ICU Healthcare Worker Visit Analysis

```
options(warn = -1)
suppressPackageStartupMessages(library(dplyr))
suppressPackageStartupMessages(library(ggplot2))
```

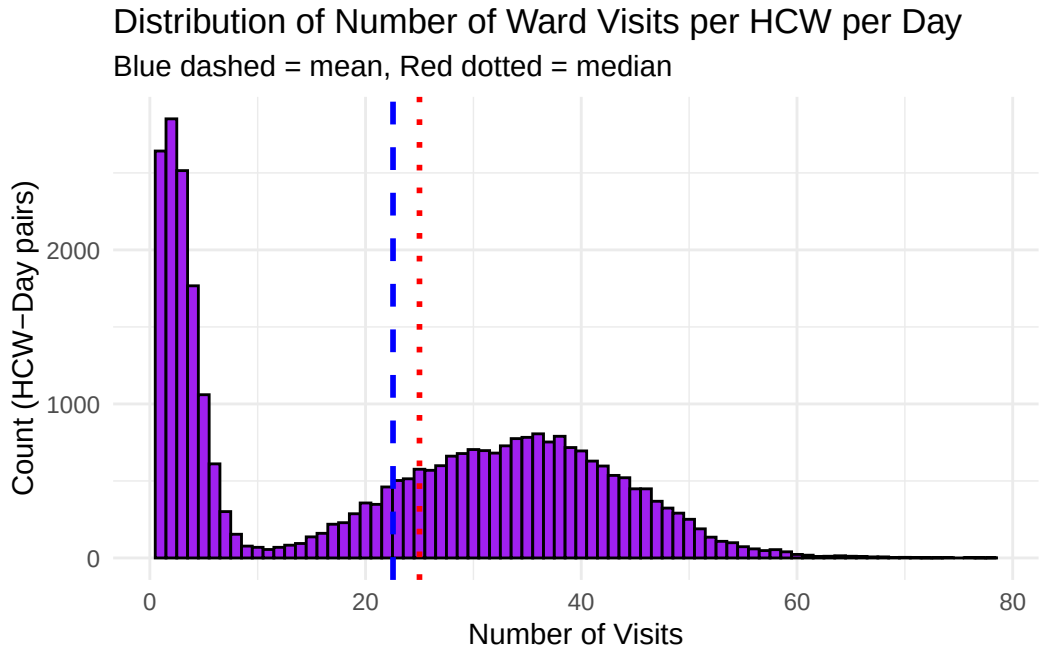
Ward Healthcare Worker Visit Analysis

This document provides analysis of the visit rates and behaviors of health care worker agents (HCWs) in the Ward. All results and visualizations related to HCW visits to Ward patients will be presented here.

```
library(dplyr)

df2 <- read.table("visit_data.txt", header = TRUE, sep = ",", stringsAsFactors = FALSE)
df2$visitDay <- floor(df2$visitTime)

# Filter for Ward visits only
df2_ward <- df2[df2$patientLocation == 'Ward', ]

# Remove first 90 visitTime values
df2_filtered <- df2_ward %>% arrange(visitTime) %>% slice(-(1:90))

# Histogram: for each hcwId, each day, distribution of number of visits
visits_per_day <- df2_filtered %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n())
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```r
library(ggplot2)
ggplot(visits_per_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_day$n_visits)), color = "blue", linetype = "d

    geom_vline(aes(xintercept = median(visits_per_day$n_visits)), color = "red", linetype = "

    labs(title = "Distribution of Number of Ward Visits per HCW per Day",
             x = "Number of Visits",
             y = "Count (HCW-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```




```r
# Text output for min, max, IQR
min_visits <- min(visits_per_day$n_visits)
max_visits <- max(visits_per_day$n_visits)
iqr_visits <- IQR(visits_per_day$n_visits)
cat("Min visits per HCW per day:", min_visits, "\n")
```

```
Min visits per HCW per day: 1
```

```r
cat("Max visits per HCW per day:", max_visits, "\n")
```

```
Max visits per HCW per day: 78
```

```r
cat("Interquartile range (IQR):", iqr_visits, "\n")
```

```
Interquartile range (IQR): 33
```

```r
nvisits <- nrow(df2_ward)

# Filter for nurse visits
df_nurse_visits <- df2_ward[df2_ward$hcwType == 'NURSE', ]
df_nurses <- distinct(df_nurse_visits, hcwType, hcwId)
nurse_count <- nrow(df_nurses)
# Filter for other HCW types
df_doctor_visits <- df2_ward[df2_ward$hcwType == 'DOCTOR', ]
df_doctors <- distinct(df_doctor_visits, hcwType, hcwId)
doctor_count <- nrow(df_doctors)
df_pt_visits     <- df2_ward[df2_ward$hcwType == 'PT', ]
df_pts <- distinct(df_pt_visits, hcwType, hcwId)
pt_count <- nrow(df_pts)

df_ot_visits     <- df2_ward[df2_ward$hcwType == 'OT', ]
df_ots <- distinct(df_ot_visits, hcwType, hcwId)
ot_count <- nrow(df_ots)

