Healthcare Worker Visit Analysis

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

Healthcare Worker Visit Analysis

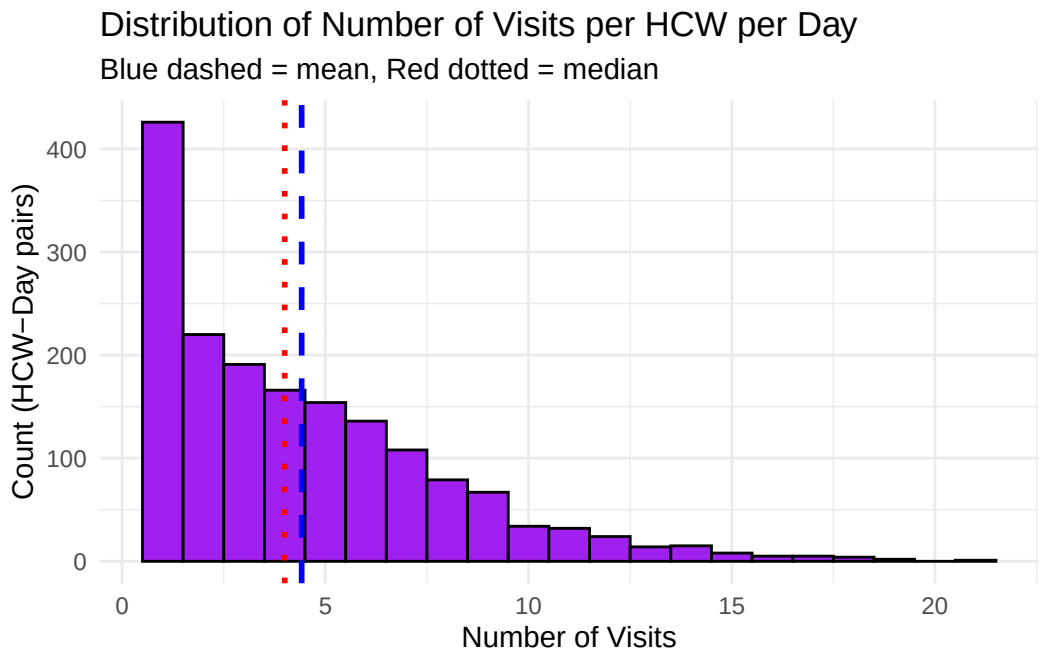
This document provides analysis of the visit rates and behaviors of health care worker agents (HCWs) in the simulation. All results and visualizations related to HCW visits will be presented here.

```
library(dplyr)

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

# Remove first 90 visitTime values
df2_filtered <- df2 %>% 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.
```

```
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 = "
```

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

    labs(title = "Distribution of Number of 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")
```

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

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

```
Max visits per HCW per day: 21
```

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

```
Interquartile range (IQR): 5
```

```r
nvisits <- nrow(df2)

# Filter for nurse visits
df_nurse_visits <- df2[df2$hcwType == 'NURSE', ]
df_nurses <- distinct(df_nurse_visits, hcwType, hcwId)
nurse_count <- nrow(df_nurses)
# Filter for other HCW types
df_doctor_visits <- df2[df2$hcwType == 'DOCTOR', ]
df_doctors <- distinct(df_doctor_visits, hcwType, hcwId)
doctor_count <- nrow(df_doctors)
df_pt_visits     <- df2[df2$hcwType == 'PT', ]
df_pts <- distinct(df_pt_visits, hcwType, hcwId)
pt_count <- nrow(df_pts)

df_ot_visits     <- df2[df2$hcwType == 'OT', ]
df_ots <- distinct(df_ot_visits, hcwType, hcwId)
ot_count <- nrow(df_ots)

