# RADPAD Data Analysis

## Libraries

```
library(readxl)
library(tidyverse)
library(knitr)
library(kableExtra)
library(emmeans)
library(nlme)
library(DHARMa)
```

## Data Processing

```
radpad <- read_excel("RADPAD_DATA_FINAL_7_3_24.xlsx", skip = 1)
r <- radpad |>
  select(`Weight (kg)`, `Procedure  type (BPV, PDA PMI, PV Stent)`,
         `RADPAD Drape Used? Y/N`, `Faculty`, `Tech 1`, `Resident 1`,
         `Resident 2`, `TEE`, `Anesthesia`, `Total fluoro time (min)`) |>
  mutate(ID = 1:nrow(radpad)) |>
  rename(Weight = `Weight (kg)`) |>
  rename(Procedure_Type = `Procedure  type (BPV, PDA PMI, PV Stent)`) |>
  mutate(Procedure_Type = replace(Procedure_Type,
                                  Procedure_Type == "PV stent",
                                  "PV Stent")) |>
  rename(Time = `Total fluoro time (min)`) |>
  rename(RADPAD = `RADPAD Drape Used? Y/N`) |>
  mutate(`Resident 1` = as.character(`Resident 1`)) |>
  pivot_longer(Faculty:Anesthesia,
               names_to = "Lab_Personnel",
               values_to = "Dose") |>
  filter((Dose != "n/a") & (Dose != "NB")) |>
  mutate(Dose = as.numeric(Dose))
```

### Subset Data by Lab Personnel

```
r1 <- r |>
  filter(Lab_Personnel == "Resident 1")
r2 <- r |>
  filter(Lab_Personnel == "Resident 2")
rF <- r |>
  filter(Lab_Personnel == "Faculty")
rTee <- r |>
  filter(Lab_Personnel == "TEE")
rTech <- r |>
  filter(Lab_Personnel == "Tech 1")
rA <- r |>
  filter(Lab_Personnel == "Anesthesia")
```

## Resident 1: ANCOVA

```
## fit OLS model
fit <- lm(Dose ~ RADPAD * Procedure_Type + Weight + Time, data = r1)
## get box cox transformation for Dose
b <- MASS::boxcox(fit, plotit = FALSE)
## make transformation
tran <- make.tran("boxcox", b$x[which.max(b$y)])
## fit model with box cox transformation
fit_r1 <- lm(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
             data = r1)

## RADPAD by Procedure Type effect on transformed scale
em0 <- emmeans(fit_r1, ~RADPAD|Procedure_Type)
c0 <- contrast(em0, "revpairwise")
data.frame(c0) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|---|
| Y - N | BPV | -1.6983295 | 0.3166119 | 197 | -5.364073 | 0.0000002 |
| Y - N | PDA | -0.7315819 | 0.4245136 | 197 | -1.723341 | 0.0863959 |
| Y - N | PMI | -1.1830164 | 0.5204075 | 197 | -2.273250 | 0.0240899 |
| Y - N | PV Stent | -2.6835382 | 0.6638418 | 197 | -4.042436 | 0.0000758 |

```
## RADPAD by Procedure Type effect on response scale
grid <- ref_grid(fit_r1)
rg <- update(grid, tran = tran)
em <- emmeans(regrid(rg, transform = "response"), ~RADPAD|Procedure_Type)
c1 <- contrast(em, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c1) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|---|
| Y - N | BPV | -12.974143 | 2.356674 | -17.621691 | -8.3265951 |
| Y - N | PDA | -4.160728 | 2.242926 | -8.583956 | 0.2625006 |
| Y - N | PMI | -11.803039 | 4.753247 | -21.176817 | -2.4292612 |
| Y - N | PV Stent | -39.587893 | 15.304016 | -69.768623 | -9.4071641 |

```
## RADPAD main effect on transformed scale
em2 <- emmeans(fit_r1, ~RADPAD)
c2 <- contrast(em2, "revpairwise")
data.frame(c2) |>
  kable() |>
  kable_styling()
```

| contrast | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|
| Y - N | -1.574116 | 0.2484582 | 197 | -6.335538 | 0 |

```
## RADPAD main effect on response scale
em3 <- emmeans(regrid(rg, transform = "response"), ~RADPAD)
c3 <- contrast(em3, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c3) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|
| Y - N | -17.13145 | 4.057066 | -25.13231 | -9.130596 |

## Resident 2: ANCOVA

