Cervical Dystonia

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```
library(haven)
library(data.table)
library(tidyverse)
library(skimr)
library(gridExtra)
library(gtsummary)
library(expss)
```

```
cerv <- read_dta("cdystonia.dta")

glimpse(cerv)
```

```
## Observations: 631
## Variables: 7
## $ week   <dbl> 0, 2, 4, 8, 12, 16, 0, 2, 4, 8, 12, 16, 0, 2, 4, 8, 12, 16, ...
## $ site   <dbl+lbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,...
## $ id     <dbl> 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, ...
## $ treat  <dbl+lbl> 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3,...
## $ age    <dbl> 65, 65, 65, 65, 65, 65, 70, 70, 70, 70, 70, 70, 64, 64, 64, ...
## $ sex    <dbl+lbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,...
## $ twstrs <dbl> 32, 30, 24, 37, 39, 36, 60, 26, 27, 41, 65, 67, 44, 20, 23, ...
```

```
head(cerv)
```

```
## # A tibble: 6 x 7
##    week      site    id     treat   age       sex twstrs
##   <dbl> <dbl+lbl> <dbl> <dbl+lbl> <dbl> <dbl+lbl>  <dbl>
## 1     0     1 [1]     1 2 [5000U]    65     1 [F]     32
## 2     2     1 [1]     1 2 [5000U]    65     1 [F]     30
## 3     4     1 [1]     1 2 [5000U]    65     1 [F]     24
## 4     8     1 [1]     1 2 [5000U]    65     1 [F]     37
## 5    12     1 [1]     1 2 [5000U]    65     1 [F]     39
## 6    16     1 [1]     1 2 [5000U]    65     1 [F]     36
```

```
cerv_dyst <- cerv %>%
             mutate(id = paste0(site, id)) %>%
             select(-site)

glimpse(cerv_dyst)
```

```
## Observations: 631
## Variables: 6
## $ week   <dbl> 0, 2, 4, 8, 12, 16, 0, 2, 4, 8, 12, 16, 0, 2, 4, 8, 12, 16, ...
## $ id     <chr> "11", "11", "11", "11", "11", "11", "12", "12", "12", "12", ...
## $ treat  <dbl+lbl> 2, 2, 2, 2, 2, 2, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3,...
## $ age    <dbl> 65, 65, 65, 65, 65, 65, 70, 70, 70, 70, 70, 70, 64, 64, 64, ...
## $ sex    <dbl+lbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,...
## $ twstrs <dbl> 32, 30, 24, 37, 39, 36, 60, 26, 27, 41, 65, 67, 44, 20, 23, ...
```

```
cerv_dyst <- cerv_dyst %>%
             mutate(treat = as.numeric(treat),sex = as.numeric(sex)) %>%
             apply_labels(treat = "Treatment", sex = "Sex")
```

Exploratory Analysis

```
theme_set(theme_classic())
table_cerv <- cerv_dyst %>% mutate(sex = if_else(sex == 1, "Female", "Male"),
                                   treat = if_else(treat == 1,
                                                   "10000U",
                                                   if_else(treat == 2,
                                                           "5000U",
                                                           "Placebo")),
                                   week = paste0("Week ",week),
                                   week = factor(week, levels = c("Week 0",
                                                                  "Week 2",
                                                                  "Week 4",
                                                                  "Week 8",
                                                                  "Week 12",
                                                                  "Week 16")))
table_cerv %>%
  select(-id, -week, -treat) %>%
  as.data.frame() %>%
  tbl_summary(by = sex) %>%
  add_p() %>%
  bold_p()
```

Characteristic	**Female**, N = 395[1]	**Male**, N = 236[1]	**p-value**[2]
Age [years]	54 (47, 65)	57 (43, 66)	0.9
TWSTRS-total score	44 (34, 52)	40 (31, 50)	0.012

[1]Statistics presented: median (IQR)
[2]Statistical tests performed: Wilcoxon rank-sum test

```
table_cerv %>%
  select(-id, -sex, -treat, -age) %>%
  as.data.frame() %>%
  tbl_summary(by = week) %>%
  add_p() %>%
  bold_p()
```

Characteristic	Week 0, N = 109[1]	Week 2, N = 103[1]	Week 4, N = 106[1]	Week 8, N = 104[1]	Week 12,
TWSTRS-total score	46 (39, 53)	38 (28, 48)	37 (26, 47)	41 (29, 50)	45 (3

[1]Statistics presented: median (IQR)
[2]Statistical tests performed: Kruskal-Wallis test