df_rt_visits     <- df2[df2$hcwType == 'RT', ]
df_rts <- distinct(df_rt_visits, hcwType, hcwId)
rt_count <- nrow(df_rts)
```

Total patient visits by hcw type

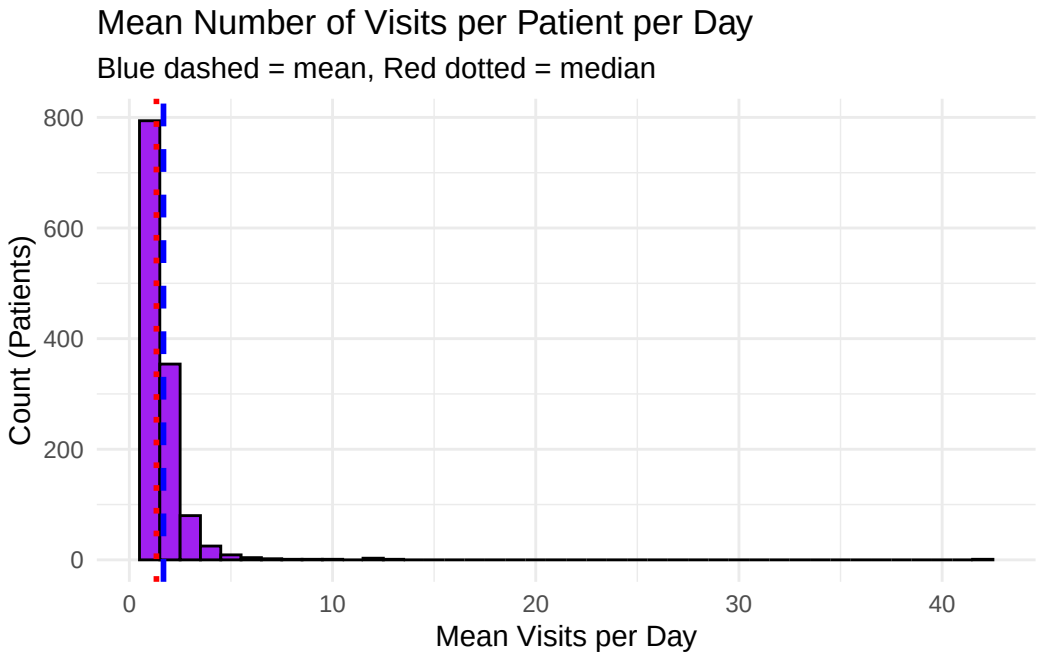
HCW Type	Total visits (365d)	mean/day
NURSE (26)	4113	0.4334036
DOCTOR (18)	3288	0.5004566
OT (7)	25	0.0097847
PT (9)	66	0.0200913
RT (7)	66	0.0258317

Histogram: Mean Number of Visits per Patient per Day

```r
# 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.
```

```r
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 Visits per Patient per Day",
       x = "Mean Visits per Day",
       y = "Count (Patients)",
       subtitle = "Blue dashed = mean, Red dotted = median") +
  theme_minimal()
```




```r
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")
```

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

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

```
Max  visits per patient per day: 42
```

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

```
Mean visits per patient per day: 1.680716
```

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

```
Median visits per patient per day: 1.333333
```

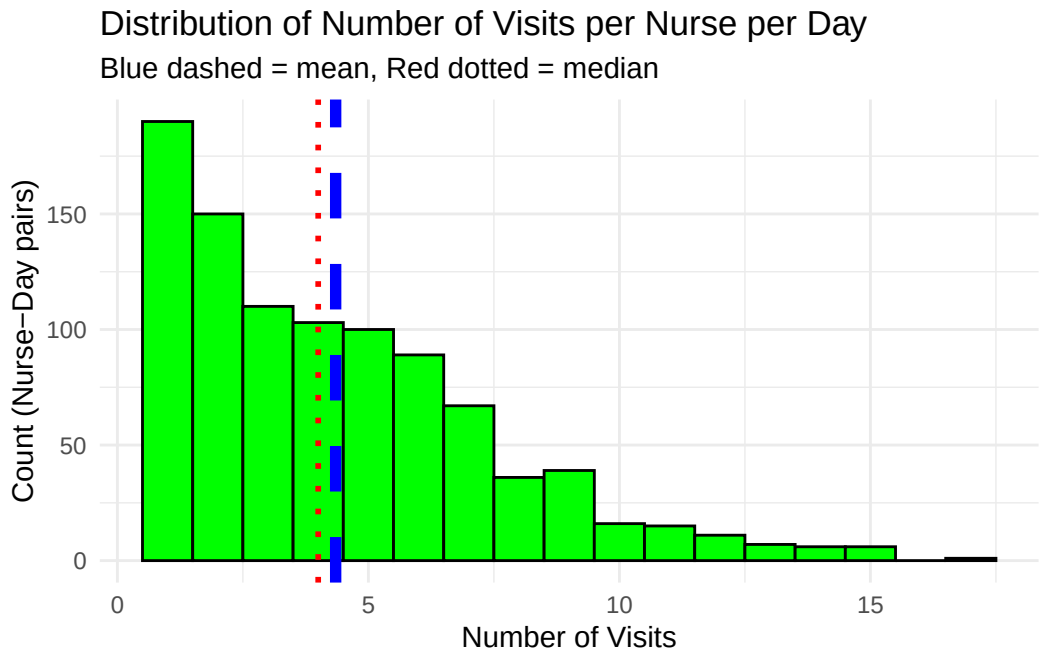
Visits per HCW per Day by Type

Distribution of Number of Visits per Nurse per Day