```
## fit OLS model
fit <- lm(Dose ~ RADPAD * Procedure_Type + Weight + Time, data = r2)
## get box cox transformation for Dose
b <- MASS::boxcox(fit, plotit = FALSE)
## make transformation
tran <- make.tran("boxcox", b$x[which.max(b$y)])
## fit model with box cox transformation
fit_r2 <- lm(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
             data = r2)

## RADPAD by Procedure Type effect on transformed scale
em0 <- emmeans(fit_r2, ~RADPAD|Procedure_Type)
c0 <- contrast(em0, "revpairwise")
data.frame(c0) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|---|
| Y - N | BPV | -0.9026462 | 0.3372925 | 170 | -2.676153 | 0.0081760 |
| Y - N | PDA | -0.9751244 | 0.4766746 | 170 | -2.045681 | 0.0423286 |
| Y - N | PMI | -1.1849285 | 0.6555607 | 170 | -1.807504 | 0.0724517 |
| Y - N | PV Stent | 0.7921115 | 0.6943863 | 170 | 1.140736 | 0.2555843 |

```
## RADPAD by Procedure Type effect on response scale
grid <- ref_grid(fit_r2)
rg <- update(grid, tran = tran)
em <- emmeans(regrid(rg, transform = "response"), ~RADPAD|Procedure_Type)
c1 <- contrast(em, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c1) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|---|
| Y - N | BPV | -0.9821124 | 0.3375179 | -1.648378 | -0.3158464 |
| Y - N | PDA | -0.6103194 | 0.2797865 | -1.162623 | -0.0580163 |
| Y - N | PMI | -0.8002968 | 0.5057039 | -1.798565 | 0.1979712 |
| Y - N | PV Stent | 2.4354618 | 2.4188302 | -2.339349 | 7.2102730 |

```
## RADPAD main effect on transformed scale
em2 <- emmeans(fit_r2, ~RADPAD)
c2 <- contrast(em2, "revpairwise")
data.frame(c2) |>
  kable() |>
  kable_styling()
```

| contrast | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|
| Y - N | -0.5676469 | 0.2793768 | 170 | -2.031833 | 0.0437274 |

```
## RADPAD main effect on response scale
em3 <- emmeans(regrid(rg, transform = "response"), ~RADPAD)
c3 <- contrast(em3, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c3) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|
| Y - N | 0.0106833 | 0.633525 | -1.239906 | 1.261272 |

### Faculty: GLS

```
## fit OLS model
fit <- lm(Dose ~ RADPAD * Procedure_Type + Weight + Time, data = rF)
## get box cox transformation for Dose
b <- MASS::boxcox(fit, plotit = FALSE)
## make transformation
tran <- make.tran("boxcox", b$x[which.max(b$y)])

## fit GLS models under different variance structures with box cox transformation
gls_fit0 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rF)
gls_fit1 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rF,
                weights = varIdent(form = ~ 1 | RADPAD))
gls_fit2 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type  + Weight + Time,
                data = rF,
                weights = varIdent(form = ~ 1 | Procedure_Type))
gls_fit3 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rF,
                weights = varIdent(form = ~ 1 | RADPAD*Procedure_Type))
aic_results <- AIC(gls_fit0, gls_fit1, gls_fit2, gls_fit3)

## identify best model using AIC criterion
data.frame(aic_results) |>
  kable() |>
  kable_styling()
```