df_rt_visits     <- df2_ward[df2_ward$hcwType == 'RT', ]
df_rts <- distinct(df_rt_visits, hcwType, hcwId)
rt_count <- nrow(df_rts)
```

Total patient visits by hcw type (Ward)

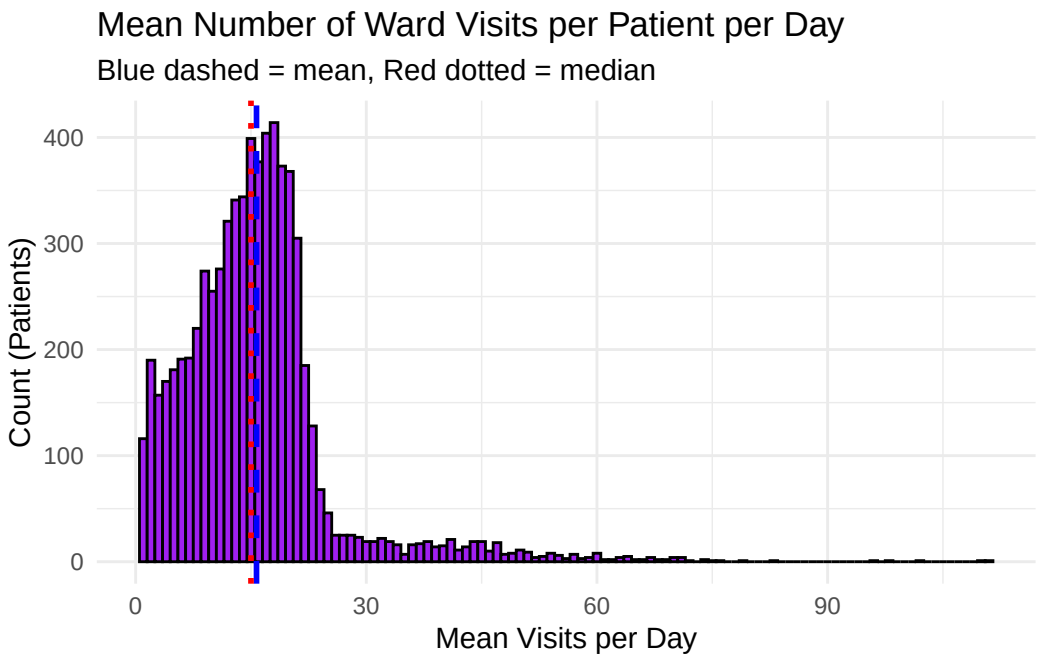
HCW Type	Total visits (365d)	mean/day
NURSE (40)	445962	30.5453425
DOCTOR (26)	244240	25.7365648
OT (12)	15174	3.4643836
PT (12)	11569	2.6413242
RT (12)	7384	1.6858447

Histogram: Mean Number of Visits per Patient per Day (Ward)

```
# Calculate mean number of visits per patientId per day
visits_per_patient_day <- df2_filtered %>% group_by(patientId, visitDay) %>% summarise(n_visi
```

```
`summarise()` has grouped output by 'patientId'. You can override using the
`.groups` argument.
```

```
mean_visits <- visits_per_patient_day %>% group_by(patientId) %>% summarise(mean_visits = mea
ggplot(mean_visits, aes(x = mean_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    geom_vline(xintercept = mean(mean_visits$mean_visits), color = "blue", linetype = "dashed
    geom_vline(xintercept = median(mean_visits$mean_visits), color = "red", linetype = "dotte
  labs(title = "Mean Number of Ward Visits per Patient per Day",
       x = "Mean Visits per Day",
       y = "Count (Patients)",
       subtitle = "Blue dashed = mean, Red dotted = median") +
  theme_minimal()
```




```
min_mean_visits <- min(mean_visits$mean_visits)
max_mean_visits <- max(mean_visits$mean_visits)
```

```r
mean_mean_visits <- mean(mean_visits$mean_visits)
median_mean_visits <- median(mean_visits$mean_visits)
cat("Min  visits per patient per day:", min_mean_visits, "\n")
```

```
Min  visits per patient per day: 1
```

```r
cat("Max  visits per patient per day:", max_mean_visits, "\n")
```

```
Max  visits per patient per day: 111
```

```r
cat("Mean visits per patient per day:", mean_mean_visits, "\n")
```

```
Mean visits per patient per day: 15.71807
```

```r
cat("Median visits per patient per day:", median_mean_visits, "\n")
```

```
Median visits per patient per day: 15
```

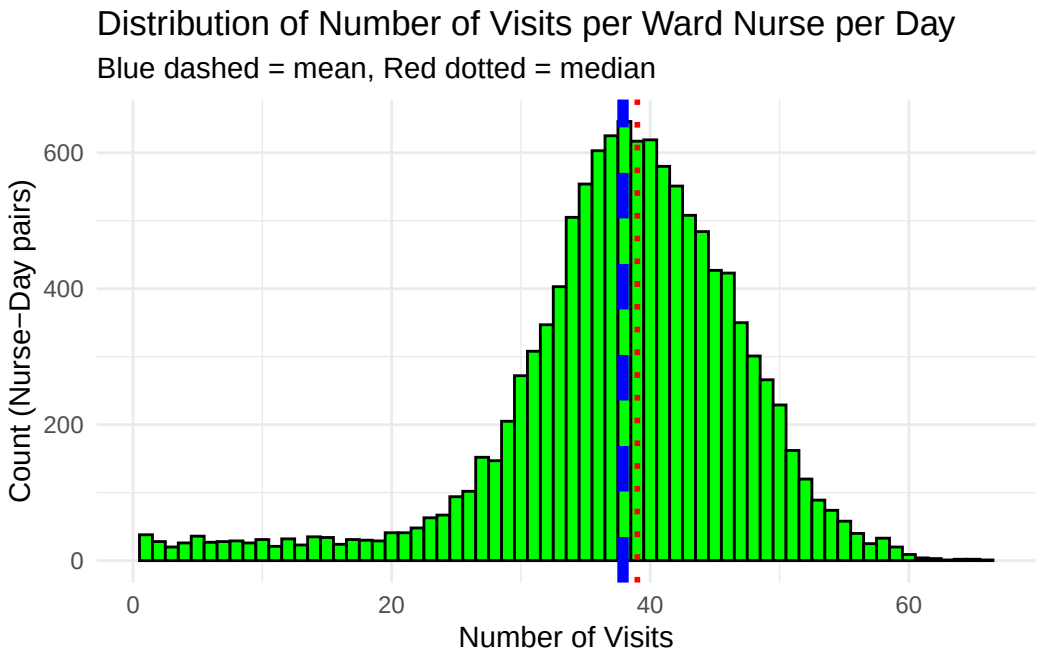
Visits per HCW per Day by Type (Ward)

Distribution of Number of Visits per Nurse per Day (Ward)