```
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.
```

```
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 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 nurse per day: 1
Max visits per nurse per day: 17
Mean visits per nurse per day: 4.3477801
Median visits per nurse per day: 4

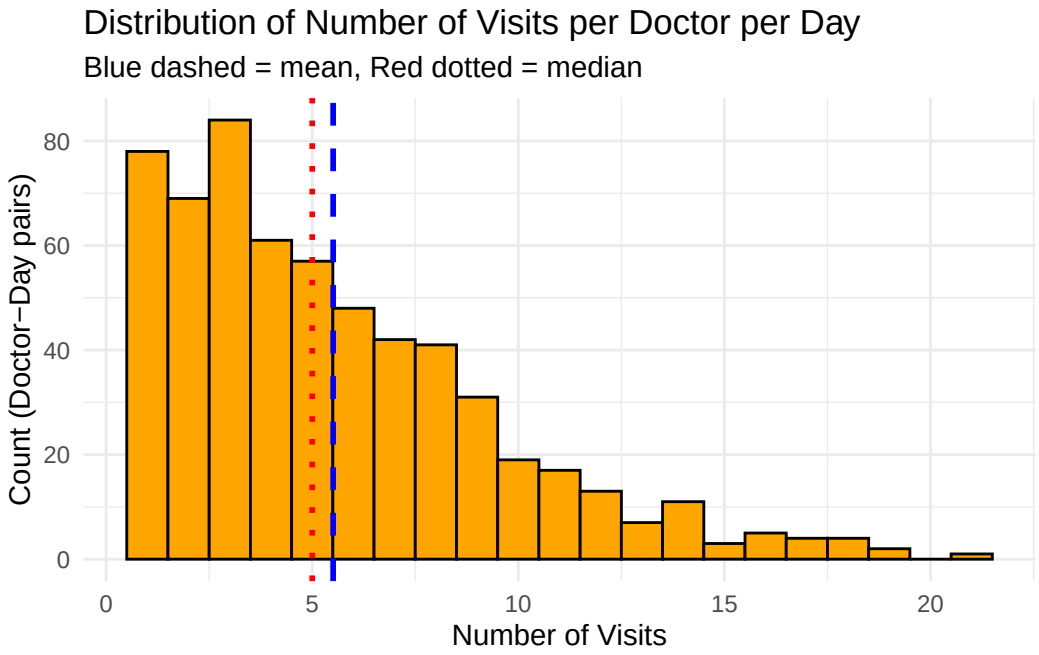
Distribution of Number of Visits per Doctor per Day

```
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 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)
```