| | df | AIC |
|---|---|---|
| gls_fit0 | 11 | 813.9697 |
| gls_fit1 | 12 | 809.9206 |
| gls_fit2 | 14 | 815.5768 |
| gls_fit3 | 18 | 814.8521 |

```
## best model is gls_fit1 wit RADPAD unequal variance
fit_rF <- gls_fit1

## RADPAD by Procedure Type effect on transformed scale
em0 <- emmeans(fit_rF, ~RADPAD|Procedure_Type)
c0 <- contrast(em0, "revpairwise")
data.frame(c0) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|---|
| Y - N | BPV | -0.8155682 | 0.3301679 | 116.8109 | -2.470162 | 0.0149497 |
| Y - N | PDA | -1.2056529 | 0.4434225 | 118.3611 | -2.718971 | 0.0075340 |
| Y - N | PMI | -1.0087395 | 0.5426571 | 112.7687 | -1.858889 | 0.0656500 |
| Y - N | PV Stent | -1.1217998 | 0.7420605 | 182.1638 | -1.511736 | 0.1323338 |

```r
## RADPAD by Procedure Type effect on response scale
grid <- ref_grid(fit_rF)
rg <- update(grid, tran = tran)
em <- emmeans(regrid(rg, transform = "response"), ~RADPAD|Procedure_Type)
c1 <- contrast(em, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c1) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|---|
| Y - N | BPV | -0.5427661 | 0.2260068 | -0.9963554 | -0.0891768 |
| Y - N | PDA | -0.6848030 | 0.2898224 | -1.2654742 | -0.1041318 |
| Y - N | PMI | -1.6826927 | 0.9479590 | -3.5829154 | 0.2175300 |
| Y - N | PV Stent | -1.1554864 | 1.0087959 | -3.1633142 | 0.8523415 |

```r
## RADPAD main effect on transformed scale
em2 <- emmeans(fit_rF, ~RADPAD)
c2 <- contrast(em2, "revpairwise")
data.frame(c2) |>
  kable() |>
  kable_styling()
```

| contrast | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|
| Y - N | -1.03794 | 0.267559 | 148.0127 | -3.879294 | 0.0001572 |

```r
## RADPAD main effect on response scale
em3 <- emmeans(regrid(rg, transform = "response"), ~RADPAD)
c3 <- contrast(em3, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c3) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|
| Y - N | -1.016437 | 0.3522642 | -1.723422 | -0.3094525 |

### TEE: GLS

```
## fit OLS model
fit <- lm(Dose ~ RADPAD * Procedure_Type + Weight + Time, data = rTee)
## get box cox transformation for Dose
b <- MASS::boxcox(fit, plotit = FALSE)
## make transformation
tran <- make.tran("boxcox", b$x[which.max(b$y)])

## fit GLS models under different variance structures with box cox transformation
gls_fit0 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rTee)
gls_fit1 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rTee,
                weights = varIdent(form = ~ 1 | RADPAD))
gls_fit2 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type  + Weight + Time,
                data = rTee,
                weights = varIdent(form = ~ 1 | Procedure_Type))
gls_fit3 <- gls(tran$linkfun(Dose) ~ RADPAD*Procedure_Type + Weight + Time,
                data = rTee,
                weights = varIdent(form = ~ 1 | RADPAD*Procedure_Type))
aic_results <- AIC(gls_fit0, gls_fit1, gls_fit2, gls_fit3)

## identify best model using AIC criterion
data.frame(aic_results) |>
  kable() |>
  kable_styling()
```

| | df | AIC |
|---|---|---|
| gls_fit0 | 11 | 341.6060 |
| gls_fit1 | 12 | 341.5092 |
| gls_fit2 | 14 | 335.6755 |
| gls_fit3 | 18 | 339.6089 |