```r
visits_per_nurse_day <- df_nurse_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```r
ggplot(visits_per_nurse_day, aes(x = n_visits)) +
  geom_histogram(binwidth = 1, fill = "green", color = "black") +
  geom_vline(aes(xintercept = mean(visits_per_nurse_day$n_visits)), color = "blue", linetype
  geom_vline(aes(xintercept = median(visits_per_nurse_day$n_visits)), color = "red", linetyp
  labs(title = "Distribution of Number of Visits per Ward Nurse per Day",
       x = "Number of Visits",
       y = "Count (Nurse-Day pairs)",
       subtitle = "Blue dashed = mean, Red dotted = median") +
  theme_minimal()
```




```
min_nurse_visits <- min(visits_per_nurse_day$n_visits)
max_nurse_visits <- max(visits_per_nurse_day$n_visits)
mean_nurse_visits <- mean(visits_per_nurse_day$n_visits)
median_nurse_visits <- median(visits_per_nurse_day$n_visits)
```

Min visits per Ward nurse per day: 1 **Max visits per Ward nurse per day:** 66 **Mean visits per Ward nurse per day:** 37.8929391 **Median visits per Ward nurse per day:** 39

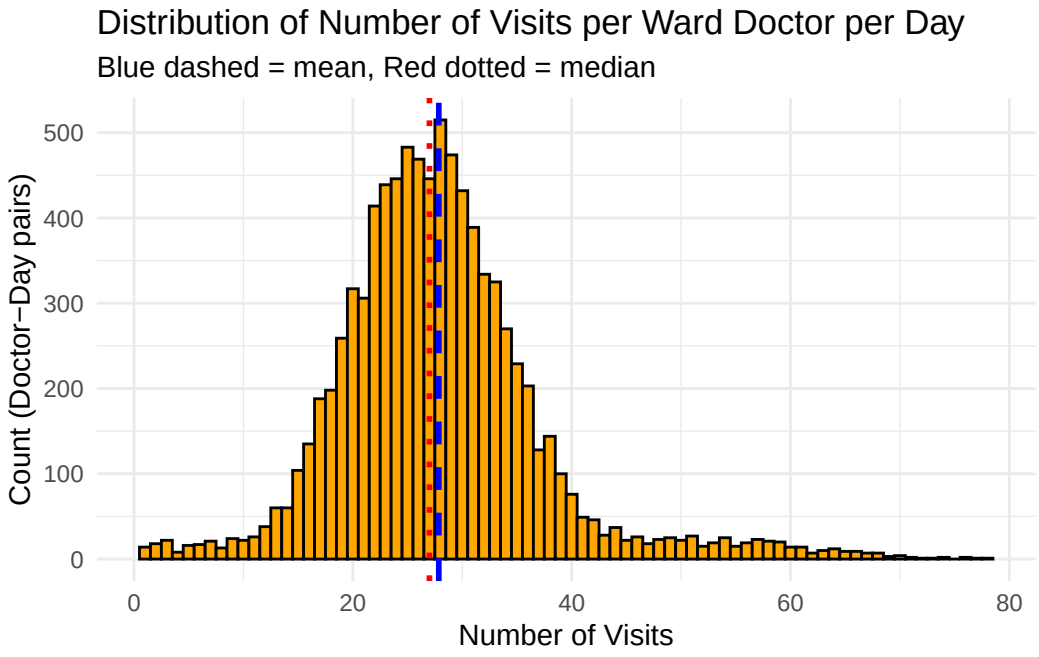
Distribution of Number of Visits per Doctor per Day (Ward)

```
visits_per_doctor_day <- df_doctor_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visi
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```
ggplot(visits_per_doctor_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "orange", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_doctor_day$n_visits)), color = "blue", linety
    geom_vline(aes(xintercept = median(visits_per_doctor_day$n_visits)), color = "red", linet
```

```
    labs(title = "Distribution of Number of Visits per Ward Doctor per Day",
             x = "Number of Visits",
             y = "Count (Doctor-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```




```
min_doctor_visits <- min(visits_per_doctor_day$n_visits)
max_doctor_visits <- max(visits_per_doctor_day$n_visits)
mean_doctor_visits <- mean(visits_per_doctor_day$n_visits)
median_doctor_visits <- median(visits_per_doctor_day$n_visits)
```

