition description", "Number of patients", "Percentage of patients"))
```

Disposition description	Number of patients	Percentage of patients
ADULT FOSTER CARE/GROUP HOME	2	0.17
AGAINST MEDICAL ADVICE	2	0.17
DIED	12	1.00
HOME HEALTH CARE OR HOME HOSPICE CARE	92	7.68
HOME/ROUTINE	960	80.13
INTERMEDIATE CARE FACILITY	10	0.83
SKILLED NURSING FACILITY	65	5.43
TRANSFERRED TO ANOTHER ACUTE SHORT TERM HOSPITAL	1	0.08
TRANSFERRED TO LT PSYCH FROM OTHER SYSTEM FACILITY	4	0.33
TRANSFERRED TO PHYSICIAN REHAB OTHER THAN OMEGA	3	0.25
TRANSFERRED TO REHAB FROM OTHER SYSTEM FACILITY	47	3.92

```

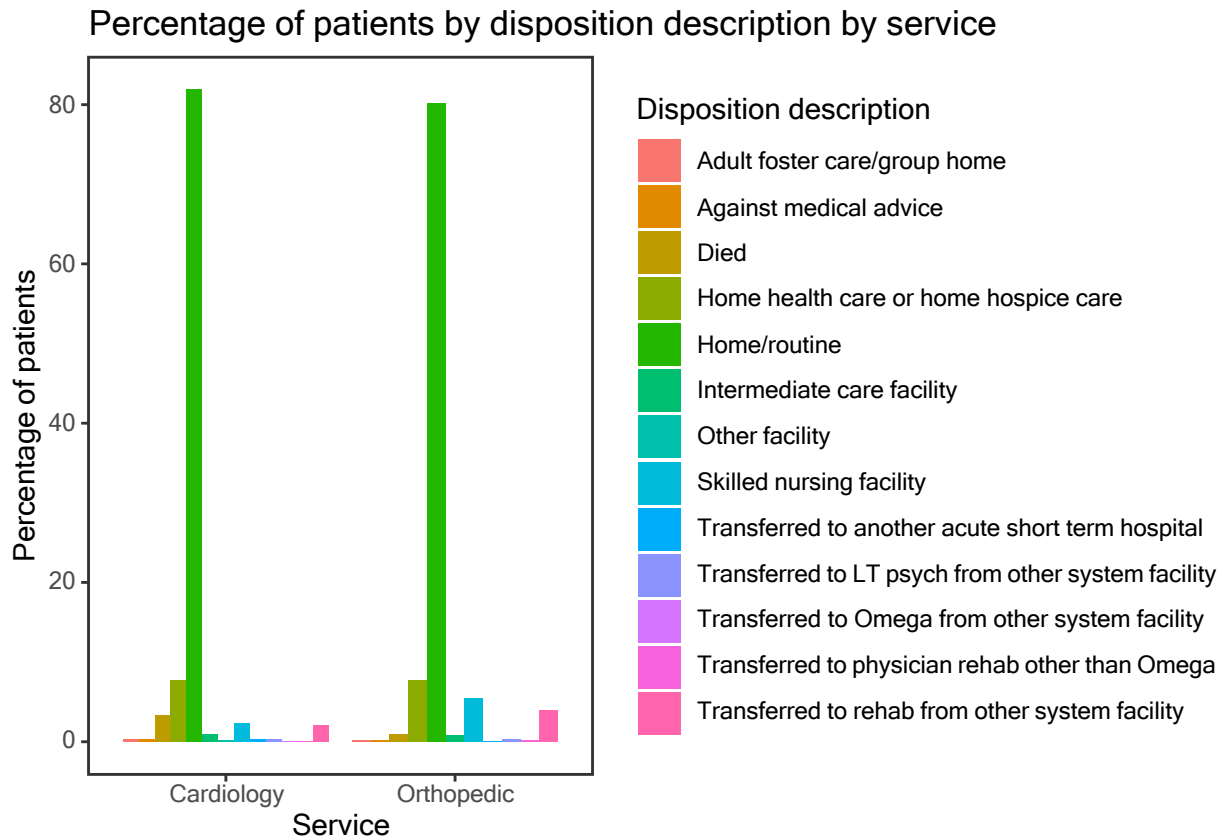
disp = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, DISPOSTN_DESCRIPT) %>%
  dplyr::summarise(count = n())

## `summarise()` has grouped output by "SERVICE". You can override using the
## `.groups` argument.

disp$perc = ifelse(disp$SERVICE == "Cardiology", disp$count/nrow(omega_cardio) * 100, disp$count/nrow(omega_ortho))

ggplot(data = disp,
       mapping = aes(x = SERVICE, y = perc, fill = as.factor(DISPOSTN_DESCRIPT))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by disposition description by service") + xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Disposition description",
                     lab = c("Adult foster care/group home",
                              "Against medical advice",
                              "Died",
                              "Home health care or home hospice care",
                              "Home/routine",
                              "Intermediate care facility",
                              "Other facility",
                              "Skilled nursing facility",
                              "Transferred to another acute short term hospital",
                              "Transferred to LT psych from other system facility",
                              "Transferred to Omega from other system facility",
                              "Transferred to physician rehab other than Omega",
                              "Transferred to rehab from other system facility")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```



```
avg_los = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(avg_los = mean(LOS, na.rm = TRUE))

avg_los_co = avg_los %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(avg_los_co, digits = 2, col.names = c("Service", "Average LOS"))
```

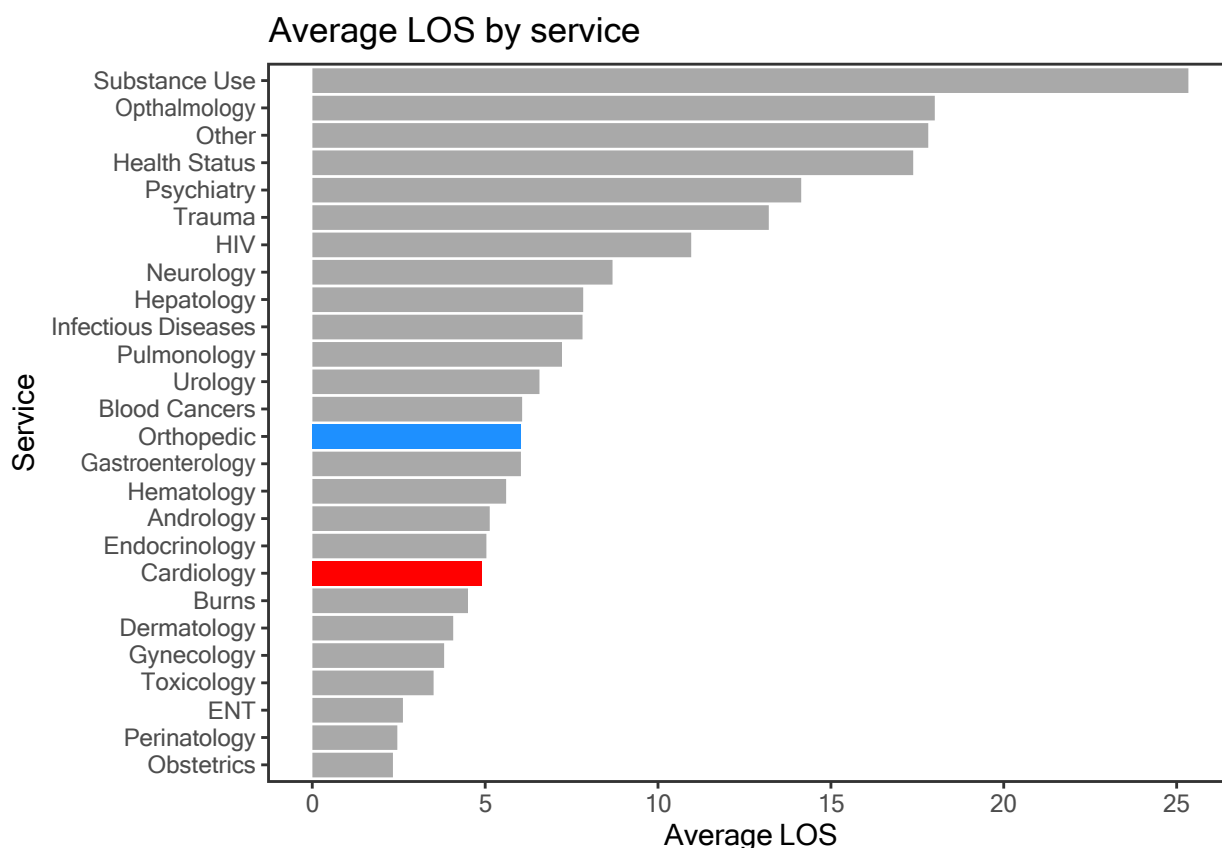
### LOS information

Service	Average LOS
Cardiology	4.90
Orthopedic	6.04

```
ggplot(data = avg_los,
  mapping = aes(x = reorder(SERVICE, avg_los), y = avg_los, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Average LOS by service") +
  xlab("Service") +
  ylab("Average LOS") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 13))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
```



```
geom_hline(yintercept = mean(omega_serv$LOS), lty = 2)
```



## II. Intensity/utilization indicators

```
dist_filt = omega_serv %>% filter(DISTANCE < 65535)
avg_dist = omega_serv %>%
  group_by(SERVICE) %>%
  filter(DISTANCE < 65535) %>%
  dplyr::summarise(avg_dist = mean(DISTANCE, na.rm = TRUE))

avg_dist_co = avg_dist %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(avg_dist_co, digits = 2, col.names = c("Service", "Average distance traveled to Omega"))
```

**Reputation: how far do these patients travel to receive cardiac and orthopedic services compared to other services?**

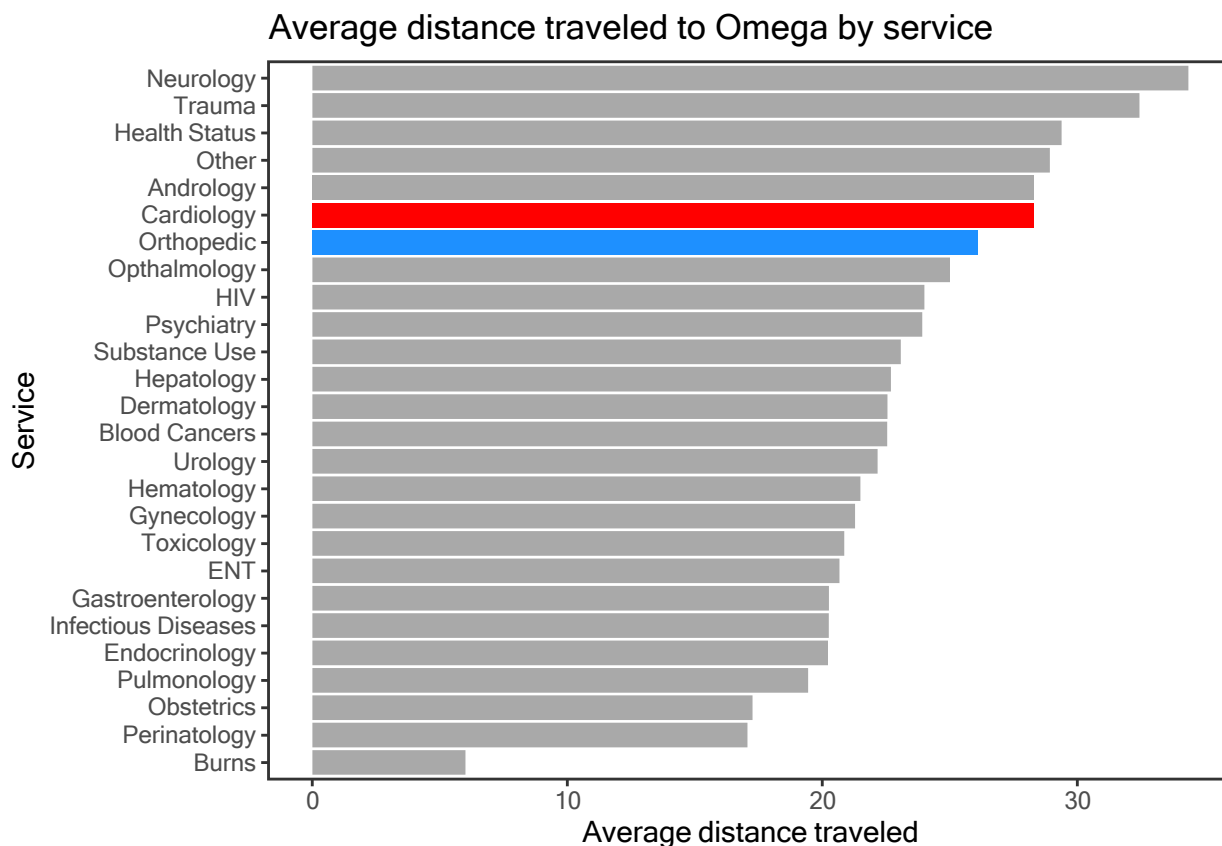
Service	Average distance traveled to Omega
Cardiology	28.30
Orthopedic	26.11

```
ggplot(data = avg_dist,
  mapping = aes(x = reorder(SERVICE, avg_dist), y = avg_dist, fill = SERVICE)) +
  geom_bar(stat = "identity") +
```

```

ggtitle("Average distance traveled to Omega by service") +
xlab("Service") +
ylab("Average distance traveled") +
scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
guides(fill = FALSE) +
coord_flip() +
theme_bw() +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
geom_hline(yintercept = mean(dist_filt$DISTANCE), lty = 2)

