Healthcare Worker Visit Analysis

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

Healthcare Worker Visit Analysis

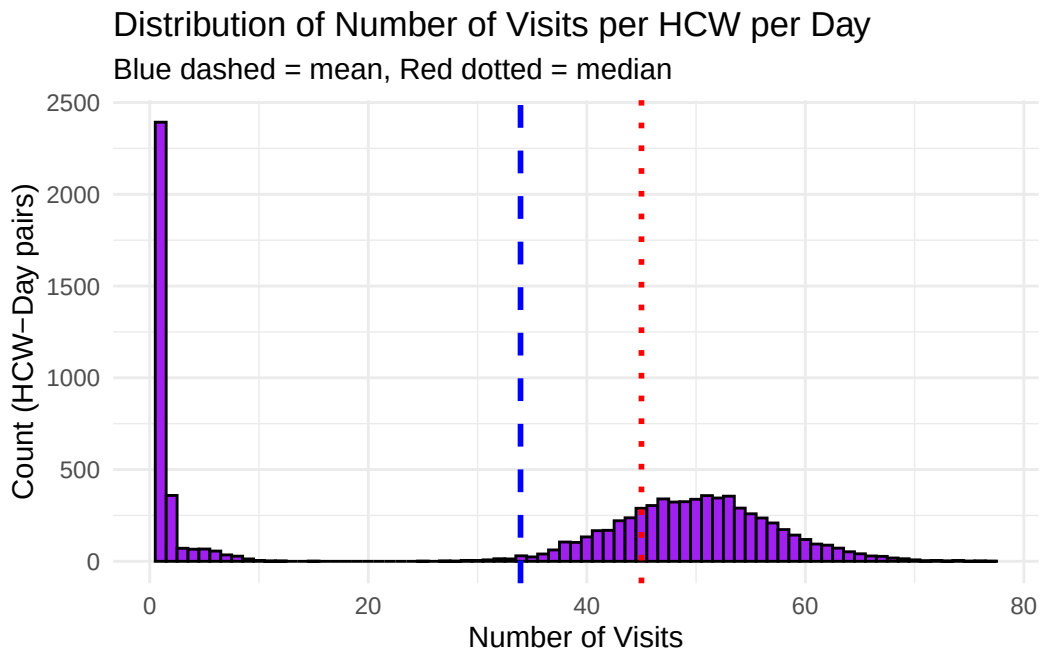
This document provides analysis of the visit rates and behaviors of health care worker agents (HCWs) in the simulation. All results and visualizations related to HCW visits will be presented here.

```
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: 77
```

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

```
Interquartile range (IQR): 51
```

```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

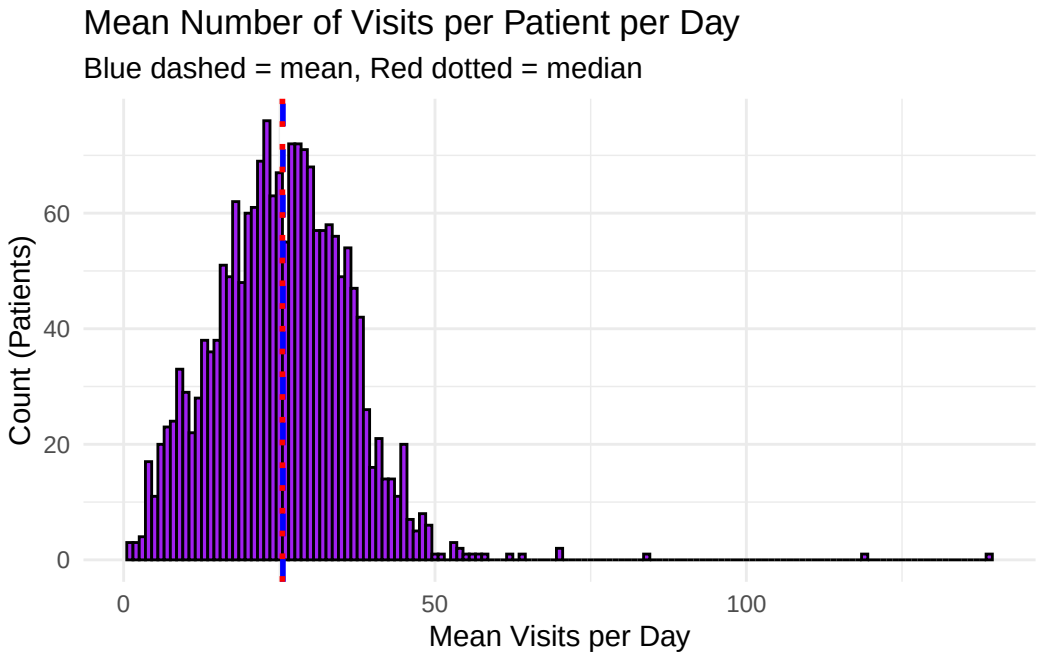
HCW Type	Total visits (365d)	mean/day
NURSE (26)	357	0.0376185
DOCTOR (18)	312606	47.5808219
OT (9)	765	0.2328767
PT (9)	1019	0.3101979
RT (9)	978	0.2977169

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: 139
```