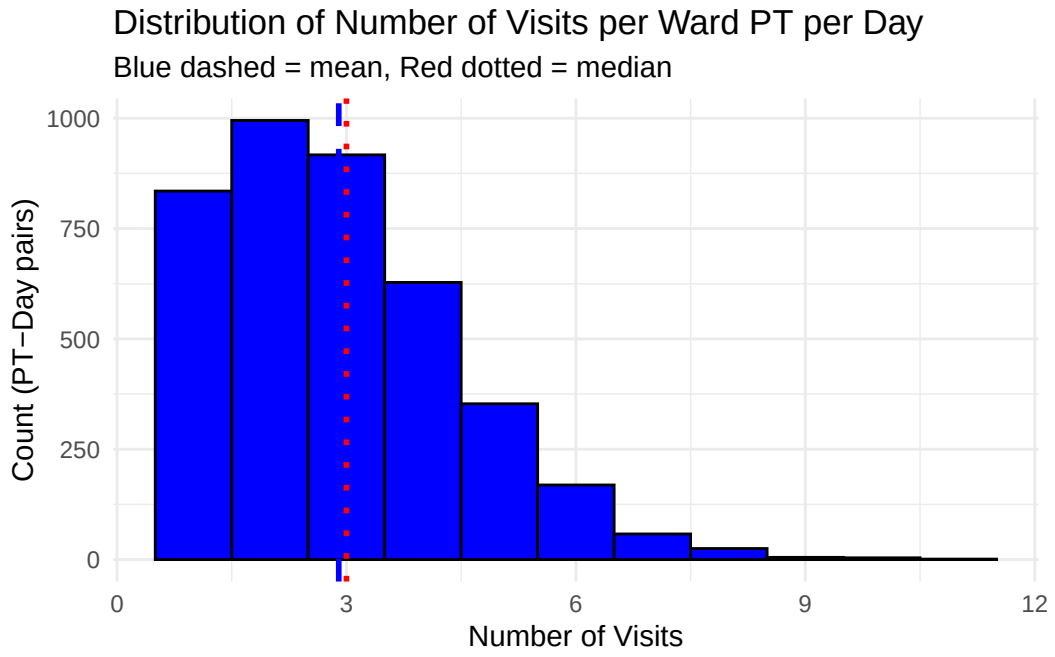
Min visits per Ward doctor per day: 1 **Max visits per Ward doctor per day:** 78 **Mean visits per Ward doctor per day:** 27.8558394 **Median visits per Ward doctor per day:** 27

Distribution of Number of Visits per PT per Day (Ward)

```
visits_per_pt_day <- df_pt_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n()
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```r
ggplot(visits_per_pt_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "blue", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_pt_day$n_visits)), color = "blue", linetype =
    geom_vline(aes(xintercept = median(visits_per_pt_day$n_visits)), color = "red", linetype
    labs(title = "Distribution of Number of Visits per Ward PT per Day",
             x = "Number of Visits",
             y = "Count (PT-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```




```r
min_pt_visits <- min(visits_per_pt_day$n_visits)
max_pt_visits <- max(visits_per_pt_day$n_visits)
mean_pt_visits <- mean(visits_per_pt_day$n_visits)
median_pt_visits <- median(visits_per_pt_day$n_visits)
```

Min visits per Ward PT per day: 1 **Max visits per Ward PT per day:** 11 **Mean visits per Ward PT per day:** 2.8994987 **Median visits per Ward PT per day:** 3

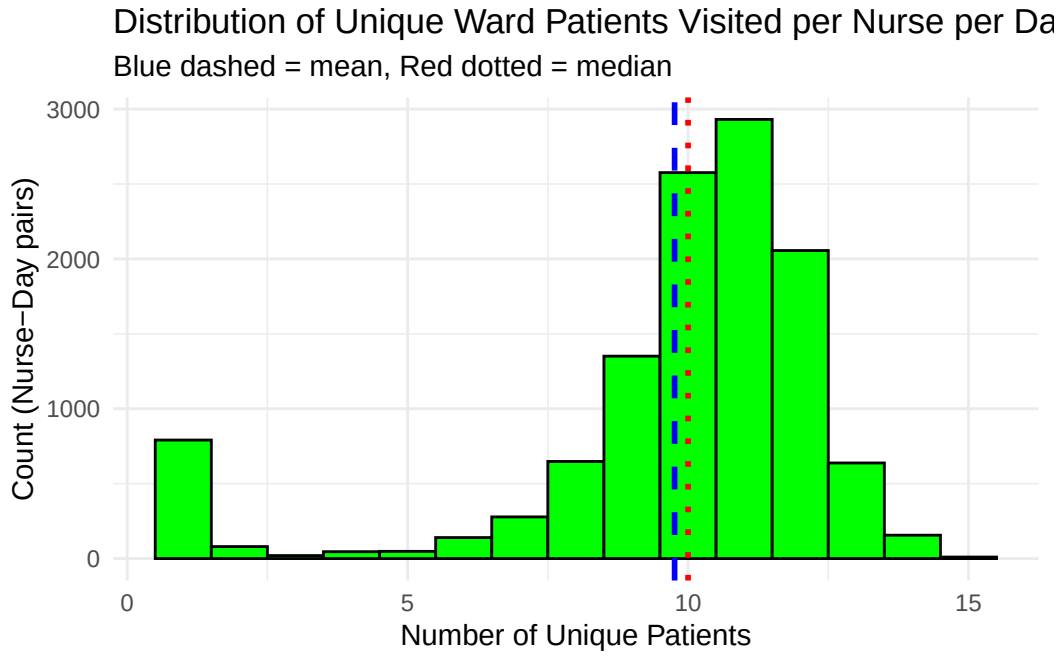
Distribution of Number of Unique Patients Visited per Day by HCW Type (Ward)

Nurses (Ward)