```



### Death rate Within 48 hours

```

omega_serv$DIED_WI_48 = ifelse(omega_serv$DIED_WI_48 == 1, 1, 0)

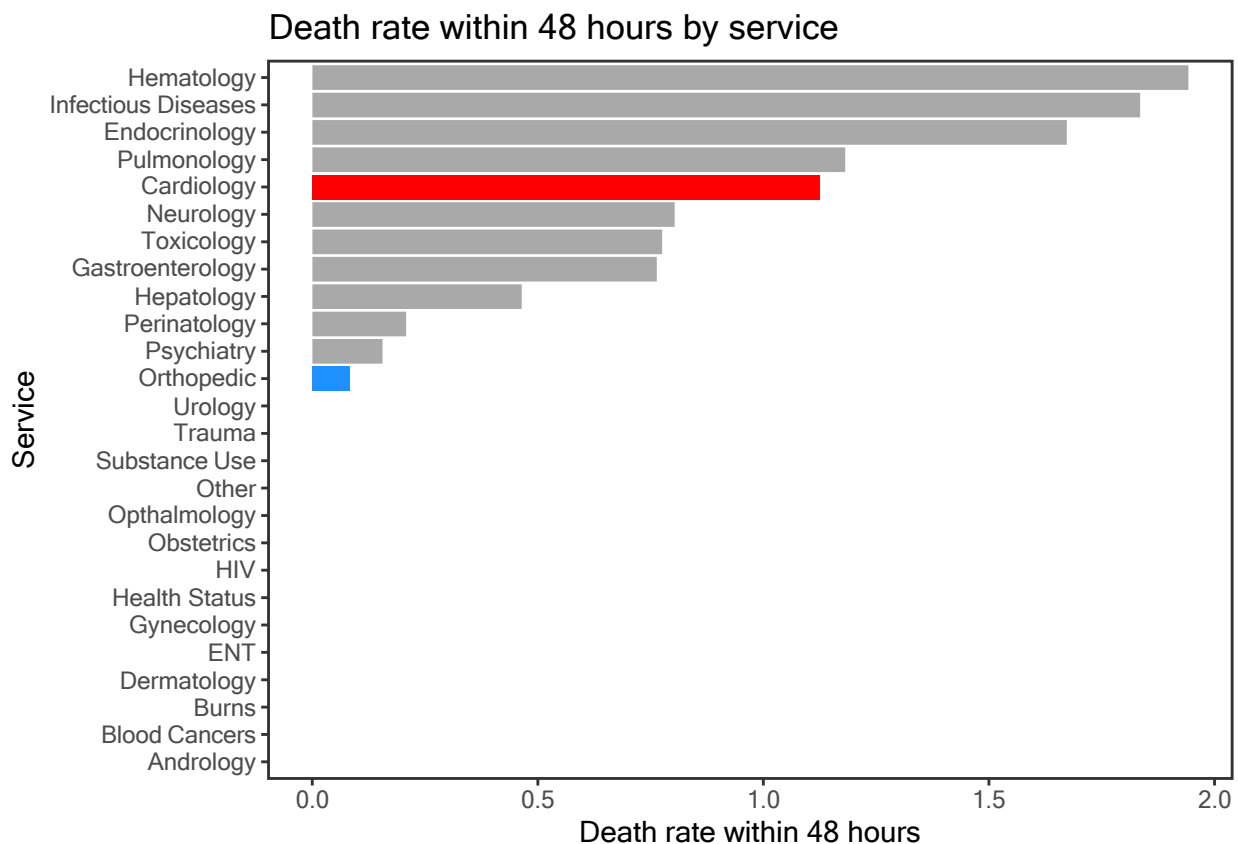
dw48 = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(dw48 = mean(DIED_WI_48, na.rm = TRUE)*100)

dw48_co = dw48 %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(dw48_co, digits = 2, col.names = c("Service", "Death rate within 48 hours"))

```

Service	Death rate within 48 hours
Cardiology	1.13
Orthopedic	0.08

```
ggplot(data = dw48,
       mapping = aes(x = reorder(SERVICE, dw48), y = dw48, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Death rate within 48 hours by service") +
  xlab("Service") +
  ylab("Death rate within 48 hours") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = mean(omega_serv$DIED_WI_48, na.rm = TRUE)*100, lty = 2)
```



## In OR

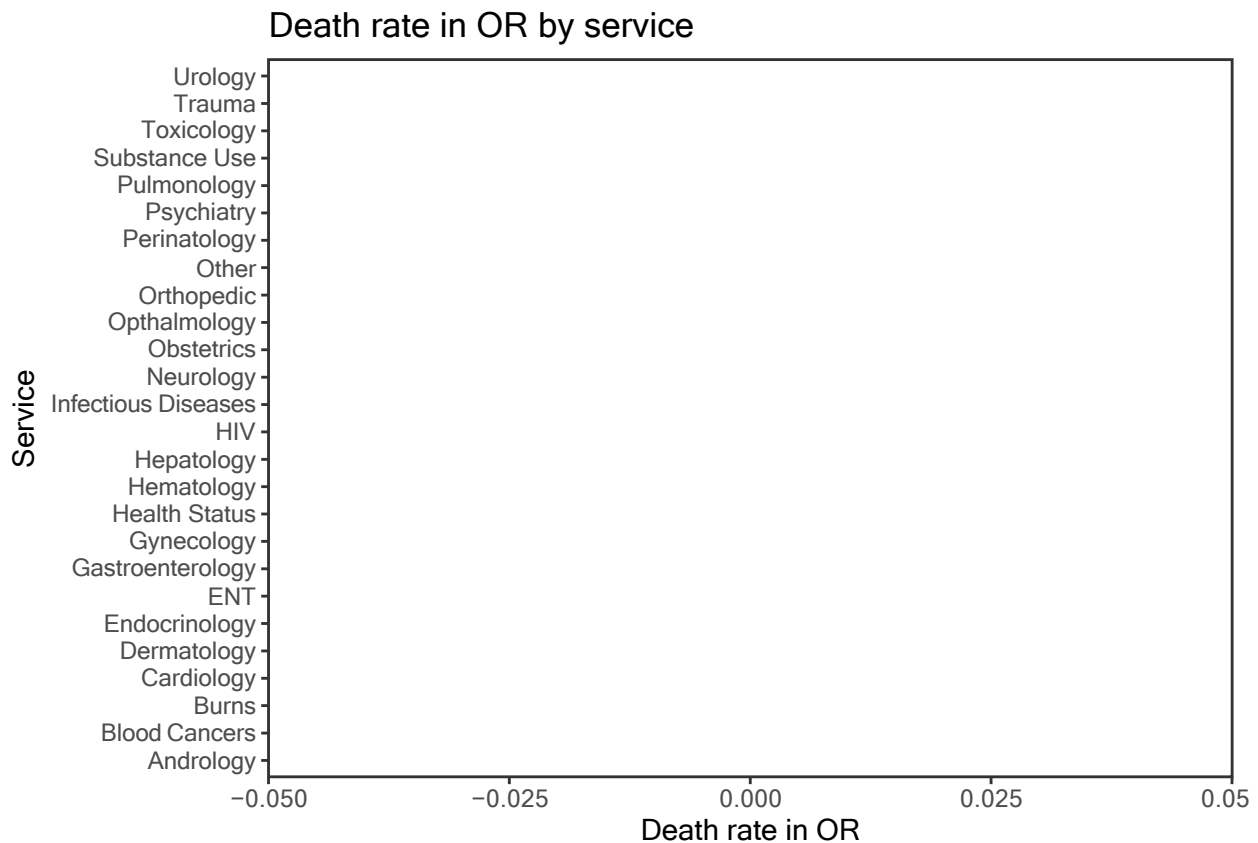
```
omega_serv$DIED_IN_OR = ifelse(omega_serv$DIED_IN_OR == 1, 1, 0)

dor = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(dor = mean(DIED_IN_OR, na.rm = TRUE)*100)

dor_co = dor %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(dor_co, digits = 2, col.names = c("Service", "Death rate in OR"))
```

Service	Death rate in OR
Cardiology	0
Orthopedic	0

```
ggplot(data = dor,
       mapping = aes(x = reorder(SERVICE, dor), y = dor, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Death rate in OR by service") +
  xlab("Service") +
  ylab("Death rate in OR") +
  scale_fill_manual(values = c(rep("black", 3), "red", rep("black", 13), "dodgerblue", rep("black", 9)))
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



### Post-operative

```
omega_serv$DIED_PSTOP = ifelse(omega_serv$DIED_PSTOP == 1, 1, 0)

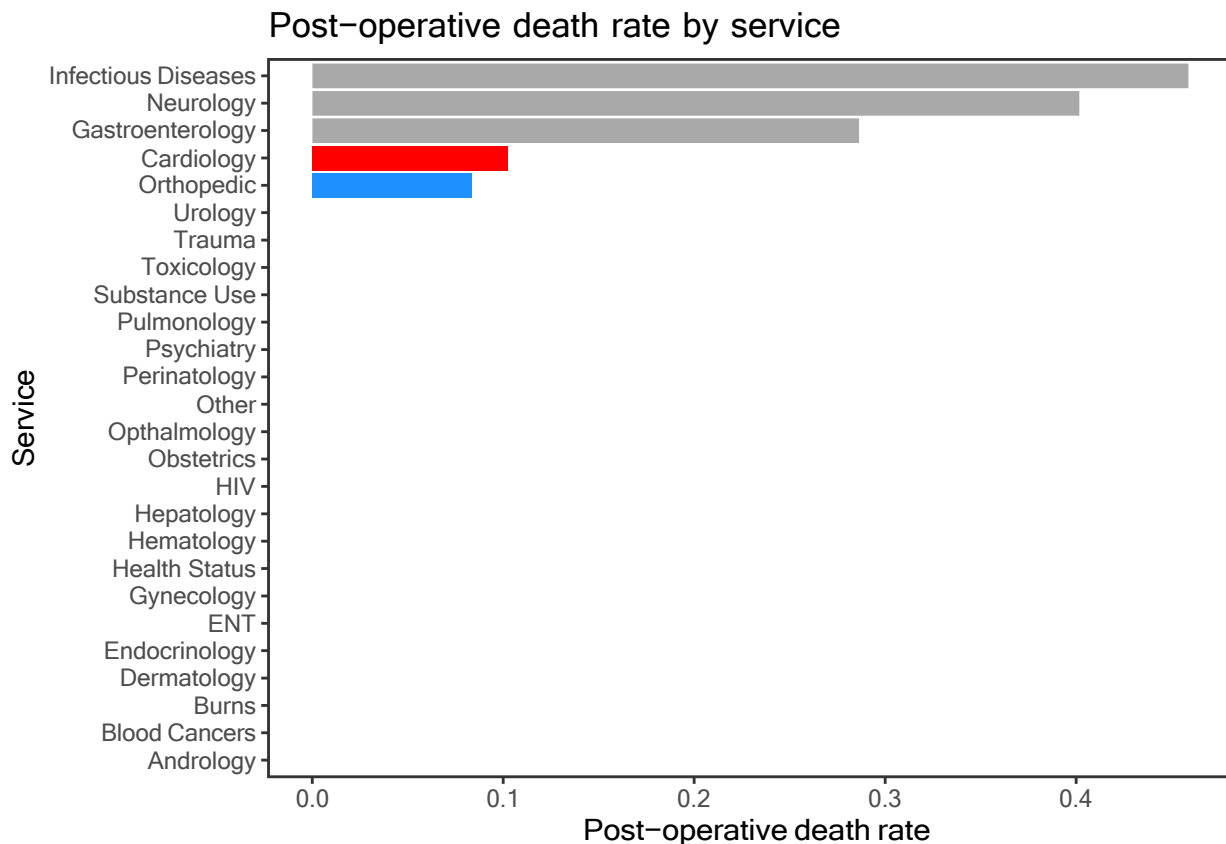
pstop = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(pstop = mean(DIED_PSTOP, na.rm = TRUE)*100)

pstop_co = pstop %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
```

```
kable(pstop_co, digits = 2, col.names = c("Service", "Post-operative death rate"))
```

Service	Post-operative death rate
Cardiology	0.10
Orthopedic	0.08