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

```
Mean visits per patient per day: 25.57558
```

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

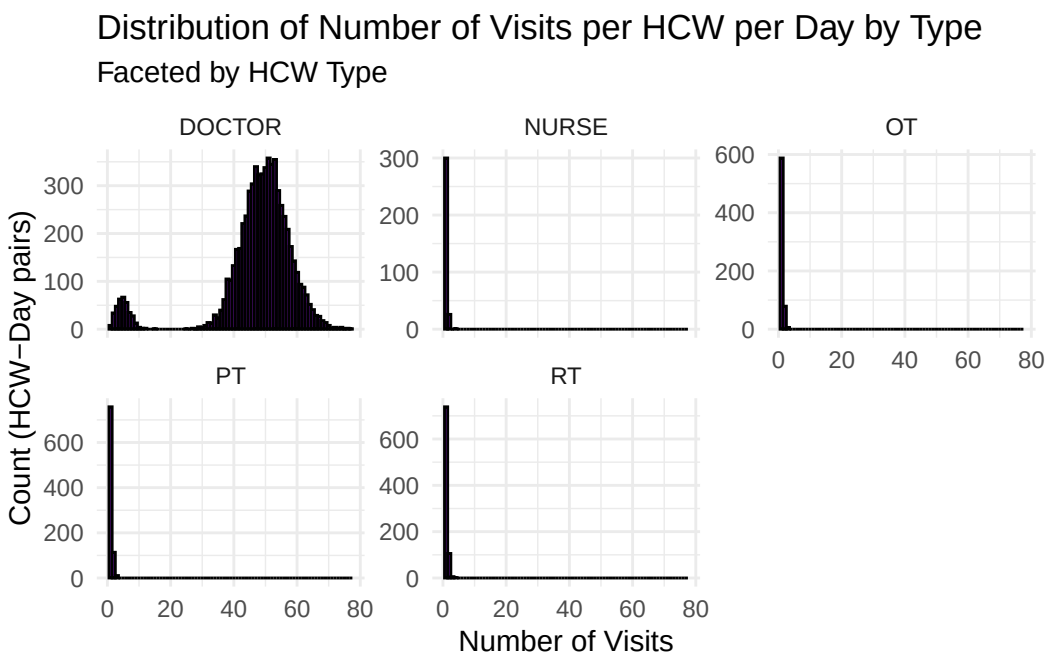
```
Median visits per patient per day: 25.5
```

Visits per HCW per Day by Type

```
# Group by hcwType, hcwId, visitDay
visits_per_day_type <- df2_filtered %>% group_by(hcwType, hcwId, visitDay) %>% summarise(n_vi
```

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

```
ggplot(visits_per_day_type, aes(x = n_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    facet_wrap(~ hcwType, scales = "free_y") +
    labs(title = "Distribution of Number of Visits per HCW per Day by Type",
             x = "Number of Visits",
             y = "Count (HCW-Day pairs)",
             subtitle = "Faceted by HCW Type") +
    theme_minimal()
```




```
    theme(
        strip.text = element_text(size = 16),
        axis.text = element_text(size = 14),
        axis.title = element_text(size = 16),
        plot.title = element_text(size = 18),
        axis.text.x = element_text(size = 14, angle = 0)
    )
```

```
List of 5
 $ axis.title :List of 11
  ..$ family       : NULL
  ..$ face         : NULL
  ..$ colour       : NULL
  ..$ size         : num 16
  ..$ hjust        : NULL
  ..$ vjust        : NULL
  ..$ angle        : NULL
  ..$ lineheight   : NULL
  ..$ margin       : NULL
  ..$ debug        : NULL
  ..$ inherit.blank: logi FALSE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
 $ axis.text  :List of 11
```

```
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : num 14
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi FALSE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ axis.text.x:List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : num 14
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : num 0
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi FALSE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ plot.title :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : num 18
 ..$ hjust        : NULL
 ..$ vjust        : NULL
 ..$ angle        : NULL
 ..$ lineheight   : NULL
 ..$ margin       : NULL
 ..$ debug        : NULL
 ..$ inherit.blank: logi FALSE
 ..- attr(*, "class")= chr [1:2] "element_text" "element"
$ strip.text :List of 11
 ..$ family       : NULL
 ..$ face         : NULL
 ..$ colour       : NULL
 ..$ size         : num 16
```

```
  ..$ hjust        : NULL
  ..$ vjust        : NULL
  ..$ angle        : NULL
  ..$ lineheight   : NULL
  ..$ margin       : NULL
  ..$ debug        : NULL
  ..$ inherit.blank: logi FALSE
  ..- attr(*, "class")= chr [1:2] "element_text" "element"
 - attr(*, "class")= chr [1:2] "theme" "gg"
 - attr(*, "complete")= logi FALSE
 - attr(*, "validate")= logi TRUE
```

```r
# Summary statistics by hcwType
summary_visits_per_day <- visits_per_day_type %>%
    group_by(hcwType) %>%
    summarise(
        min_visits = min(n_visits),
        max_visits = max(n_visits),
        mean_visits = mean(n_visits),
        median_visits = median(n_visits),
        iqr_visits = IQR(n_visits)
    )
knitr::kable(summary_visits_per_day, caption = "Summary: Visits per HCW per Day by Type")
```