```
unique_patients_per_nurse_day <- df_nurse_visits %>% group_by(hcwId, visitDay) %>% summarise
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```
ggplot(unique_patients_per_nurse_day, aes(x = n_unique_patients)) +
    geom_histogram(binwidth = 1, fill = "green", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_patients)), color = "blue", linetype = "dashed"
    geom_vline(aes(xintercept = median(n_unique_patients)), color = "red", linetype = "dotte
    labs(title = "Distribution of Unique Ward Patients Visited per Nurse per Day",
             x = "Number of Unique Patients",
             y = "Count (Nurse-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```



```r
min_nurse_patients <- min(unique_patients_per_nurse_day$n_unique_patients)
max_nurse_patients <- max(unique_patients_per_nurse_day$n_unique_patients)
mean_nurse_patients <- mean(unique_patients_per_nurse_day$n_unique_patients)
median_nurse_patients <- median(unique_patients_per_nurse_day$n_unique_patients)
```

Min unique Ward patients per Nurse per day: 1 **Max unique Ward patients per Nurse per day:** 15 **Mean unique Ward patients per Nurse per day:** 9.7599626 **Median unique Ward patients per Nurse per day:** 10

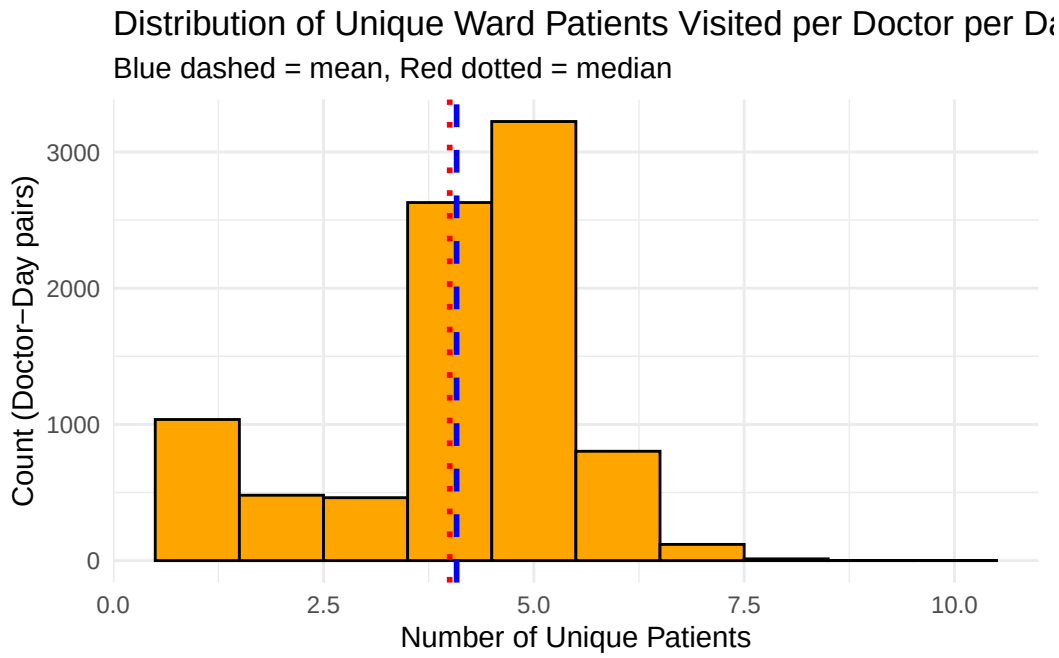
Unique Patients visited per day (Ward)

Doctors

```r
unique_patients_per_doctor_day <- df_doctor_visits %>% group_by(hcwId, visitDay) %>% summaris
```

```
`summarise()` has grouped output by 'hcwId'. You can override using the
`.groups` argument.
```

```r
ggplot(unique_patients_per_doctor_day, aes(x = n_unique_patients)) +
    geom_histogram(binwidth = 1, fill = "orange", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_patients)), color = "blue", linetype = "dashed"
    geom_vline(aes(xintercept = median(n_unique_patients)), color = "red", linetype = "dotte
    labs(title = "Distribution of Unique Ward Patients Visited per Doctor per Day",
             x = "Number of Unique Patients",
             y = "Count (Doctor-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```