```
ggplot(data = pstop,
       mapping = aes(x = reorder(SERVICE, pstop), y = pstop, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Post-operative death rate by service") +
  xlab("Service") +
  ylab("Post-operative death rate") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 20))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = mean(omega_serv$DIED_PSTOP, na.rm = TRUE)*100, lty = 2)
```



### On arrival

```
omega_serv$DOA = ifelse(omega_serv$DOA == 1, 1, 0)

doa = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(doa = mean(DOA, na.rm = TRUE)*100)
```

```

doa_co = doa %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(doa_co, digits = 2, col.names = c("Service", "Death rate on arrival"))

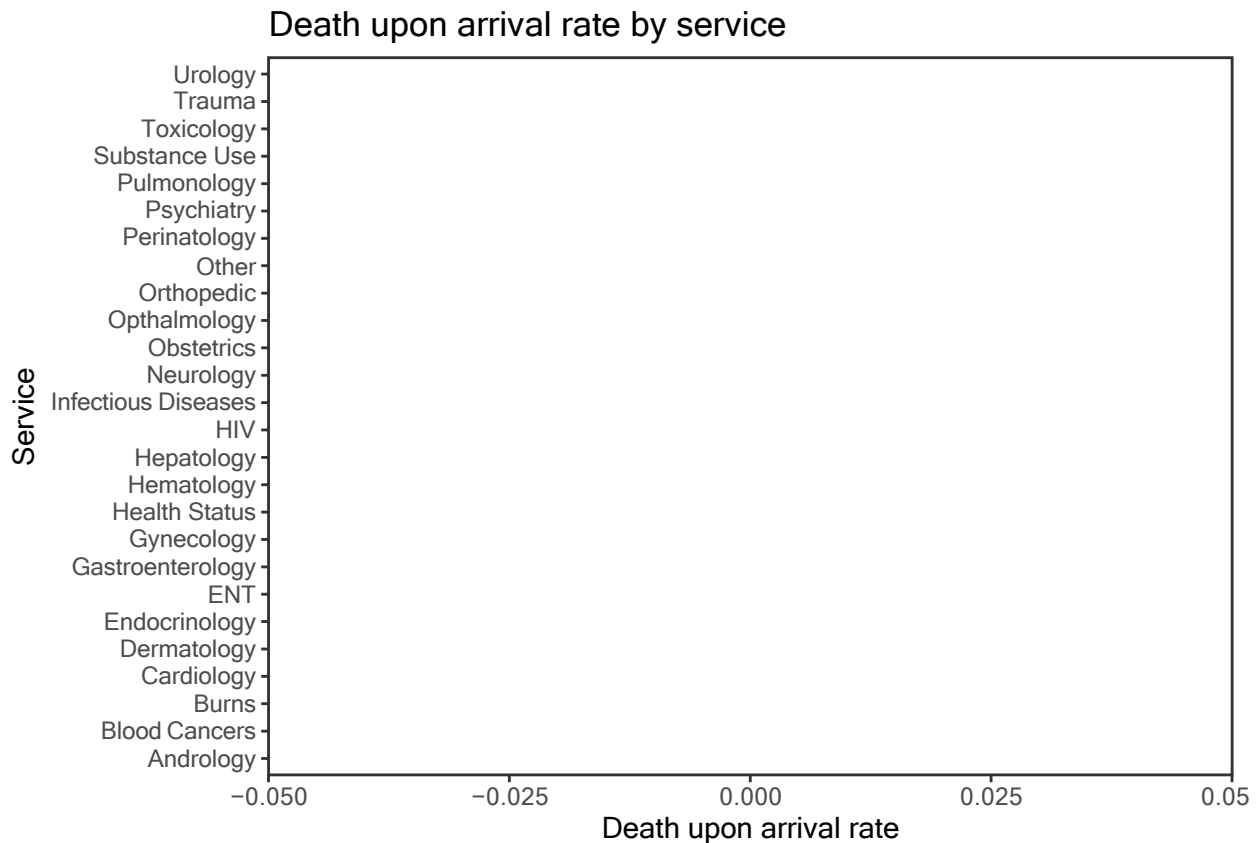
```

Service	Death rate on arrival
Cardiology	0
Orthopedic	0

```

ggplot(data = doa,
  mapping = aes(x = reorder(SERVICE, doa), y = doa, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Death upon arrival rate by service") +
  xlab("Service") +
  ylab("Death upon arrival rate") +
  scale_fill_manual(values = c(rep("black", 3), "red", rep("black", 13), "dodgerblue", rep("black", 9)))
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```



### in ER

```

omega_serv$ER_DEATH = ifelse(omega_serv$ER_DEATH == 1, 1, 0)

er = omega_serv %>%

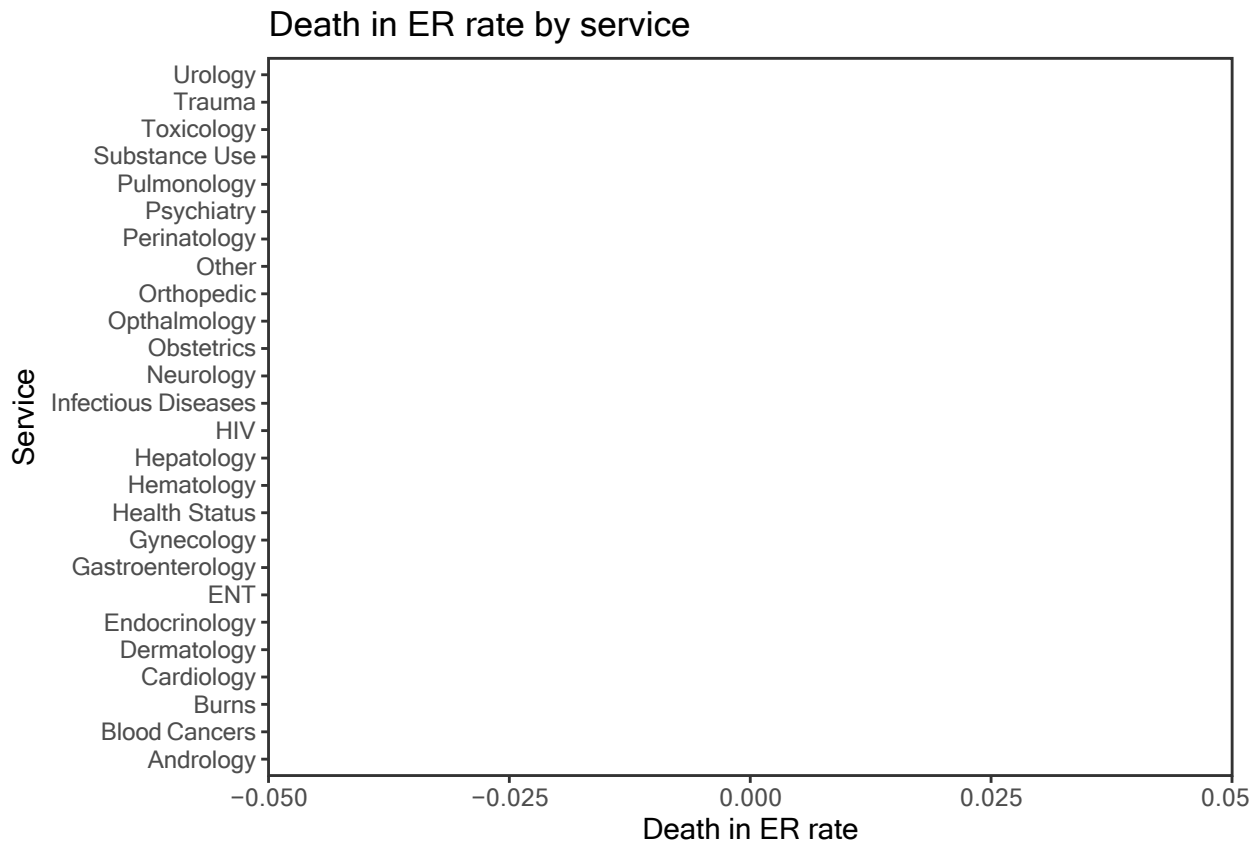
```

```
group_by(SERVICE) %>%
dplyr::summarise(er = mean(ER_DEATH, na.rm = TRUE)*100)

er_co = er %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(er_co, digits = 2, col.names = c("Service", "Death in ER rate"))
```

Service	Death in ER rate
Cardiology	0
Orthopedic	0

```
ggplot(data = er,
       mapping = aes(x = reorder(SERVICE, er), y = er, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Death in ER rate by service") +
  xlab("Service") +
  ylab("Death in ER rate") +
  scale_fill_manual(values = c(rep("black", 3), "red", rep("black", 13), "dodgerblue", rep("black", 9)))
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



**Overall**

```

omega_serv$DEATH = ifelse(omega_serv$DIED_IN_OR == 1 | omega_serv$DIED_PSTOP == 1 | omega_serv$DIED_WI_
death = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(death = mean(DEATH, na.rm = TRUE)*100)

death_co = death %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(death_co, digits = 2, col.names = c("Service", "Overall death rate"))

```

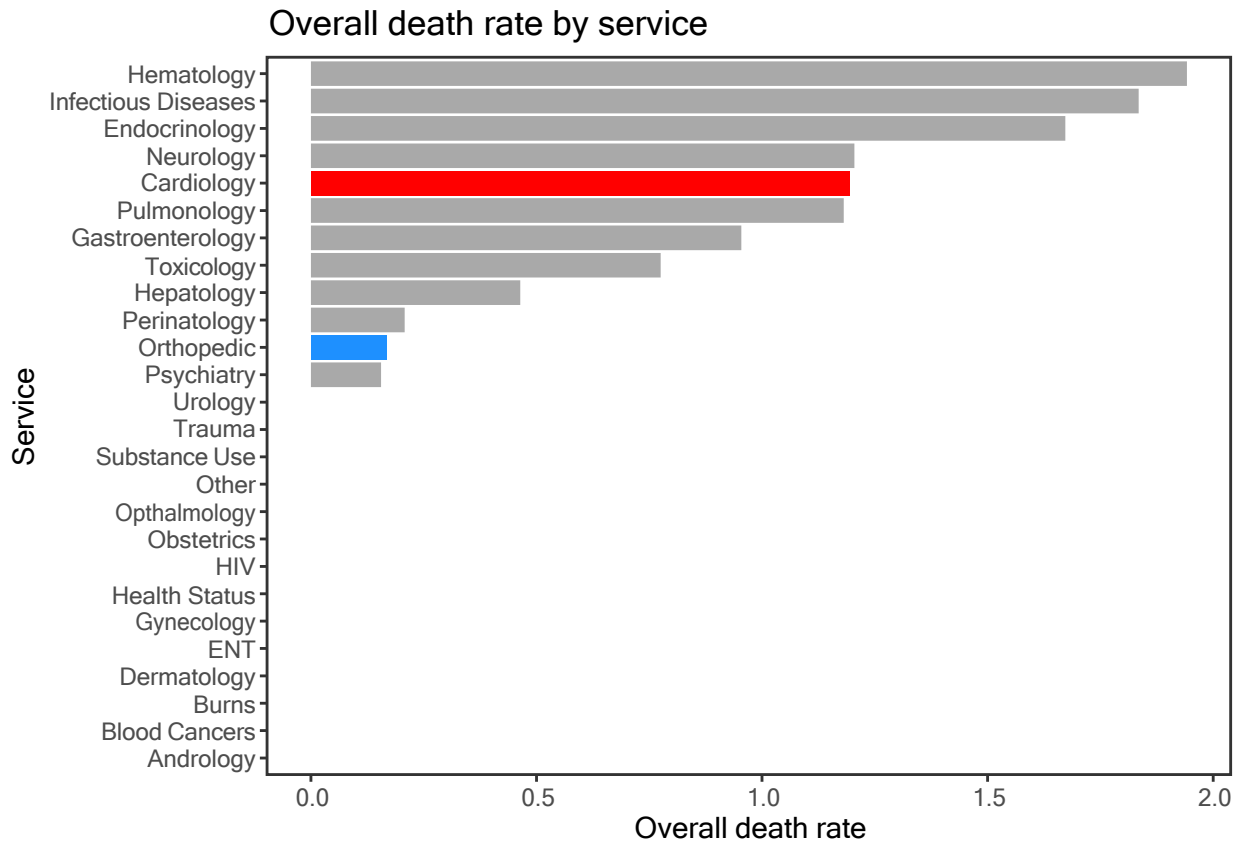
Service	Overall death rate
Cardiology	1.19
Orthopedic	0.17