```
## best model is gls_fit1 wit RADPAD unequal variance
fit_rTee <- gls_fit1

## RADPAD by Procedure Type effect on transformed scale
em0 <- emmeans(fit_rTee, ~RADPAD|Procedure_Type)
c0 <- contrast(em0, "revpairwise")
data.frame(c0) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|---|
| Y - N | BPV | 0.7021749 | 0.6082394 | 55.22109 | 1.1544383 | 0.2532921 |
| Y - N | PDA | -0.1938401 | 0.4247102 | 41.82674 | -0.4564057 | 0.6504595 |
| Y - N | PMI | -1.9577727 | 1.2683772 | 25.23666 | -1.5435256 | 0.1351514 |
| Y - N | PV Stent | 0.5206947 | 0.7977064 | 53.04261 | 0.6527397 | 0.5167432 |

```r
## RADPAD by Procedure Type effect on response scale
grid <- ref_grid(fit_rTee)
rg <- update(grid, tran = tran)
em <- emmeans(regrid(rg, transform = "response"), ~RADPAD|Procedure_Type)
c1 <- contrast(em, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c1) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|---|
| Y - N | BPV | 0.9539667 | 0.9093810 | -0.9616119 | 2.8695453 |
| Y - N | PDA | -0.3758287 | 0.8110305 | -2.0622368 | 1.3105793 |
| Y - N | PMI | -2.6094189 | 1.6565376 | -6.1004164 | 0.8815785 |
| Y - N | PV Stent | 1.2954955 | 2.2665989 | -3.3306121 | 5.9216032 |

```r
## RADPAD main effect on transformed scale
em2 <- emmeans(fit_rTee, ~RADPAD)
c2 <- contrast(em2, "revpairwise")
data.frame(c2) |>
  kable() |>
  kable_styling()
```

| contrast | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|
| Y - N | -0.2321858 | 0.4143263 | 33.6283 | -0.5603936 | 0.5789257 |

```r
## RADPAD main effect on response scale
em3 <- emmeans(regrid(rg, transform = "response"), ~RADPAD)
c3 <- contrast(em3, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c3) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|
| Y - N | -0.1839464 | 0.7583612 | -1.782121 | 1.414229 |

### Anesthesia: Gamma GLM

```
## fit gamma GLM
fit_A <- glm(Dose ~ RADPAD * Procedure_Type + Weight + Time,
             family = Gamma(link = "log"),
             data = rA)

## RADPAD by Procedure Type effect on transformed scale
em0 <- emmeans(fit_A, ~RADPAD|Procedure_Type)
c0 <- contrast(em0, "revpairwise")
data.frame(c0) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|---|
| Y - N | BPV | -4.471577 | 0.3254711 | 186 | -13.738783 | 0.00e+00 |
| Y - N | PDA | -3.533352 | 0.4321001 | 186 | -8.177162 | 0.00e+00 |
| Y - N | PMI | -3.048403 | 0.6779127 | 186 | -4.496748 | 1.21e-05 |
| Y - N | PV Stent | -4.719313 | 0.6713197 | 186 | -7.029904 | 0.00e+00 |

```
## RADPAD by Procedure Type effect on response scale
grid <- ref_grid(fit_A)
rg <- update(grid, tran = tran)
em <- emmeans(regrid(rg, transform = "response"), ~RADPAD|Procedure_Type)
c1 <- contrast(em, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c1) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

| contrast | Procedure_Type | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|---|
| Y - N | BPV | -11.627870 | 1.941908 | -15.458866 | -7.7968740 |
| Y - N | PDA | -6.118409 | 1.514286 | -9.105793 | -3.1310245 |
| Y - N | PMI | -4.586953 | 1.382497 | -7.314343 | -1.8595636 |
| Y - N | PV Stent | -15.259043 | 7.784883 | -30.617060 | 0.0989736 |

```
## RADPAD main effect on transformed scale
em2 <- emmeans(fit_A, ~RADPAD)
c2 <- contrast(em2, "revpairwise")
data.frame(c2) |>
  kable() |>
  kable_styling()
```

| contrast | estimate | SE | df | t.ratio | p.value |
|---|---|---|---|---|---|
| Y - N | -3.943161 | 0.273787 | 186 | -14.40229 | 0 |