```
min_doctor_patients <- min(unique_patients_per_doctor_day$n_unique_patients)
max_doctor_patients <- max(unique_patients_per_doctor_day$n_unique_patients)
mean_doctor_patients <- mean(unique_patients_per_doctor_day$n_unique_patients)
median_doctor_patients <- median(unique_patients_per_doctor_day$n_unique_patients)
```

Min unique Ward patients per Doctor per day: 1 **Max unique Ward patients per Doctor per day:** 10 **Mean unique Ward patients per Doctor per day:** 4.0821168 **Median unique Ward patients per Doctor per day:** 4

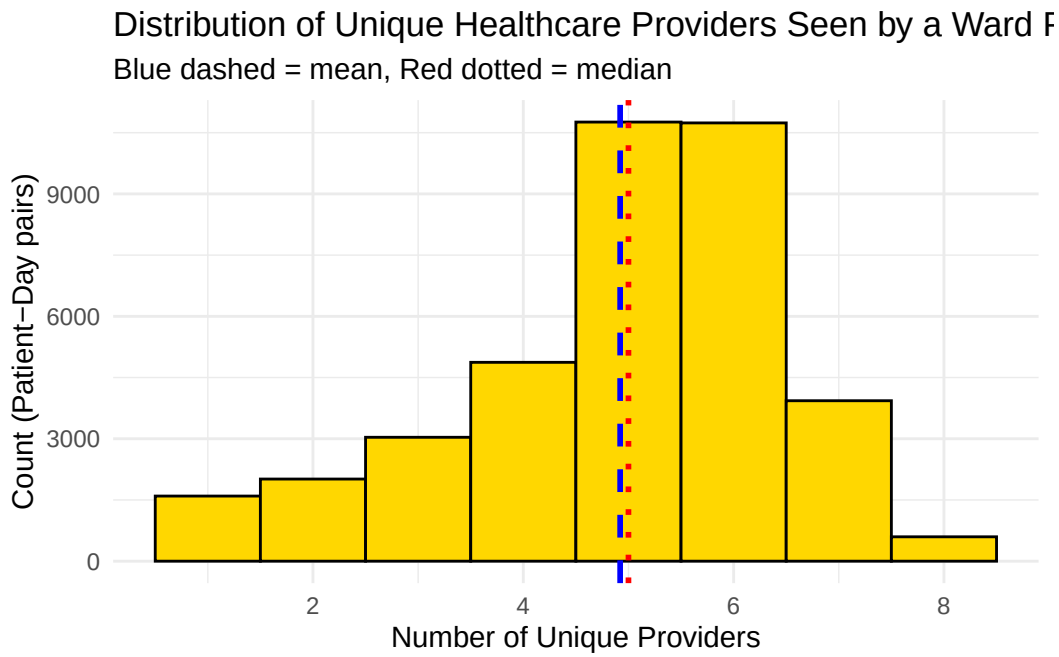
Distribution of Number of Unique Healthcare Providers Seen by a Patient per Day (Ward)

```
unique_providers_per_patient_day <- df2_filtered %>% group_by(patientId, visitDay) %>% summa
```

```
`summarise()` has grouped output by 'patientId'. You can override using the
`.groups` argument.
```

```
ggplot(unique_providers_per_patient_day, aes(x = n_unique_providers)) +
    geom_histogram(binwidth = 1, fill = "gold", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_providers)), color = "blue", linetype = "dashe
```

```
    geom_vline(aes(xintercept = median(n_unique_providers)), color = "red", linetype = "dotte
    labs(title = "Distribution of Unique Healthcare Providers Seen by a Ward Patient per Day"
             x = "Number of Unique Providers",
             y = "Count (Patient-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
```




```
min_patient_providers <- min(unique_providers_per_patient_day$n_unique_providers)
max_patient_providers <- max(unique_providers_per_patient_day$n_unique_providers)
mean_patient_providers <- mean(unique_providers_per_patient_day$n_unique_providers)
median_patient_providers <- median(unique_providers_per_patient_day$n_unique_providers)
```

Min unique providers per Ward patient per day: 1 **Max unique providers per Ward patient per day:** 8 **Mean unique providers per Ward patient per day:** 4.9208213 **Median unique providers per Ward patient per day:** 5

```
options(warn = -1)
suppressPackageStartupMessages(library(dplyr))
suppressPackageStartupMessages(library(ggplot2))
```

ICU Healthcare Worker Visit Analysis

This document provides analysis of the visit rates and behaviors of health care worker agents (HCWs) in the ICU. All results and visualizations related to HCW visits to ICU patients will be presented here.

```
library(dplyr)

df2 <- read.table("visit_data.txt", header = TRUE, sep = ",", stringsAsFactors = FALSE)
df2$visitDay <- floor(df2$visitTime)

# Filter for ICU visits only
df2_icu <- df2[df2$patientLocation == 'ICU', ]

# Remove first 90 visitTime values
df2_filtered <- df2_icu %>% arrange(visitTime) %>% slice(-(1:90))

# Histogram: for each hcwId, each day, distribution of number of visits
visits_per_day <- df2_filtered %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n())
library(ggplot2)
ggplot(visits_per_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_day$n_visits)), color = "blue", linetype = "d

    geom_vline(aes(xintercept = median(visits_per_day$n_visits)), color = "red", linetype = "

    labs(title = "Distribution of Number of ICU Visits per HCW per Day",
             x = "Number of Visits",
             y = "Count (HCW-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()