```

ggplot(data = death,
  mapping = aes(x = reorder(SERVICE, death), y = death, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Overall death rate by service") +
  xlab("Service") +
  ylab("Overall death rate") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = mean(omega_serv$DEATH, na.rm = TRUE)*100, lty = 2)

```





```
omega_serv$TEACH_SVC = ifelse(omega_serv$TEACH_SVC == "TEACHING", 1, 0)

teach = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(teach = mean(TEACH_SVC)*100)

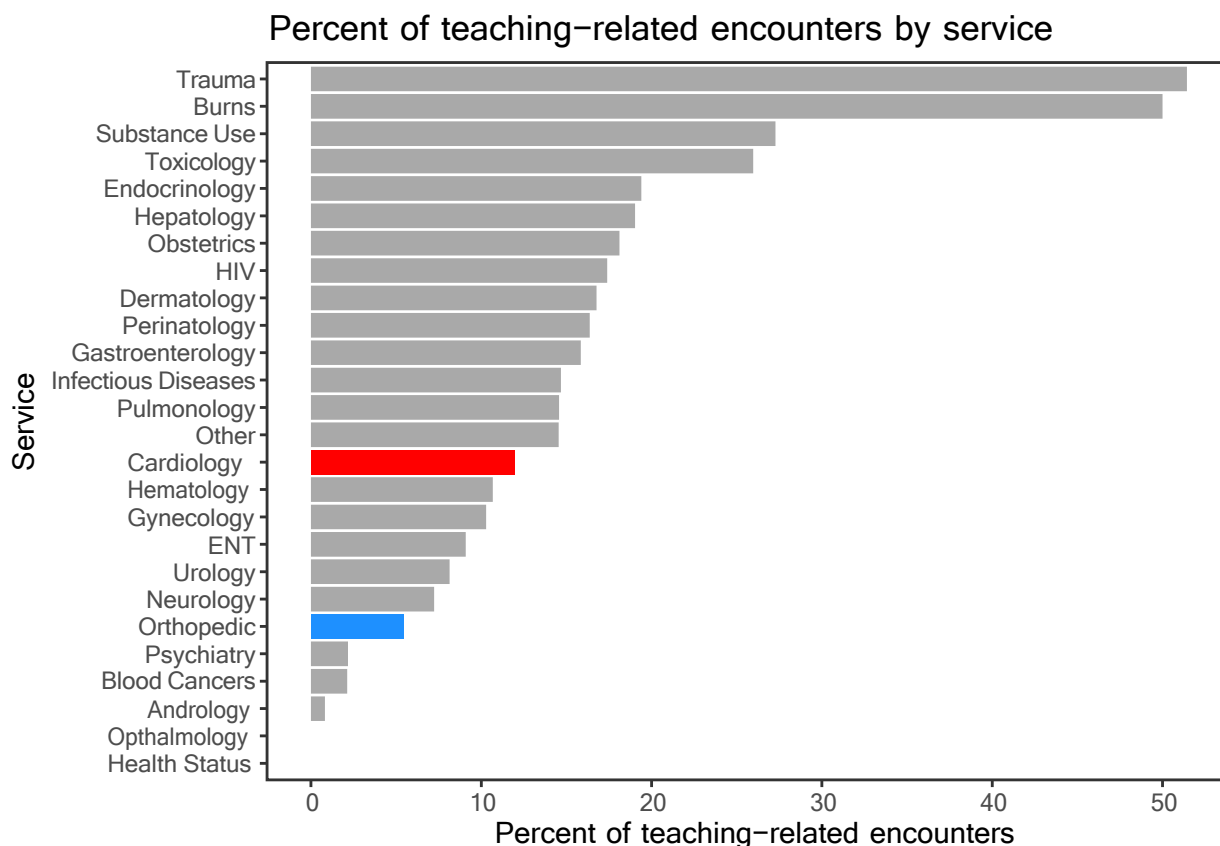
teach_co = teach %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(teach_co, digits = 2, col.names = c("Service", "Percent of teaching-related encounters"))
```

### Percent of encounters where service provided was teaching-related

Service	Percent of teaching-related encounters
Cardiology	11.97
Orthopedic	5.43

```
ggplot(data = teach,
  mapping = aes(x = reorder(SERVICE, teach), y = teach, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Percent of teaching-related encounters by service") +
  xlab("Service") +
  ylab("Percent of teaching-related encounters") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 10))) +
  guides(fill = FALSE) +
```

```
coord_flip() +
theme_bw() +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
geom_hline(yintercept = mean(omega_serv$TEACH_SVC, na.rm = TRUE)*100, lty = 2)
```



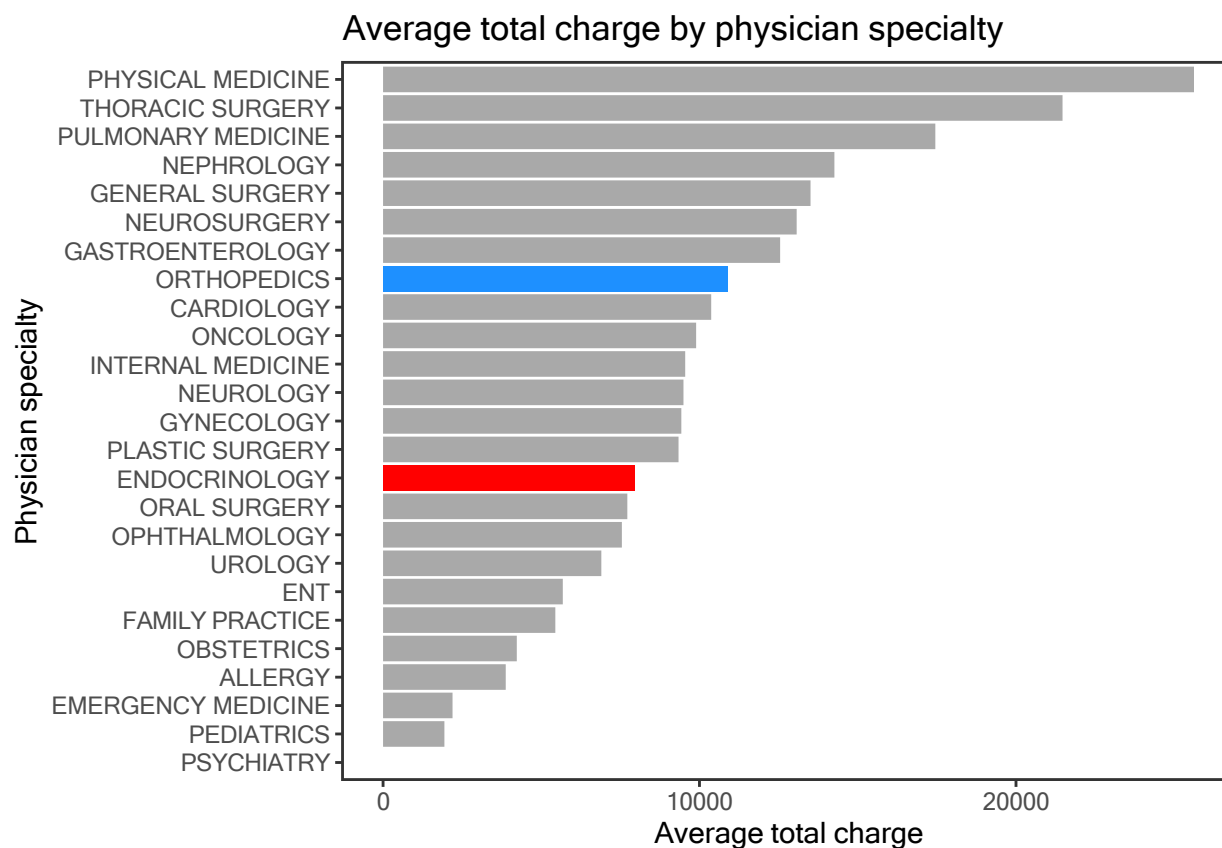
```
physician = omega_serv %>%
  group_by(PHYS_A_SPC_DESCRIPTOR) %>%
  dplyr::summarise(avg.charge = mean(TOT_CHARGE, na.rm = TRUE))
phys_co = physician %>%
  filter(PHYS_A_SPC_DESCRIPTOR %in% c("CARDIOLOGY", "ORTHOPEDICS"))
kable(phys_co, digits = 2, col.names = c("Physician specialty", "Average total charge"))
```

**Physician/surgeon information (e.g., admitting physician, specialty type, operating surgeon)**

Physician specialty	Average total charge
CARDIOLOGY	10367.52
ORTHOPEDICS	10884.38

```
ggplot(data = physician,
  mapping = aes(x = reorder(PHYS_A_SPC_DESCRIPTOR, avg.charge), y = avg.charge, fill = PHYS_A_SPC_DESCRIPTOR) +
  geom_bar(stat = "identity") +
  ggtitle("Average total charge by physician specialty") +
  xlab("Physician specialty") +
  ylab("Average total charge") +
```

```
scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
guides(fill = FALSE) +
coord_flip() +
theme_bw() +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
geom_hline(yintercept = mean(omega_serv$TOT_CHARGE, na.rm = TRUE), lty = 2)
```