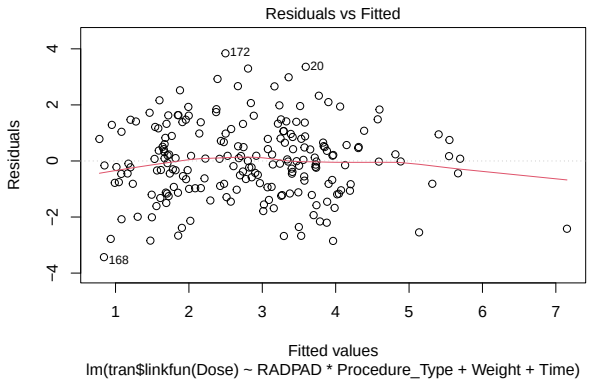
```r
## RADPAD main effect on response scale
em3 <- emmeans(regrid(rg, transform = "response"), ~RADPAD)
c3 <- contrast(em3, method = "revpairwise", infer = c(TRUE, FALSE))
data.frame(c3) |>
  select(-df) |>
  kable(round = 3) |>
  kable_styling()
```

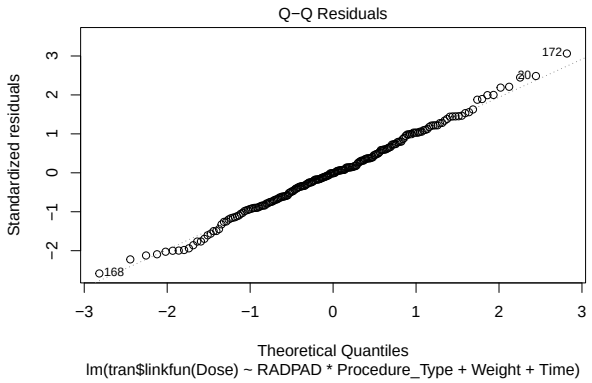
| contrast | estimate | SE | lower.CL | upper.CL |
|---|---|---|---|---|
| Y - N | -9.398069 | 2.016801 | -13.37681 | -5.419324 |