# Text output for min, max, IQR
min_visits <- min(visits_per_day$n_visits)
max_visits <- max(visits_per_day$n_visits)
iqr_visits <- IQR(visits_per_day$n_visits)
cat("Min visits per HCW per day:", min_visits, "\n")
cat("Max visits per HCW per day:", max_visits, "\n")
cat("Interquartile range (IQR):", iqr_visits, "\n")


nvisits <- nrow(df2_icu)
```

```r
# Filter for nurse visits
df_nurse_visits <- df2_icu[df2_icu$hcwType == 'NURSE', ]
df_nurses <- distinct(df_nurse_visits, hcwType, hcwId)
nurse_count <- nrow(df_nurses)
# Filter for other HCW types
df_doctor_visits <- df2_icu[df2_icu$hcwType == 'DOCTOR', ]
df_doctors <- distinct(df_doctor_visits, hcwType, hcwId)
doctor_count <- nrow(df_doctors)
df_pt_visits     <- df2_icu[df2_icu$hcwType == 'PT', ]
df_pts <- distinct(df_pt_visits, hcwType, hcwId)
pt_count <- nrow(df_pts)

df_ot_visits     <- df2_icu[df2_icu$hcwType == 'OT', ]
df_ots <- distinct(df_ot_visits, hcwType, hcwId)
ot_count <- nrow(df_ots)

df_rt_visits     <- df2_icu[df2_icu$hcwType == 'RT', ]
df_rts <- distinct(df_rt_visits, hcwType, hcwId)
rt_count <- nrow(df_rts)
```

Total patient visits by hcw type (ICU)

HCW Type	Total visits (365d)	mean/day
NURSE ({r} nurse_count)	{r} nrow(df_nurse_visits)	{r} nrow(df_nurse_visits)/365.0/nurse_cour
DOCTOR ({r} doctor_count)	{r} nrow(df_doctor_visits)	{r} nrow(df_doctor_visits)/365.0/doctor_co
OT ({r} ot_count)	{r} nrow(df_ot_visits)	{r} nrow(df_ot_visits)/365.0/ot_count
PT ({r} pt_count)	{r} nrow(df_pt_visits)	{r} nrow(df_pt_visits)/365.0/pt_count
RT ({r} rt_count)	{r} nrow(df_rt_visits)	{r} nrow(df_rt_visits)/365.0/rt_count

Histogram: Mean Number of Visits per Patient per Day (ICU)

```r
# Calculate mean number of visits per patientId per day
visits_per_patient_day <- df2_filtered %>% group_by(patientId, visitDay) %>% summarise(n_visi
```

```
mean_visits <- visits_per_patient_day %>% group_by(patientId) %>% summarise(mean_visits = mea
ggplot(mean_visits, aes(x = mean_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    geom_vline(xintercept = mean(mean_visits$mean_visits), color = "blue", linetype = "dashed
    geom_vline(xintercept = median(mean_visits$mean_visits), color = "red", linetype = "dotte
  labs(title = "Mean Number of ICU Visits per Patient per Day",
       x = "Mean Visits per Day",
       y = "Count (Patients)",
       subtitle = "Blue dashed = mean, Red dotted = median") +
  theme_minimal()


min_mean_visits <- min(mean_visits$mean_visits)
max_mean_visits <- max(mean_visits$mean_visits)
mean_mean_visits <- mean(mean_visits$mean_visits)
median_mean_visits <- median(mean_visits$mean_visits)
cat("Min  visits per patient per day:", min_mean_visits, "\n")
cat("Max  visits per patient per day:", max_mean_visits, "\n")
cat("Mean visits per patient per day:", mean_mean_visits, "\n")
cat("Median visits per patient per day:", median_mean_visits, "\n")
```

Visits per HCW per Day by Type (ICU)

Distribution of Number of Visits per Nurse per Day (ICU)

```
visits_per_nurse_day <- df_nurse_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits
ggplot(visits_per_nurse_day, aes(x = n_visits)) +
  geom_histogram(binwidth = 1, fill = "green", color = "black") +
  geom_vline(aes(xintercept = mean(visits_per_nurse_day$n_visits)), color = "blue", linetype
  geom_vline(aes(xintercept = median(visits_per_nurse_day$n_visits)), color = "red", linetype
  labs(title = "Distribution of Number of Visits per ICU Nurse per Day",
       x = "Number of Visits",
       y = "Count (Nurse-Day pairs)",
       subtitle = "Blue dashed = mean, Red dotted = median") +
  theme_minimal()
```

```
min_nurse_visits <- min(visits_per_nurse_day$n_visits)
max_nurse_visits <- max(visits_per_nurse_day$n_visits)
```

```
mean_nurse_visits <- mean(visits_per_nurse_day$n_visits)
median_nurse_visits <- median(visits_per_nurse_day$n_visits)
```

Min visits per ICU nurse per day: `r min_nurse_visits` **Max visits per ICU nurse per day:** `r max_nurse_visits` **Mean visits per ICU nurse per day:** `r mean_nurse_visits` **Median visits per ICU nurse per day:** `r median_nurse_visits`

Distribution of Number of Visits per Doctor per Day (ICU)

```
visits_per_doctor_day <- df_doctor_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visit
ggplot(visits_per_doctor_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "orange", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_doctor_day$n_visits)), color = "blue", linety
    geom_vline(aes(xintercept = median(visits_per_doctor_day$n_visits)), color = "red", linet
    labs(title = "Distribution of Number of Visits per ICU Doctor per Day",
             x = "Number of Visits",
             y = "Count (Doctor-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
min_doctor_visits <- min(visits_per_doctor_day$n_visits)
max_doctor_visits <- max(visits_per_doctor_day$n_visits)
mean_doctor_visits <- mean(visits_per_doctor_day$n_visits)
median_doctor_visits <- median(visits_per_doctor_day$n_visits)
```

Min visits per ICU doctor per day: `r min_doctor_visits` **Max visits per ICU doctor per day:** `r max_doctor_visits` **Mean visits per ICU doctor per day:** `r mean_doctor_visits` **Median visits per ICU doctor per day:** `r median_doctor_visits`

Distribution of Number of Visits per PT per Day (ICU)