```
omega_serv$REQ_EXT_REV = ifelse(omega_serv$EXT_REV > 0, 1, 0)

ext_rev = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(ext_rev = mean(EXT_REV)*100)

ext_rev_co = ext_rev %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(ext_rev_co, digits = 2, col.names = c("Service", "Percent of visits requiring external review"))
```

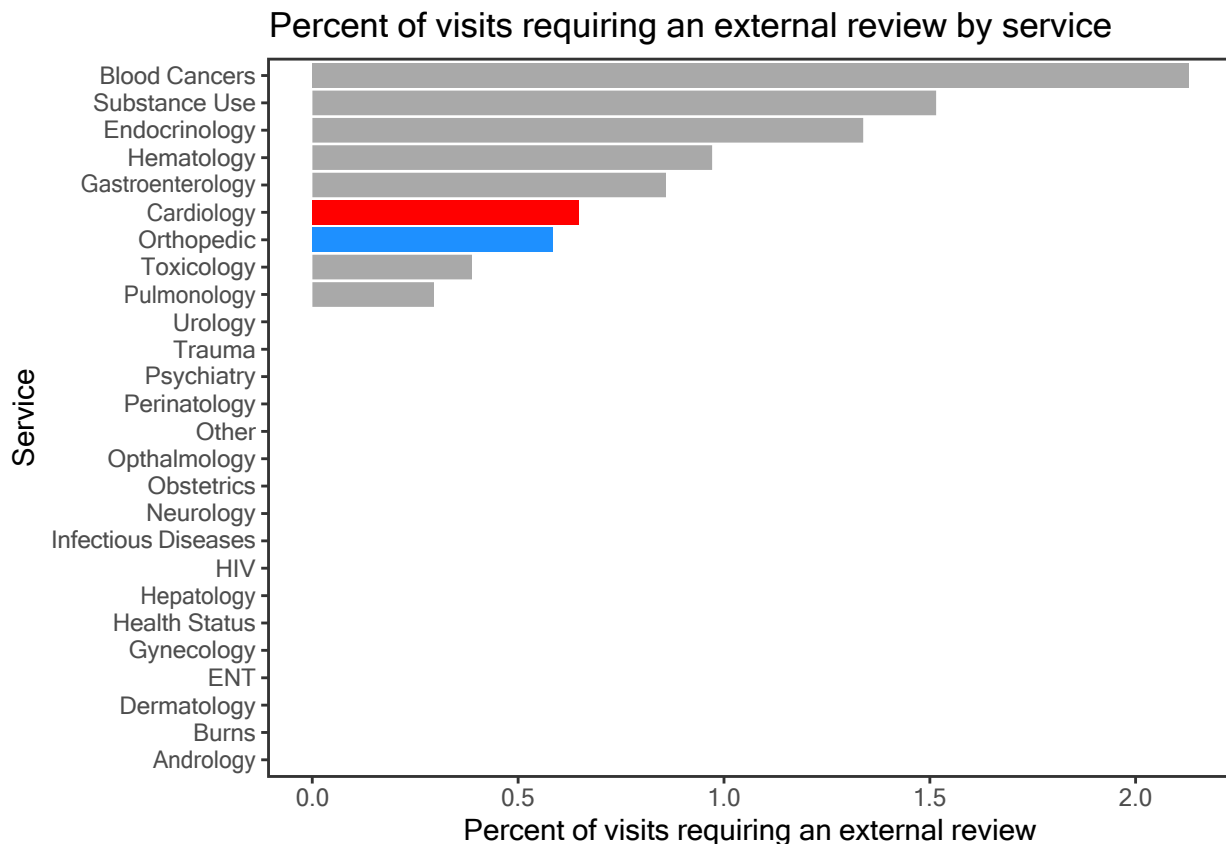
#### Percent of visits requiring an external review

Service	Percent of visits requiring external review
Cardiology	0.65
Orthopedic	0.58

```

ggplot(data = ext_rev,
       mapping = aes(x = reorder(SERVICE, ext_rev), y = ext_rev, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Percent of visits requiring an external review by service") +
  xlab("Service") +
  ylab("Percent of visits requiring an external review") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = mean(omega_serv$REQ_EXT_REV, na.rm = TRUE)*100, lty = 2)

```



```

omega_crit = omega[,c("PAT_NO", "ADM_DATE", "DIS_DATE", "SERVICE")]
crit = merge(crit, omega_crit, by = c("PAT_NO", "ADM_DATE", "DIS_DATE"), all.x = TRUE)
crit_num = crit %>%
  group_by(SERVICE) %>%
  dplyr::summarise(num = n())
omega_num = omega %>% group_by(SERVICE) %>% dplyr::summarise(count = n())
crit_count = merge(crit_num, omega_num, by = "SERVICE")

crit_count$prop = crit_count$num/crit_count$count * 100
crit_count = na.omit(crit_count)

crit_count_co = crit_count %>%

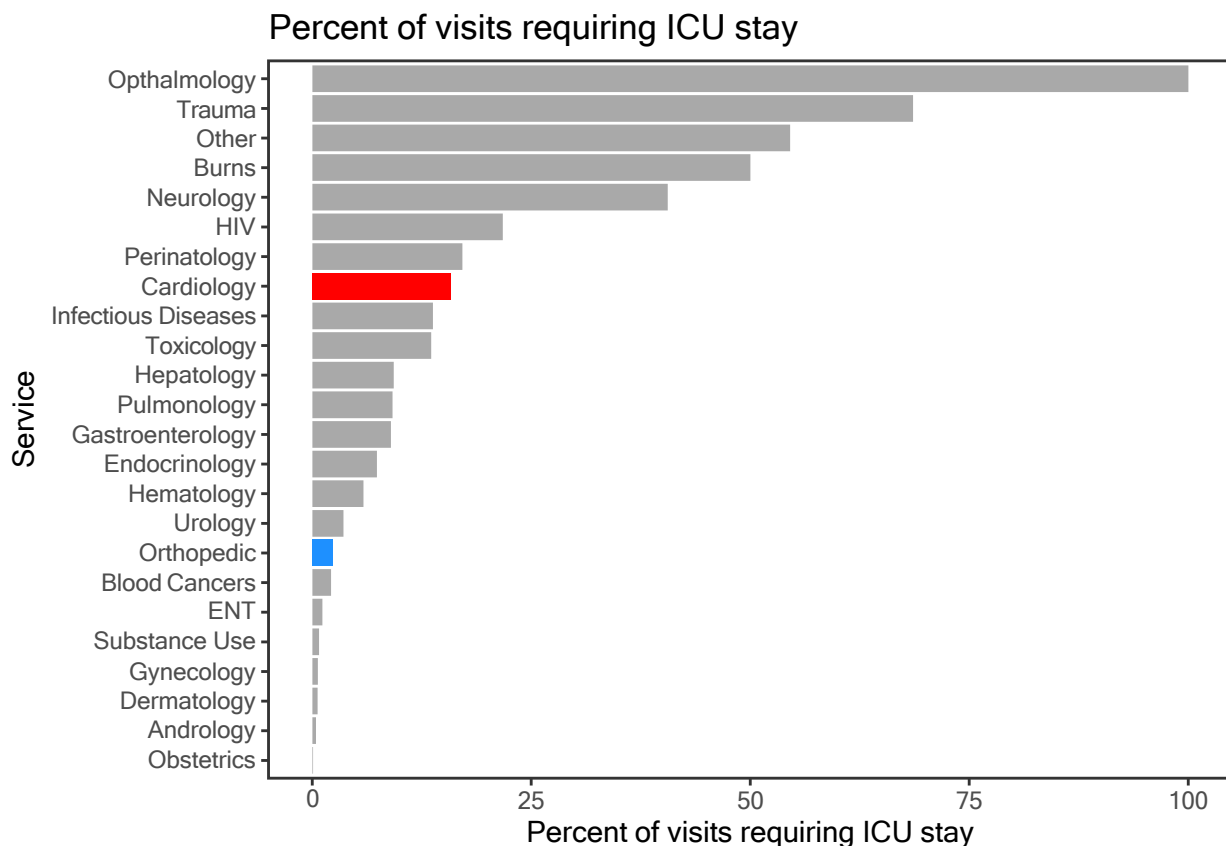
```

```
filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  select("SERVICE", "prop")
kable(crit_count_co, digits = 2, col.names = c("Service", "Percent of visits with ICU stay"))
```

### ICU/CCU information

Service	Percent of visits with ICU stay
Cardiology	15.79
Orthopedic	2.34

```
ggplot(data = crit_count,
       mapping = aes(x = reorder(SERVICE, prop), y = prop, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Percent of visits requiring ICU stay") +
  xlab("Service") +
  ylab("Percent of visits requiring ICU stay") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 12), "dodgerblue", rep("darkgrey", 12))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
  geom_hline(yintercept = (sum(crit_count$num)/sum(crit_count$count))*100, lty = 2)
```



```
new_omega = crit %>% inner_join(omega_serv)
```

```
## Joining, by = c("PAT_NO", "ADM_DATE", "DIS_DATE", "SERVICE")
```

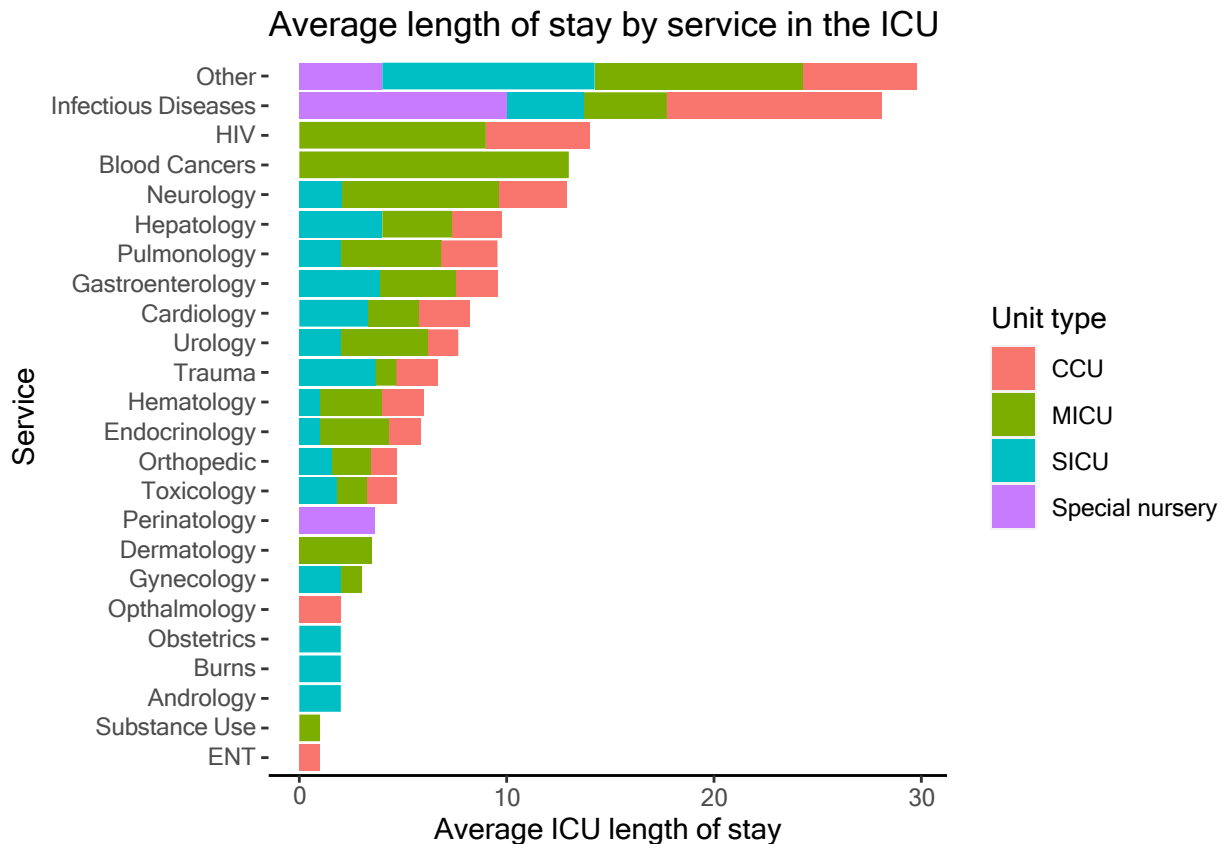
```
CCU_COUNTS = table(new_omega$ICU)/nrow(new_omega)*100

plot = new_omega %>%
  group_by(SERVICE, ICU) %>%
  dplyr::summarise(avg_ICU_LOS = mean(ICU_LOS)) %>%
  arrange(desc(avg_ICU_LOS))

## `summarise()` has grouped output by "SERVICE". You can override using the
## `.groups` argument.

total_length = plot %>% group_by(SERVICE) %>% dplyr::summarise(tot = sum(avg_ICU_LOS))
plot = merge(plot, total_length, by = "SERVICE")

plot %>%
  ggplot(aes(x = reorder(SERVICE, tot), y = avg_ICU_LOS, fill = ICU)) +
  coord_flip() +
  geom_bar(stat = "identity")+
  labs(x = "Service", y = "Average ICU length of stay", title = "Average length of stay by service in
  theme(panel.background = element_blank(),
        panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),
        axis.line = element_line(colour = "black"),
        legend.background = element_rect(fill = "white"),
        legend.position = "right") +
  scale_fill_discrete(name = "Unit type", lab = c("CCU", "MICU", "SICU", "Special nursery"))
```



**Principal operations performed on each group Top 10 operations for each service**