```
table_cerv %>%
  select(-id, -sex, -week, -age) %>%
  as.data.frame() %>%
  tbl_summary(by = treat) %>%
  add_p() %>%
  bold_p()
```

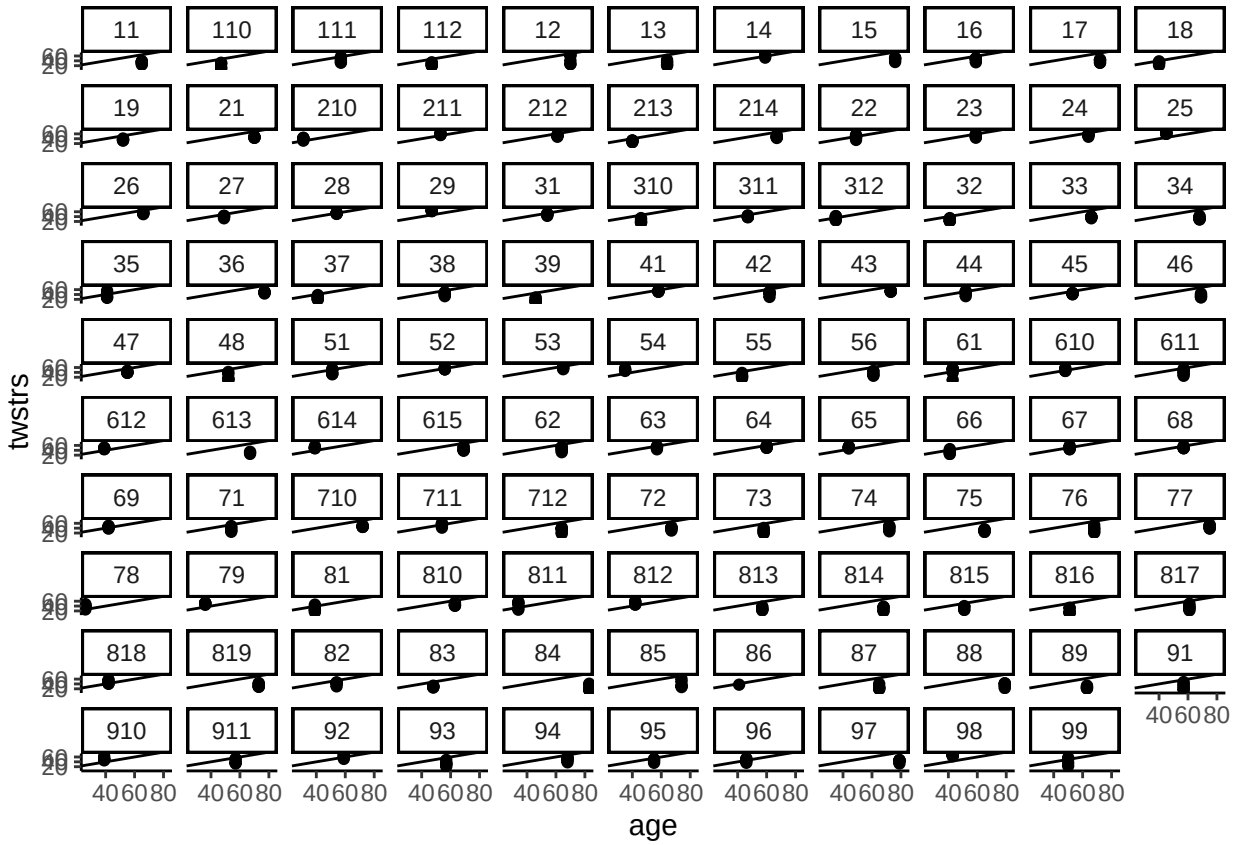
Characteristic	10000U, N = 213[1]	5000U, N = 211[1]	Placebo, N = 207[1]	p-value[2]
TWSTRS-total score	44 (33, 51)	43 (32, 51)	43 (33, 50)	>0.9

[1]Statistics presented: median (IQR)
[2]Statistical tests performed: Kruskal-Wallis test

```
age_hist <- ggplot(data = cerv_dyst, aes(x = age)) +
            geom_histogram(col = "white", fill = "seagreen3")

twstrs_hist <- ggplot(data = cerv_dyst, aes(x = twstrs)) +
               geom_histogram(col = "white", fill = "seagreen3") +
               labs(x = "Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS)")

ggplot(data = cerv_dyst, aes(x = age, y = twstrs)) + geom_point() + facet_wrap(~id)  + geom_abline()
```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twstrs
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