```
visits_per_pt_day <- df_pt_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n()
ggplot(visits_per_pt_day, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "blue", color = "black") +
    geom_vline(aes(xintercept = mean(visits_per_pt_day$n_visits)), color = "blue", linetype =
    geom_vline(aes(xintercept = median(visits_per_pt_day$n_visits)), color = "red", linetype
    labs(title = "Distribution of Number of Visits per ICU PT per Day",
             x = "Number of Visits",
```

```
             y = "Count (PT-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
min_pt_visits <- min(visits_per_pt_day$n_visits)
max_pt_visits <- max(visits_per_pt_day$n_visits)
mean_pt_visits <- mean(visits_per_pt_day$n_visits)
median_pt_visits <- median(visits_per_pt_day$n_visits)
```

Min visits per ICU PT per day: `r min_pt_visits` **Max visits per ICU PT per day:** `r max_pt_visits` **Mean visits per ICU PT per day:** `r mean_pt_visits` **Median visits per ICU PT per day:** `r median_pt_visits`

Distribution of Number of Unique Patients Visited per Day by HCW Type (ICU)

Nurses (ICU)

```
unique_patients_per_nurse_day <- df_nurse_visits %>% group_by(hcwId, visitDay) %>% summarise
ggplot(unique_patients_per_nurse_day, aes(x = n_unique_patients)) +
    geom_histogram(binwidth = 1, fill = "green", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_patients)), color = "blue", linetype = "dashed"
    geom_vline(aes(xintercept = median(n_unique_patients)), color = "red", linetype = "dotte
    labs(title = "Distribution of Unique ICU Patients Visited per Nurse per Day",
             x = "Number of Unique Patients",
             y = "Count (Nurse-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
min_nurse_patients <- min(unique_patients_per_nurse_day$n_unique_patients)
max_nurse_patients <- max(unique_patients_per_nurse_day$n_unique_patients)
mean_nurse_patients <- mean(unique_patients_per_nurse_day$n_unique_patients)
median_nurse_patients <- median(unique_patients_per_nurse_day$n_unique_patients)
```

Min unique ICU patients per Nurse per day: `r min_nurse_patients` **Max unique ICU patients per Nurse per day:** `r max_nurse_patients` **Mean unique ICU patients per Nurse per day:** `r mean_nurse_patients` **Median unique ICU patients per Nurse per day:** `r median_nurse_patients`

Unique Patients visited per day (ICU)

Doctors

```
unique_patients_per_doctor_day <- df_doctor_visits %>% group_by(hcwId, visitDay) %>% summaris
ggplot(unique_patients_per_doctor_day, aes(x = n_unique_patients)) +
    geom_histogram(binwidth = 1, fill = "orange", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_patients)), color = "blue", linetype = "dashed"
    geom_vline(aes(xintercept = median(n_unique_patients)), color = "red", linetype = "dotte
    labs(title = "Distribution of Unique ICU Patients Visited per Doctor per Day",
             x = "Number of Unique Patients",
             y = "Count (Doctor-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
min_doctor_patients <- min(unique_patients_per_doctor_day$n_unique_patients)
max_doctor_patients <- max(unique_patients_per_doctor_day$n_unique_patients)
mean_doctor_patients <- mean(unique_patients_per_doctor_day$n_unique_patients)
median_doctor_patients <- median(unique_patients_per_doctor_day$n_unique_patients)
```

Min unique ICU patients per Doctor per day: `r min_doctor_patients` **Max unique ICU patients per Doctor per day:** `r max_doctor_patients` **Mean unique ICU patients per Doctor per day:** `r mean_doctor_patients` **Median unique ICU patients per Doctor per day:** `r median_doctor_patients`

Distribution of Number of Unique Healthcare Providers Seen by a Patient per Day (ICU)

```
unique_providers_per_patient_day <- df2_filtered %>% group_by(patientId, visitDay) %>% summar
ggplot(unique_providers_per_patient_day, aes(x = n_unique_providers)) +
    geom_histogram(binwidth = 1, fill = "gold", color = "black") +
    geom_vline(aes(xintercept = mean(n_unique_providers)), color = "blue", linetype = "dashe
    geom_vline(aes(xintercept = median(n_unique_providers)), color = "red", linetype = "dott
    labs(title = "Distribution of Unique Healthcare Providers Seen by an ICU Patient per Day
             x = "Number of Unique Providers",
             y = "Count (Patient-Day pairs)",
             subtitle = "Blue dashed = mean, Red dotted = median") +
    theme_minimal()
min_patient_providers <- min(unique_providers_per_patient_day$n_unique_providers)
max_patient_providers <- max(unique_providers_per_patient_day$n_unique_providers)
```

```r
mean_patient_providers <- mean(unique_providers_per_patient_day$n_unique_providers)
median_patient_providers <- median(unique_providers_per_patient_day$n_unique_providers)
```

Min unique providers per ICU patient per day: `r min_patient_providers` **Max unique providers per ICU patient per day:** `r max_patient_providers` **Mean unique providers per ICU patient per day:** `r mean_patient_providers` **Median unique providers per ICU patient per day:** `r median_patient_providers`