## Resiudal Analysis

### Resident 1

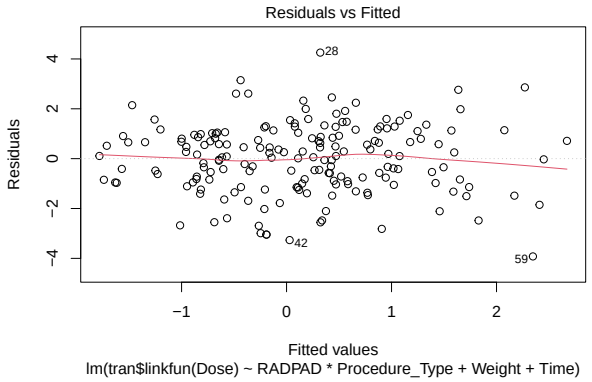
```
plot(fit_r1, which = c(1,2))
```

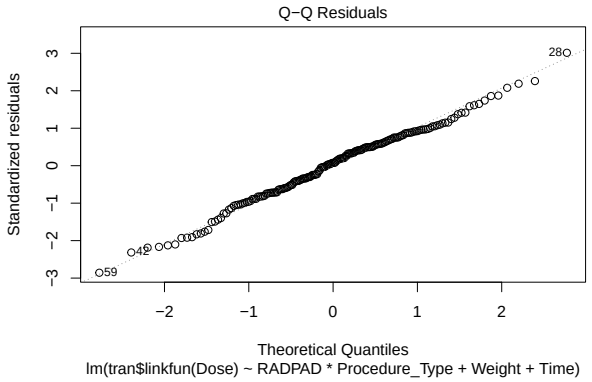



### Resident 2

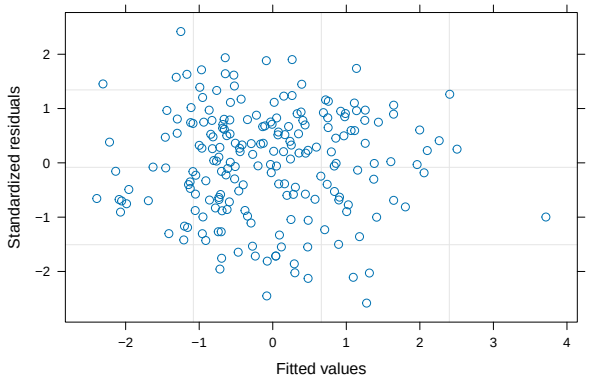
```
plot(fit_r2, which = c(1,2))
```



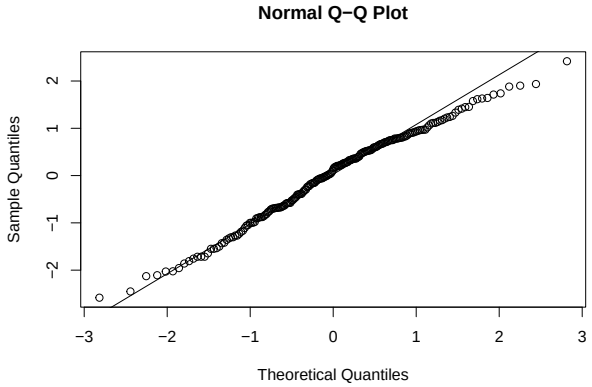



### Faculty

```
plot(fit_rF)
```

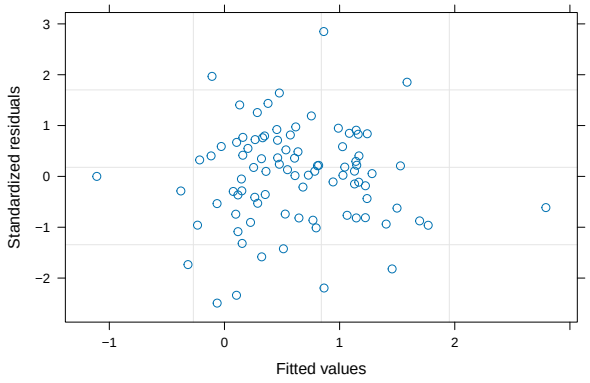



```
qqnorm(residuals(fit_rF, type = "pearson"))
qqline(residuals(fit_rF, type = "pearson"))
```