```
cardiac_top_op = subset(omega_cardio, !is.na(OP_DESC))
ortho_top_op = subset(omega_ortho, !is.na(OP_DESC))
```

#### # cardiac

```
cardiac_top_op = cardiac_top_op %>%
  group_by(OP_DESC) %>%
  dplyr::summarise(count = n(),
                   prop = n()/nrow(omega_cardio) * 100) %>%
  arrange(desc(count)) %>%
  top_n(10)
```

## Selecting by prop

```
kable(cardiac_top_op, digits = 2, col.names = c("Cardiac operation", "Number of patients", "Percentage
```

Cardiac operation	Number of patients	Percentage of patients
PTCA-1 VESSEL NO LYSIS	455	15.51
LEFT HEART CARDIAC CATH	309	10.54
DX ULTRASOUND-HEART	246	8.39
C.A.T. SCAN OF HEAD	190	6.48
PTCA-MULTIPLE VESSELS	81	2.76
CARDIAC ELECTRPHYS STUDY	74	2.52
INSERT IV LEAD-ATR&VENT	55	1.88
DX ULTRASOUND-VASCULAR	54	1.84
RT/LEFT HEART CARD CATH	52	1.77
CONTR CEREBR ARTERIOGRAM	51	1.74

#### # orthopedic

```
ortho_top_op = ortho_top_op %>%
  group_by(OP_DESC) %>%
  dplyr::summarise(count = n(),
                   prop = n()/nrow(omega_ortho) * 100) %>%
  arrange(desc(count)) %>%
  top_n(10)
```

## Selecting by prop

```
kable(ortho_top_op, digits = 2, col.names = c("Orthopedic operation", "Number of patients", "Percentage
```

Orthopedic operation	Number of patients	Percentage of patients
IV DISC EXCISION	192	16.03
SPINAL CANAL EXPLOR NEC	76	6.34
OPEN REDUC-INT FIX FEMUR	70	5.84
OP RED-INT FIX TIB/FIBUL	61	5.09
CRUCIATE LIG REPAIR NEC	58	4.84
EXCIS DEBRIDEMENT WOUND	32	2.67
SHOULDER ARTHROPLAST NEC	27	2.25
BONE SCAN	19	1.59
OP RED-INT FIX RAD/ULNA	17	1.42
C.A.T. SCAN OF HEAD	16	1.34

### Number of patients with operations

```

num_op = omega %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE) %>%
  dplyr::summarise(num_op = sum(!is.na(OP_DESC)))
num_op$prop = ifelse(num_op$SERVICE == "Cardiology", num_op$num_op/nrow(omega_cardio)*100, num_op$num_o
kable(num_op, digits = 2, col.names = c("Service", "Number of patients having operations", "Percentage

```

Service	Number of patients having operations	Percentage of patients having operations
Cardiology	2315	78.93
Orthopedic	1092	91.15

### Average number of operations performed

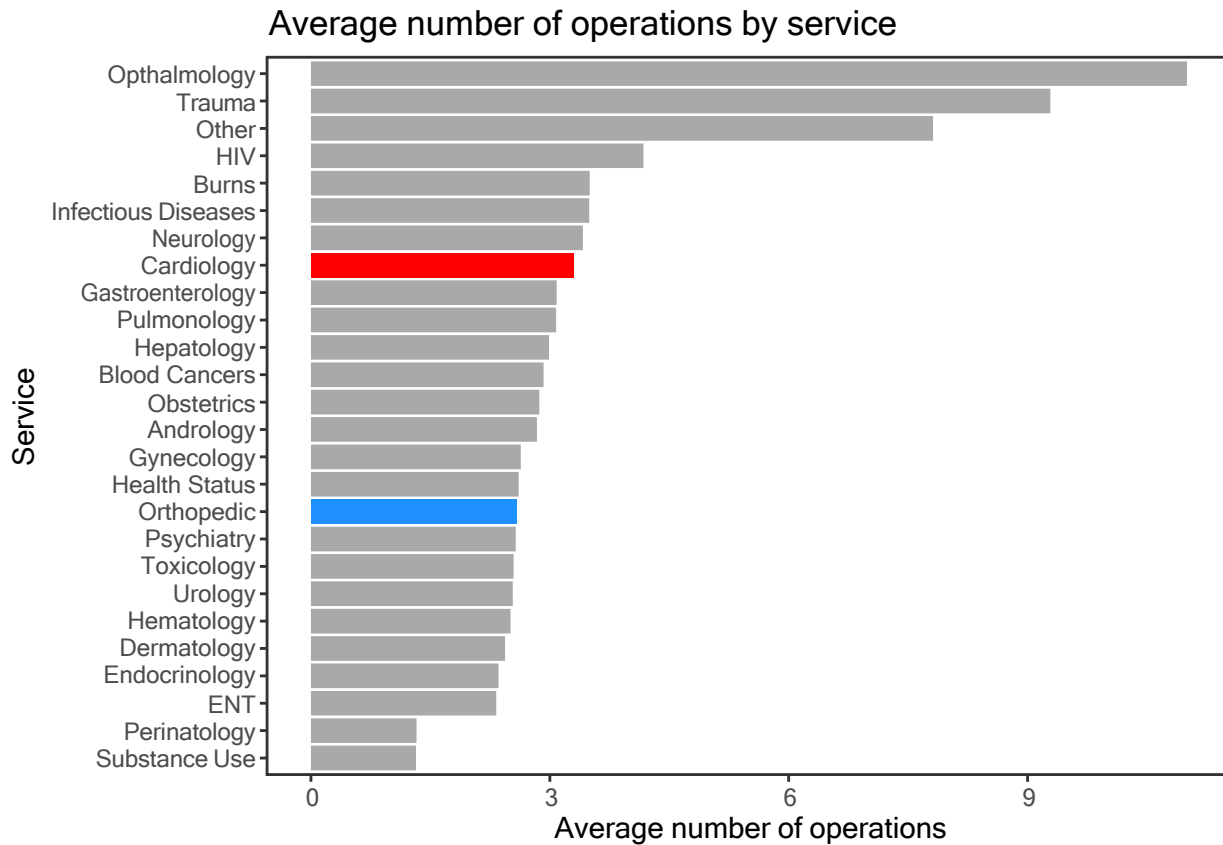
```

ome_px_service = merge(ome_px, omega, by = c("PAT_NO", "ADM_DATE", "DIS_DATE"), all.x = TRUE)
ome_px_first = ome_px_service[ome_px_service$OCCURRENCE == 1,]
avg_op = ome_px_first %>%
  filter(!is.na(SERVICE)) %>%
  group_by(SERVICE) %>%
  dplyr::summarise(total = sum(TOT_NO_OPS),
                    count = n()) %>%
  mutate(avg_op = total/count) %>%
  select(SERVICE, avg_op)

ggplot(data = avg_op,
       mapping = aes(x = reorder(SERVICE, avg_op), y = avg_op, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Average number of operations by service") +
  xlab("Service") +
  ylab("Average number of operations") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```





### III. Financial viability

```
omega_serv$PROFIT = omega_serv$TOT_PAY - omega_serv$TOT_COST

profit = omega_serv %>%
  group_by(SERVICE) %>%
  dplyr::summarise(avg_prof = mean(PROFIT, na.rm = TRUE))

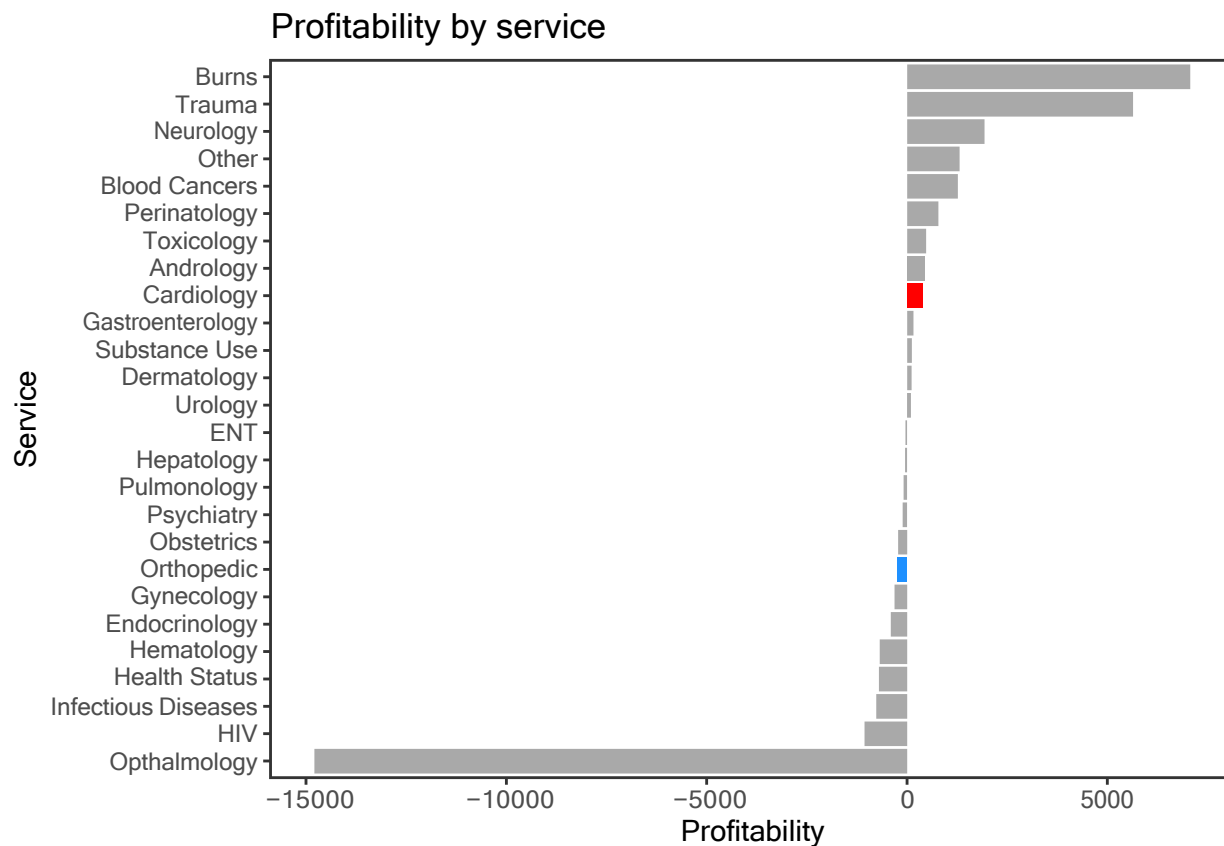
profit_co = profit %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(profit_co, digits = 2, col.names = c("Service", "Profitability"))
```