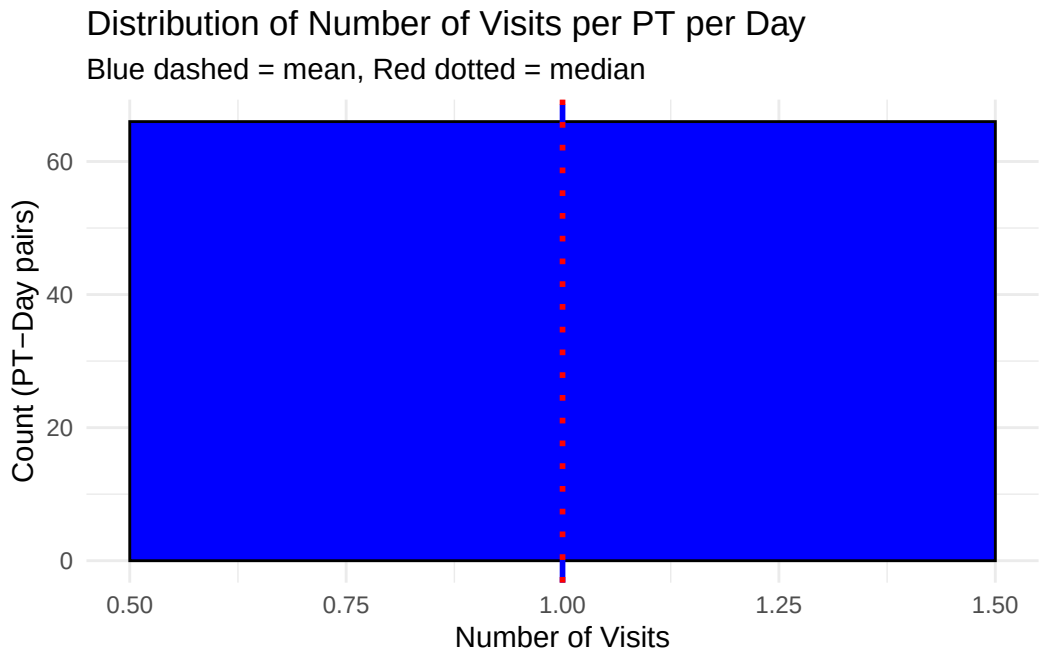
Min visits per doctor per day: 1
Max visits per doctor per day: 21
Mean visits per doctor per day: 5.5075377
Median visits per doctor per day: 5

Distribution of Number of Visits per PT per Day

```
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.
```

```
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 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)
```

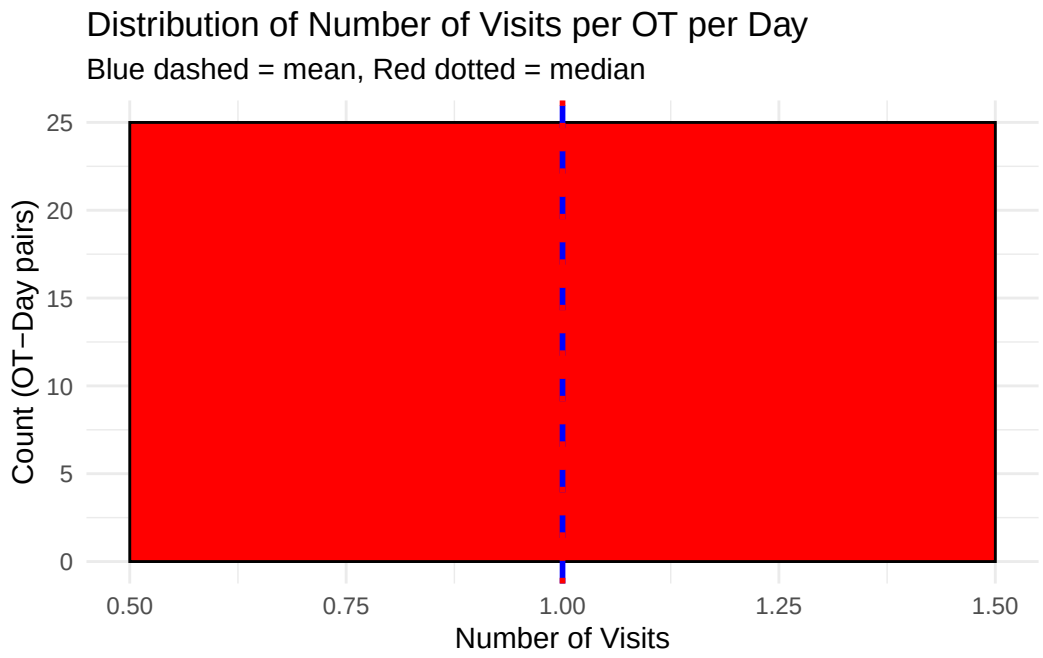
Min visits per PT per day: 1
Max visits per PT per day: 1
Mean visits per PT per day: 1
Median visits per PT per day: 1