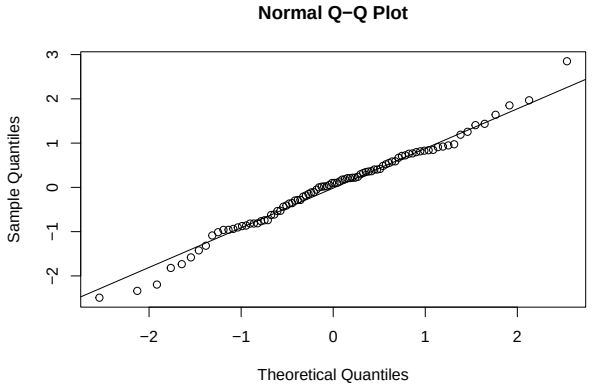


### Tee

```
plot(fit_rTee)
```

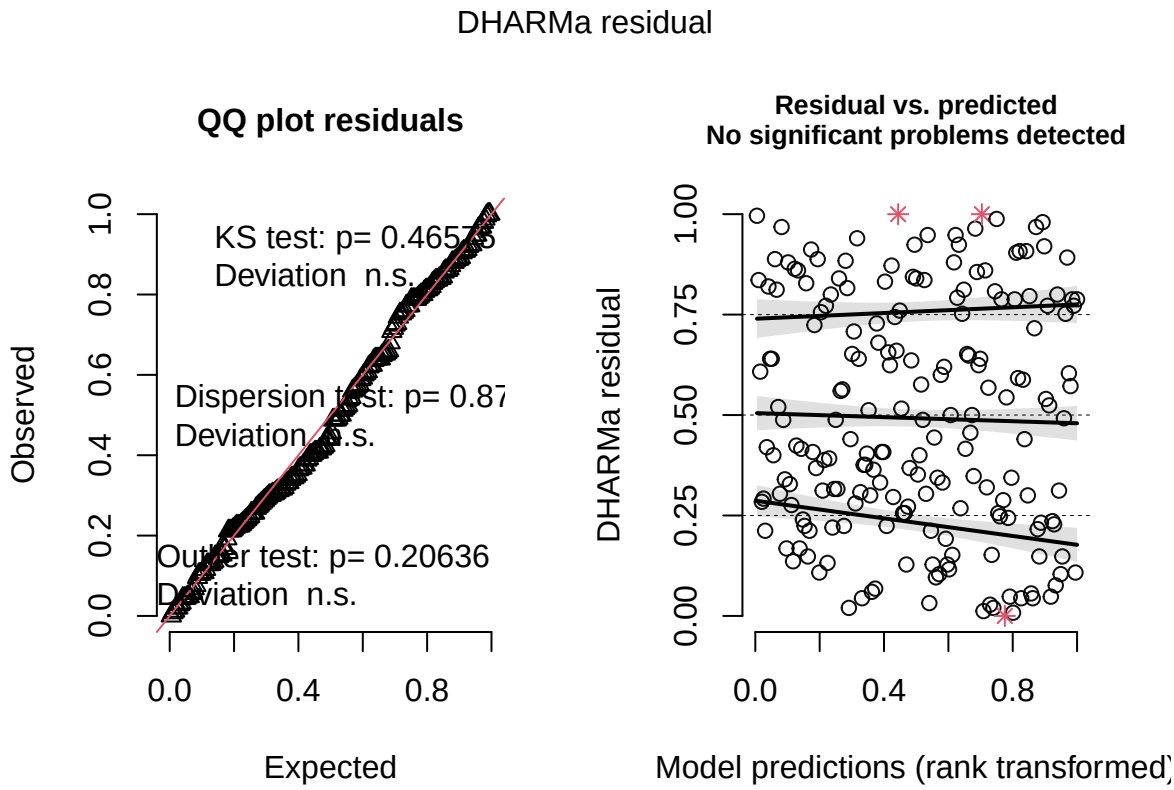



```
qqnorm(residuals(fit_rTee, type = "pearson"))
qqline(residuals(fit_rTee, type = "pearson"))
```



### Anesthesia

```
plot(simulateResiduals(fit_A))
```



### Numeric Summaries

```
r |>
  group_by(Lab_Personnel, Procedure_Type, RADPAD) |>
  summarise(Count = n(),
            Mean = mean(Dose),
            Median = median(Dose),
            SD = sd(Dose), Min = min(Dose),
            Max = max(Dose)) |>
  kable(digits = 3) |>
  kable_styling()
```