#### Profitability of patients from cardiac and orthopedic services

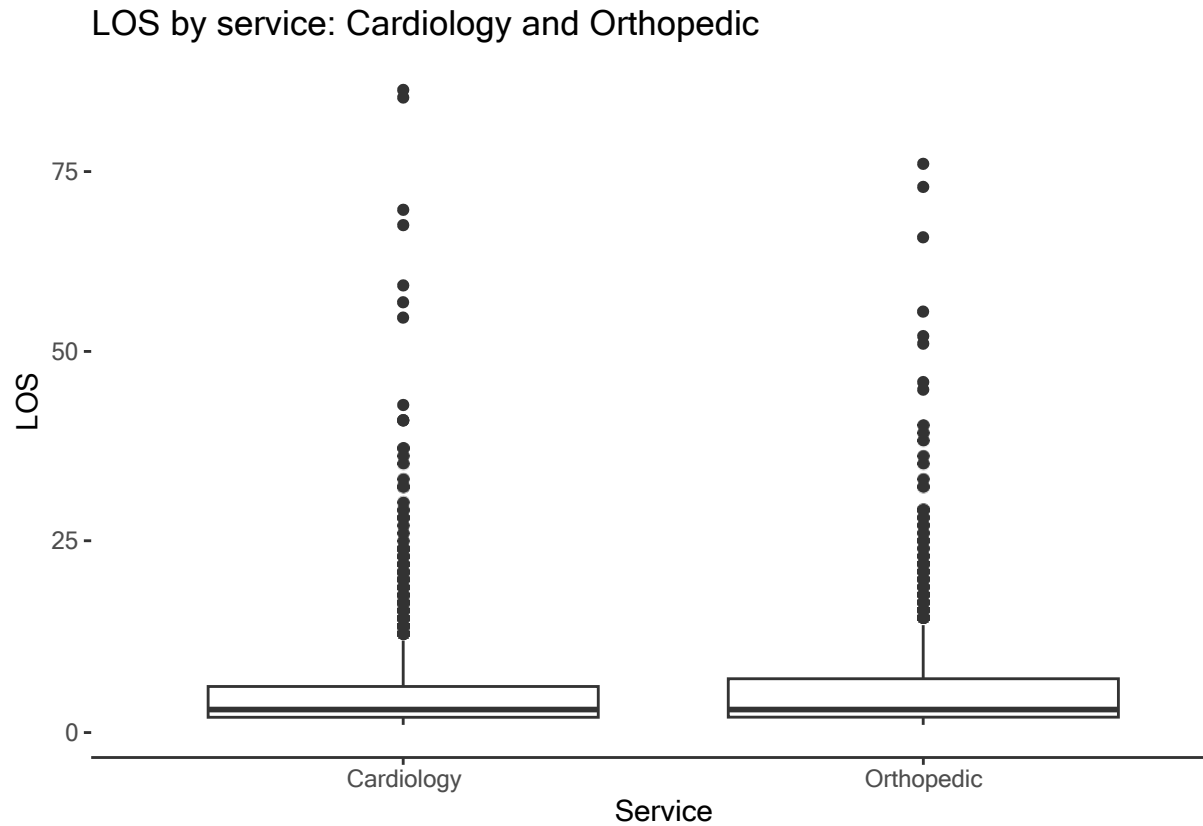
Service	Profitability
Cardiology	377.63
Orthopedic	-235.56

```
ggplot(data = profit,
       mapping = aes(x = reorder(SERVICE, avg_prof), y = avg_prof, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("Profitability by service") +
  xlab("Service") +
  ylab("Profitability") +
```

```
scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkg
guides(fill = FALSE) +
coord_flip() +
theme_bw() +
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +
geom_hline(yintercept = mean(omega_serv$PROFIT, na.rm = TRUE), lty = 2)
```



```
omega_co = subset(omega, SERVICE %in% c("Cardiology", "Orthopedic"))
ggplot(omega_co, aes(x = SERVICE, y = LOS)) +
  geom_boxplot() +
  theme_bw() +
  ggtitle("LOS by service: Cardiology and Orthopedic") +
  xlab("Service") +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



#### LOS outlier rates

```
los_outlier_i = omega_serv %>%
  group_by(SERVICE) %>%
  mutate(OUTLIER = ifelse(LOS > quantile(LOS, 0.75) + 1.5*IQR(LOS) | LOS < quantile(LOS, 0.25) - 1.5*IQR(LOS), 1, 0))

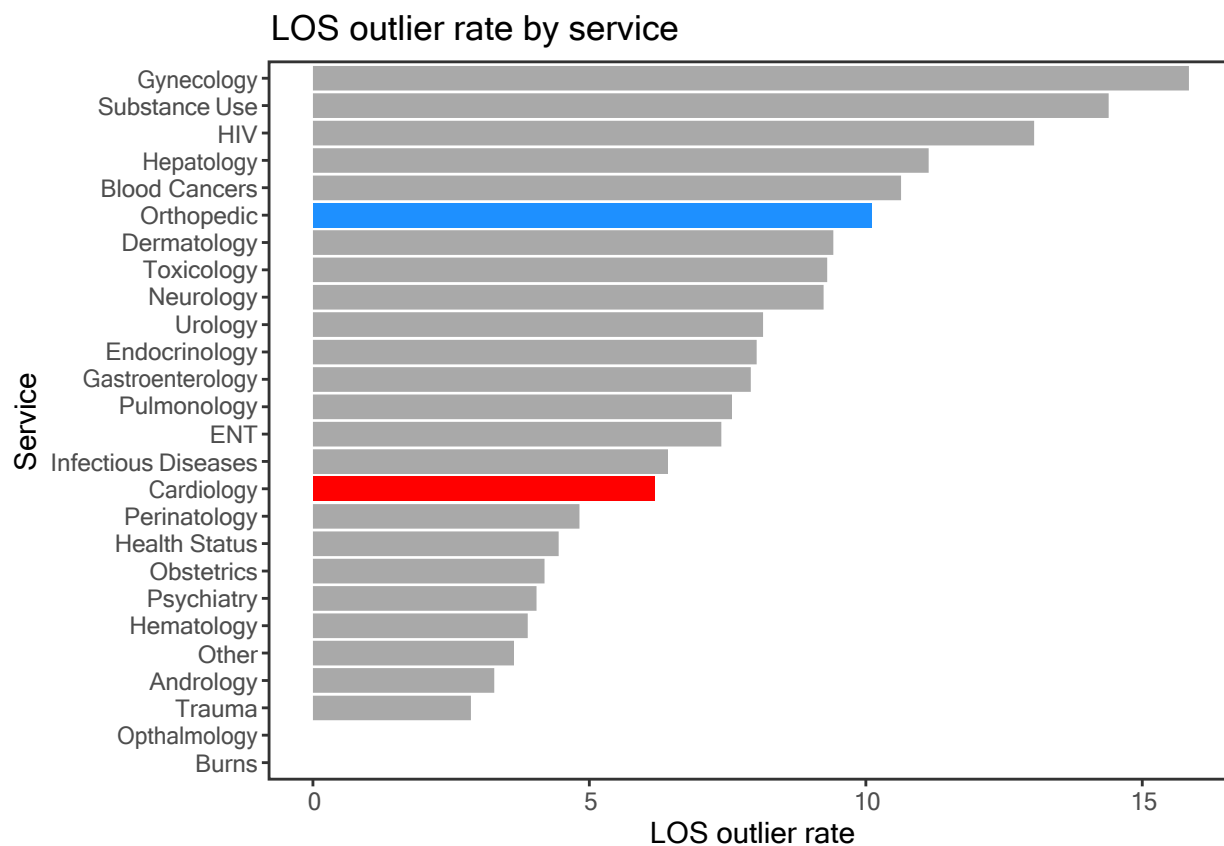
los_outlier = los_outlier_i %>%
  group_by(SERVICE) %>%
  dplyr::summarise(lor = mean(OUTLIER)*100)

los_outlier_co = los_outlier %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic"))
kable(los_outlier_co, digits = 2, col.names = c("Service", "LOS outlier rate"))
```

Service	LOS outlier rate
Cardiology	6.17
Orthopedic	10.10

```
ggplot(data = los_outlier,
       mapping = aes(x = reorder(SERVICE, lor), y = lor, fill = SERVICE)) +
  geom_bar(stat = "identity") +
  ggtitle("LOS outlier rate by service") +
  xlab("Service") +
  ylab("LOS outlier rate") +
  scale_fill_manual(values = c(rep("darkgrey", 3), "red", rep("darkgrey", 13), "dodgerblue", rep("darkgrey", 13))) +
  guides(fill = FALSE) +
  coord_flip() +
  theme_bw() +
```

```
theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank()) +  
geom_hline(yintercept = mean(los_outlier_i$OUTLIER, na.rm = TRUE)*100, lty = 2)
```



## payer mix MAJOR PAYOR

```
cardio_major = omega_cardio %>%
  group_by(MAJOR_PAY) %>%
  dplyr::summarise(count = n())
cardio_major$perc = cardio_major$count/nrow(omega_cardio) * 100
kable(cardio_major, digits = 2, col.names = c("Major payor", "Number of patients", "Percentage of patients"))
```

Major payor	Number of patients	Percentage of patients
BLUE_CROSS	658	22.43
MEDICAID	84	2.86
MEDICARE	1655	56.43
PRIV/COMM	536	18.27

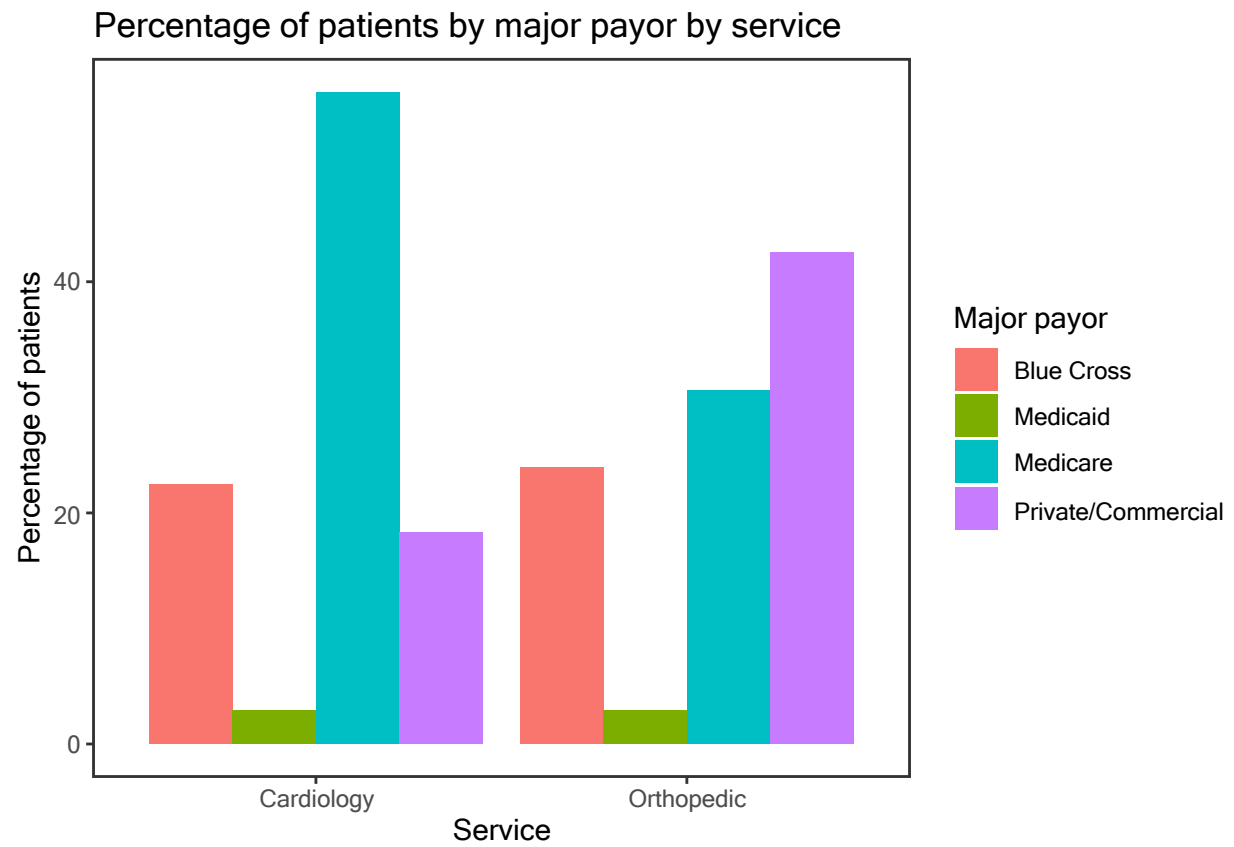
```
ortho_major = omega_ortho %>%
  group_by(MAJOR_PAY) %>%
  dplyr::summarise(count = n())
ortho_major$perc = ortho_major$count/nrow(omega_ortho) * 100
kable(ortho_major, digits = 2, col.names = c("Major payor", "Number of patients", "Percentage of patients"))
```

Major payor	Number of patients	Percentage of patients
BLUE_CROSS	287	23.96
MEDICAID	35	2.92
MEDICARE	366	30.55
PRIV/COMM	510	42.57

```
major = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, MAJOR_PAY) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
major$perc = ifelse(major$SERVICE == "Cardiology", major$count/nrow(omega_cardio) * 100, major$count/nrow(omega_ortho) * 100)
ggplot(data = major,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(MAJOR_PAY))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by major payor by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Major payor", lab = c("Blue Cross", "Medicaid", "Medicare", "Private/Comm")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