Distribution of Number of Visits per OT per Day

```
visits_per_ot_day <- df_ot_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n()
```

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

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




```
min_ot_visits <- min(visits_per_ot_day$n_visits)
max_ot_visits <- max(visits_per_ot_day$n_visits)
mean_ot_visits <- mean(visits_per_ot_day$n_visits)
median_ot_visits <- median(visits_per_ot_day$n_visits)
```

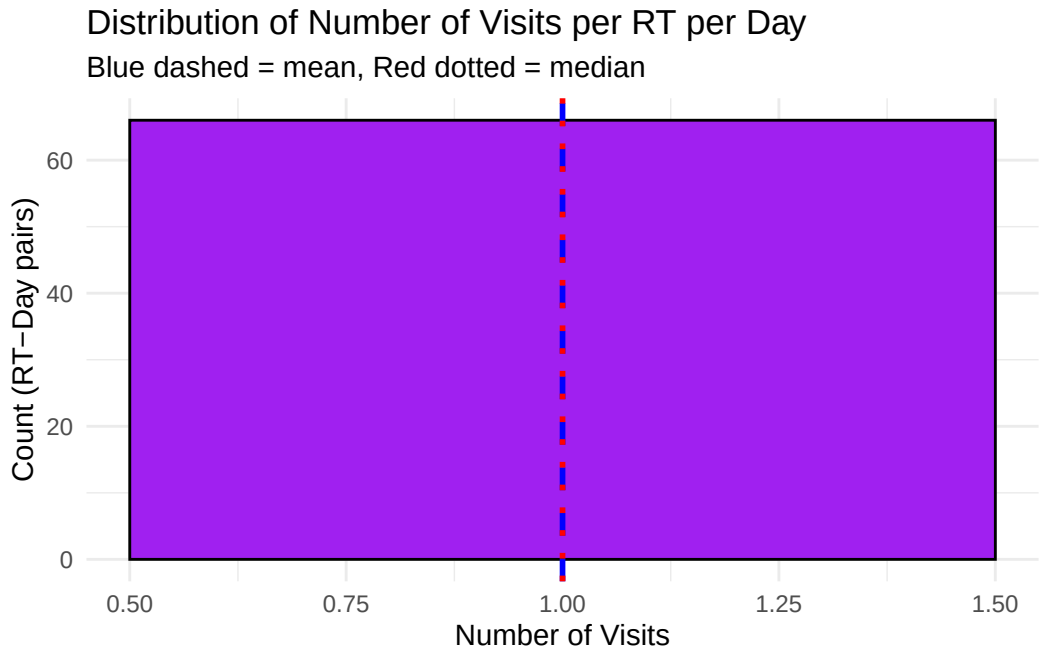
Min visits per OT per day: 1
Max visits per OT per day: 1
Mean visits per OT per day: 1
Median visits per OT per day: 1

Distribution of Number of Visits per RT per Day

```
visits_per_rt_day <- df_rt_visits %>% group_by(hcwId, visitDay) %>% summarise(n_visits = n()
```

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

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



```r
min_rt_visits <- min(visits_per_rt_day$n_visits)
max_rt_visits <- max(visits_per_rt_day$n_visits)
mean_rt_visits <- mean(visits_per_rt_day$n_visits)
median_rt_visits <- median(visits_per_rt_day$n_visits)
```

Min visits per RT per day: 1
Max visits per RT per day: 1
Mean visits per RT per day: 1
Median visits per RT per day: 1