| Lab_Personnel | Procedure_Type | RADPAD | Count | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|---|---|---|
| Anesthesia | BPV | N | 72 | 13.387 | 4.685 | 18.280 | 0.01 | 84.94 |
| Anesthesia | BPV | Y | 24 | 0.161 | 0.050 | 0.306 | 0.01 | 1.46 |
| Anesthesia | PDA | N | 38 | 5.997 | 1.765 | 14.327 | 0.01 | 88.04 |
| Anesthesia | PDA | Y | 14 | 0.139 | 0.065 | 0.161 | 0.01 | 0.51 |
| Anesthesia | PMI | N | 26 | 4.815 | 2.355 | 7.912 | 0.03 | 39.45 |
| Anesthesia | PMI | Y | 5 | 0.168 | 0.100 | 0.181 | 0.01 | 0.44 |
| Anesthesia | PV Stent | N | 9 | 40.408 | 23.270 | 46.803 | 1.39 | 146.79 |
| Anesthesia | PV Stent | Y | 8 | 0.226 | 0.205 | 0.170 | 0.05 | 0.57 |
| Faculty | BPV | N | 73 | 3.544 | 1.280 | 5.709 | 0.01 | 32.81 |
| Faculty | BPV | Y | 25 | 0.999 | 0.540 | 1.175 | 0.02 | 4.23 |
| Faculty | PDA | N | 40 | 1.857 | 0.580 | 3.300 | 0.01 | 13.54 |
| Faculty | PDA | Y | 14 | 0.588 | 0.110 | 1.424 | 0.02 | 5.45 |
| Faculty | PMI | N | 28 | 5.780 | 3.620 | 8.515 | 0.02 | 44.42 |
| Faculty | PMI | Y | 9 | 1.771 | 0.540 | 2.690 | 0.04 | 8.60 |
| Faculty | PV Stent | N | 9 | 6.920 | 4.640 | 6.291 | 0.71 | 20.12 |
| Faculty | PV Stent | Y | 8 | 3.411 | 2.305 | 3.765 | 0.38 | 11.70 |
| Resident 1 | BPV | N | 73 | 30.965 | 15.440 | 36.953 | 2.28 | 196.00 |
| Resident 1 | BPV | Y | 25 | 9.330 | 6.120 | 9.876 | 0.05 | 38.35 |
| Resident 1 | PDA | N | 40 | 11.430 | 5.765 | 16.513 | 0.59 | 72.00 |
| Resident 1 | PDA | Y | 14 | 5.540 | 2.830 | 7.739 | 1.23 | 31.38 |
| Resident 1 | PMI | N | 29 | 25.794 | 18.330 | 20.463 | 1.82 | 98.66 |
| Resident 1 | PMI | Y | 9 | 21.856 | 8.750 | 37.307 | 0.23 | 116.92 |
| Resident 1 | PV Stent | N | 9 | 87.398 | 92.000 | 35.524 | 41.17 | 136.67 |
| Resident 1 | PV Stent | Y | 8 | 30.610 | 14.810 | 45.049 | 0.89 | 135.56 |
| Resident 2 | BPV | N | 71 | 4.131 | 1.840 | 6.333 | 0.02 | 43.29 |
| Resident 2 | BPV | Y | 24 | 2.260 | 0.525 | 4.318 | 0.01 | 18.45 |
| Resident 2 | PDA | N | 36 | 1.473 | 0.880 | 2.126 | 0.08 | 9.11 |
| Resident 2 | PDA | Y | 12 | 0.489 | 0.345 | 0.466 | 0.05 | 1.36 |
| Resident 2 | PMI | N | 12 | 2.221 | 1.630 | 1.672 | 0.52 | 6.40 |
| Resident 2 | PMI | Y | 8 | 0.584 | 0.310 | 0.654 | 0.05 | 1.92 |
| Resident 2 | PV Stent | N | 9 | 4.776 | 3.480 | 4.865 | 0.12 | 16.25 |
| Resident 2 | PV Stent | Y | 8 | 15.078 | 3.855 | 23.021 | 0.51 | 62.83 |
| TEE | BPV | N | 13 | 4.218 | 1.660 | 5.919 | 0.02 | 18.74 |
| TEE | BPV | Y | 7 | 2.839 | 3.480 | 1.696 | 0.33 | 4.50 |
| TEE | PDA | N | 36 | 3.195 | 2.280 | 3.325 | 0.03 | 12.77 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TEE | PDA | Y | 12 | 2.814 | 2.050 | 2.870 | 0.26 | 8.98 |
| TEE | PMI | N | 9 | 25.231 | 3.920 | 63.015 | 0.08 | 193.00 |
| TEE | PMI | Y | 1 | 0.330 | 0.330 | NA | 0.33 | 0.33 |
| TEE | PV Stent | N | 8 | 4.803 | 2.355 | 6.728 | 0.54 | 20.28 |
| TEE | PV Stent | Y | 4 | 11.992 | 3.595 | 18.926 | 0.54 | 40.24 |
| Tech 1 | BPV | N | 72 | 0.136 | 0.040 | 0.278 | 0.00 | 1.40 |
| Tech 1 | BPV | Y | 25 | 0.028 | 0.000 | 0.061 | 0.00 | 0.26 |
| Tech 1 | PDA | N | 38 | 0.093 | 0.025 | 0.145 | 0.00 | 0.56 |
| Tech 1 | PDA | Y | 14 | 0.061 | 0.025 | 0.073 | 0.00 | 0.20 |
| Tech 1 | PMI | N | 24 | 0.302 | 0.025 | 0.919 | 0.00 | 4.50 |
| Tech 1 | PMI | Y | 9 | 0.119 | 0.000 | 0.282 | 0.00 | 0.85 |
| Tech 1 | PV Stent | N | 8 | 0.360 | 0.060 | 0.680 | 0.01 | 2.00 |
| Tech 1 | PV Stent | Y | 8 | 0.162 | 0.040 | 0.202 | 0.00 | 0.49 |