Table 2: Summary: Visits per HCW per Day by Type

hcwType	min_visits	max_visits	mean_visits	median_visits	iqr_visits
DOCTOR	1	77	47.596558	50	10
NURSE	1	4	1.088685	1	0
OT	1	3	1.135215	1	0
PT	1	3	1.154020	1	0
RT	1	4	1.145369	1	0

Mean Visits per Patient per Day by HCW Type

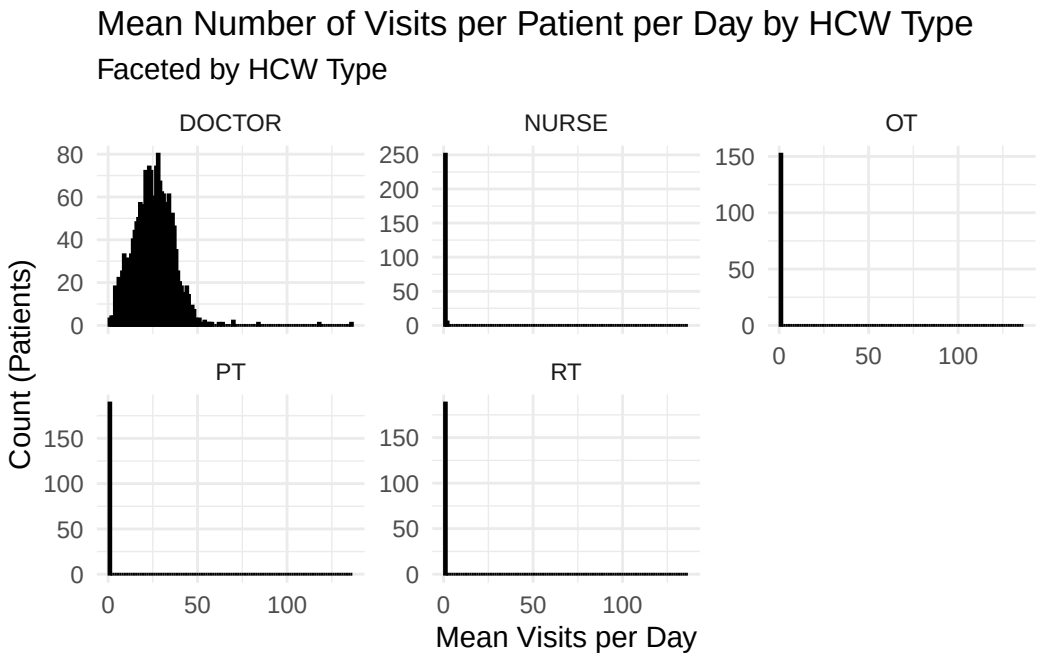
```r
# Calculate mean number of visits per patientId per day, grouped by hcwType
visits_per_patient_day_type <- df2_filtered %>% group_by(hcwType, patientId, visitDay) %>% su
```

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

```
mean_visits_type <- visits_per_patient_day_type %>% group_by(hcwType, patientId) %>% summaris
```

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

```
ggplot(mean_visits_type, aes(x = mean_visits)) +
    geom_histogram(binwidth = 1, fill = "purple", color = "black") +
    facet_wrap(~ hcwType, scales = "free_y") +
    labs(title = "Mean Number of Visits per Patient per Day by HCW Type",
             x = "Mean Visits per Day",
             y = "Count (Patients)",
             subtitle = "Faceted by HCW Type") +
    theme_minimal()
```




```
# Summary statistics by hcwType
summary_mean_visits <- mean_visits_type %>%
    group_by(hcwType) %>%
    summarise(
        min_mean_visits = min(mean_visits),
        max_mean_visits = max(mean_visits),
        mean_mean_visits = mean(mean_visits),
        median_mean_visits = median(mean_visits)
```

```
    )
knitr::kable(summary_mean_visits, caption = "Summary: Mean Visits per Patient per Day by HCW
```

Table 3: Summary: Mean Visits per Patient per Day by HCW Type

hcwType	min_mean_visits	max_mean_visits	mean_mean_visits	median_mean_visits
DOCTOR	1	136.4	25.362047	25.33333
NURSE	1	2.0	1.023763	1.00000
OT	1	1.0	1.000000	1.00000
PT	1	1.0	1.000000	1.00000
RT	1	1.0	1.000000	1.00000