## PRIMARY PAYOR

```
cardio_primary = omega_cardio %>%
  group_by(PRIM_PAY) %>%
  dplyr::summarise(count = n())
cardio_primary$perc = cardio_primary$count/nrow(omega_cardio) * 100
kable(cardio_primary, digits = 2, col.names = c("Primary payor", "Number of patients", "Percentage of patients"))
```

Primary payor	Number of patients	Percentage of patients
BLUE_CROSS	658	22.43
COMMERCIAL	508	17.32
MEDICAID	84	2.86
MEDICARE	1655	56.43
PRIVATE	22	0.75
WORK_COMP	6	0.20

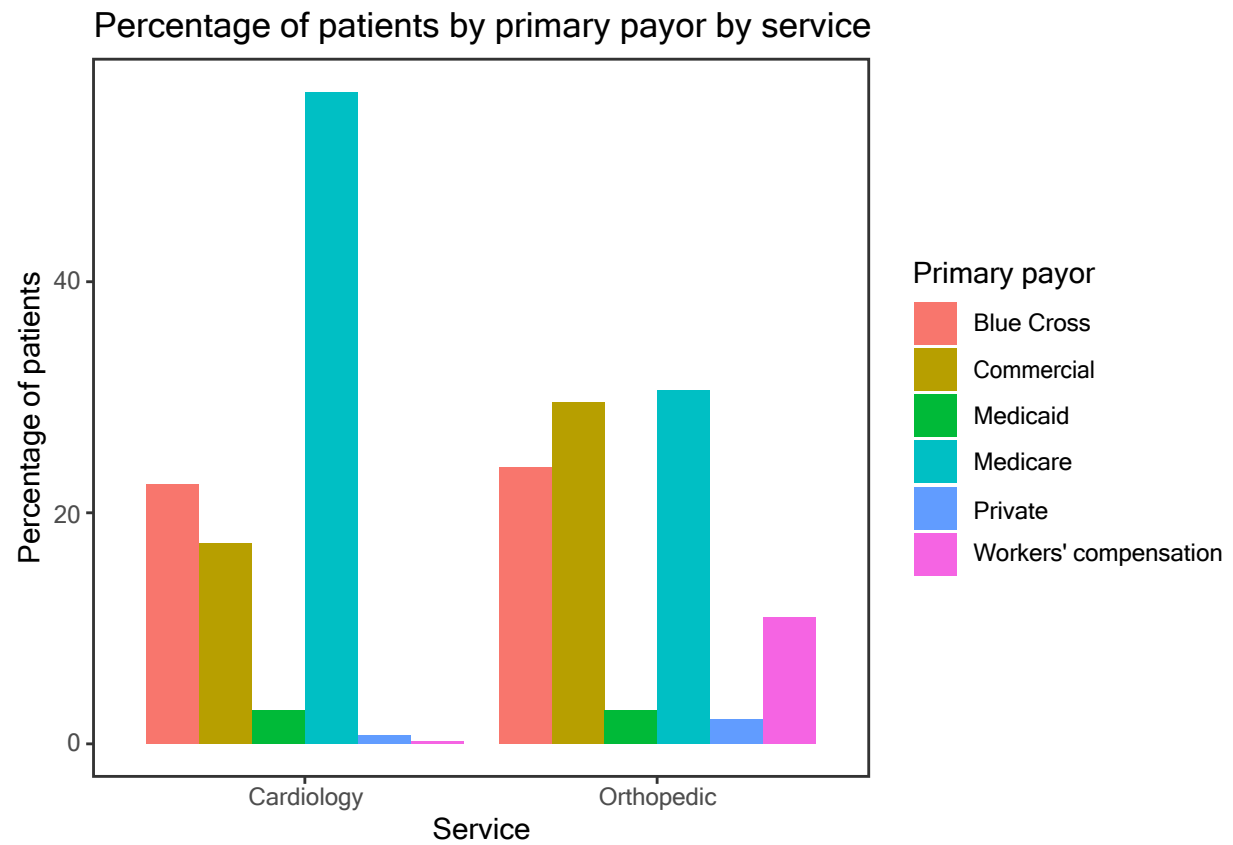
```
ortho_primary = omega_ortho %>%
  group_by(PRIM_PAY) %>%
  dplyr::summarise(count = n())
ortho_primary$perc = ortho_primary$count/nrow(omega_ortho) * 100
kable(ortho_primary, digits = 2, col.names = c("Primary payor", "Number of patients", "Percentage of patients"))
```

Primary payor	Number of patients	Percentage of patients
BLUE_CROSS	287	23.96
COMMERCIAL	354	29.55
MEDICAID	35	2.92
MEDICARE	366	30.55
PRIVATE	25	2.09
WORK_COMP	131	10.93

```
primary = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, PRIM_PAY) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
primary$perc = ifelse(primary$SERVICE == "Cardiology", primary$count/nrow(omega_cardio) * 100, primary$count/nrow(omega_ortho) * 100)
ggplot(data = primary,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(PRIM_PAY))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by primary payor by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Primary payor", lab = c("Blue Cross", "Commercial", "Medicaid", "Medicare")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```





## SECONDARY PAYOR

```
cardio_secondary = omega_cardio %>%
  group_by(SEC_PAY) %>%
  dplyr::summarise(count = n())
cardio_secondary$perc = cardio_secondary$count/nrow(omega_cardio) * 100
kable(cardio_secondary, digits = 2, col.names = c("Secondary payor", "Number of patients", "Percentage of patients"))
```

Secondary payor	Number of patients	Percentage of patients
BLUE_CROSS	1063	36.24
COMMERCIAL	435	14.83
MEDICAID	88	3.00
MEDICARE	81	2.76
NOT_RECORD	21	0.72
PRIVATE	1245	42.45

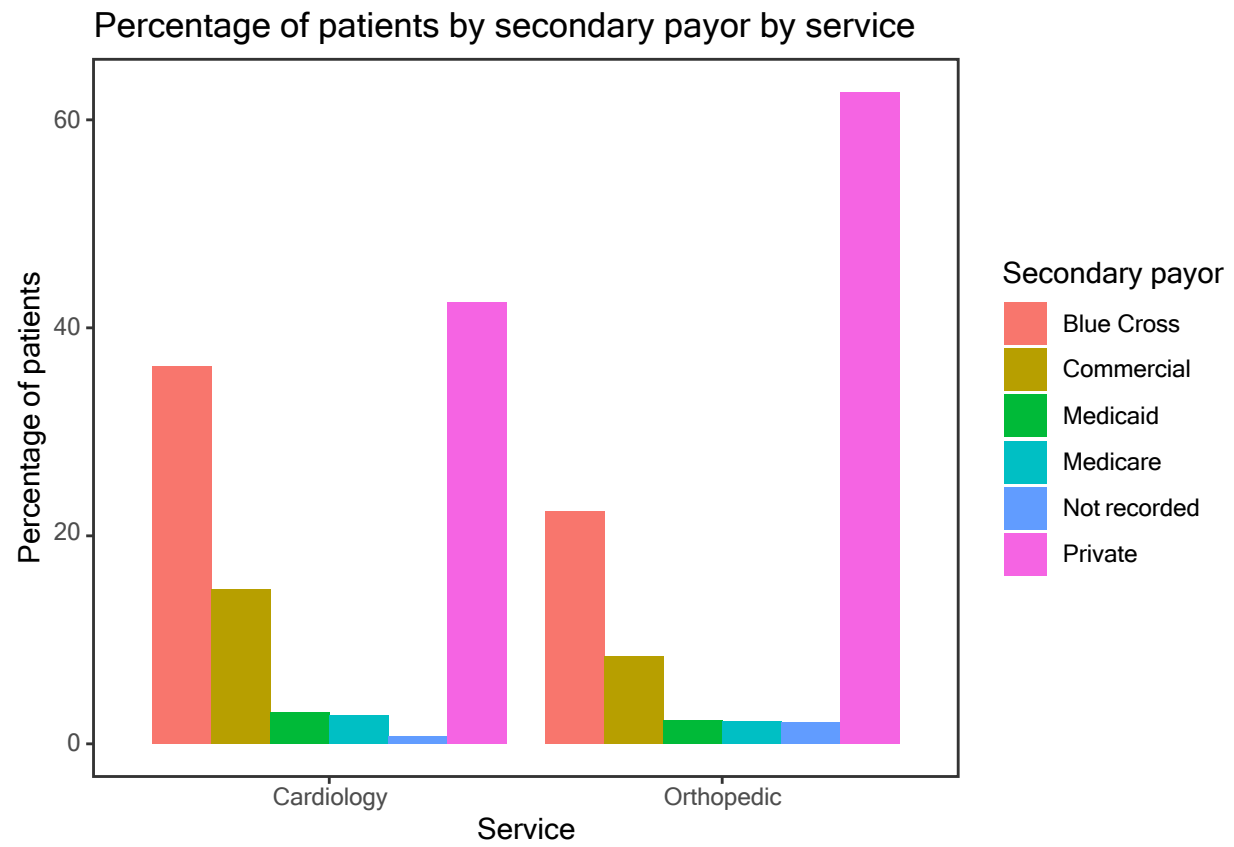
```
ortho_secondary = omega_ortho %>%
  group_by(SEC_PAY) %>%
  dplyr::summarise(count = n())
ortho_secondary$perc = ortho_secondary$count/nrow(omega_ortho) * 100
kable(ortho_secondary, digits = 2, col.names = c("Secondary payor", "Number of patients", "Percentage of patients"))
```

Secondary payor	Number of patients	Percentage of patients
BLUE_CROSS	268	22.37
COMMERCIAL	101	8.43
MEDICAID	27	2.25
MEDICARE	26	2.17
NOT_RECORD	25	2.09
PRIVATE	751	62.69

```
secondary = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  group_by(SERVICE, SEC_PAY) %>%
  dplyr::summarise(count = n())
```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```
secondary$perc = ifelse(secondary$SERVICE == "Cardiology", secondary$count/nrow(omega_cardio) * 100, secondary$count/nrow(omega_ortho) * 100)
ggplot(data = secondary,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(SEC_PAY))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by secondary payor by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Secondary payor", lab = c("Blue Cross", "Commercial", "Medicaid", "Medicare", "Not Record", "Private")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())
```



```

cardio_admtype = omega_cardio %>%
  group_by(ADM_TYPE) %>%
  filter(ADM_TYPE != 0) %>%
  dplyr::summarise(count = n())
cardio_admtype$perc = cardio_admtype$count/nrow(omega_cardio) * 100
kable(cardio_admtype, digits = 2, col.names = c("Admission type", "Number of patients", "Percentage of patients"))

```

### Rates of emergent vs. elective care

Admission type	Number of patients	Percentage of patients
ELECTIVE	288	9.82
EMERGENT	2644	90.15

```

ortho_admtype = omega_ortho %>%
  group_by(ADM_TYPE) %>%
  filter(ADM_TYPE != 0) %>%
  dplyr::summarise(count = n())
ortho_admtype$perc = ortho_admtype$count/nrow(omega_ortho) * 100
kable(ortho_admtype, digits = 2, col.names = c("Admission type", "Number of patients", "Percentage of patients"))

```

Admission type	Number of patients	Percentage of patients
ELECTIVE	661	55.18
EMERGENT	537	44.82

```

admtype = omega_serv %>%
  filter(SERVICE %in% c("Cardiology", "Orthopedic")) %>%
  filter(ADM_TYPE != 0) %>%
  group_by(SERVICE, ADM_TYPE) %>%
  dplyr::summarise(count = n())

```

## `summarise()` has grouped output by "SERVICE". You can override using the  
## `.groups` argument.

```

admtype$perc = ifelse(admtype$SERVICE == "Cardiology", admtype$count/nrow(omega_cardio) * 100, admtype$count/nrow(omega_ortho) * 100)

```

```

ggplot(data = admtype,
  mapping = aes(x = SERVICE, y = perc, fill = as.factor(ADM_TYPE))) +
  geom_bar(stat = "identity", position = "dodge") +
  ggtitle("Percentage of patients by admission type by service") +
  xlab("Service") +
  ylab("Percentage of patients") +
  scale_fill_discrete(name = "Admission type", lab = c("Elective", "Emergent")) +
  theme_bw() +
  theme(panel.grid.major = element_blank(), panel.grid.minor = element_blank())

```

