

# **Systolic Blood Pressure Case Study**

**MAS II Fall 2018**

**Standardized goodness of fit statistics and fitted betas**

## Model 1 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
##  9247.867 9307.507 -4612.934
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2653508
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.2876551 3.752395
##
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF   t-value p-value
## (Intercept) -6.792998 0.2660766 1463 -25.530230 0.0000
## Treatment_F2  7.504027 0.3661963 1463  20.491817 0.0000
## Treatment_F3  6.781470 0.3661963 1463  18.518676 0.0000
## Treatment_F4  4.521330 0.3661963 1463  12.346739 0.0000
## Treatment_F5  2.399954 0.3661963 1463   6.553736 0.0000
## Treatment_F6  3.360502 0.3661963 1463   9.176779 0.0000
## Treatment_F7  0.822955 0.3661963 1463   2.247305 0.0248
## Treatment_F8 -1.316800 0.3661963 1463  -3.595886 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.688
## Treatment_F3 -0.688  0.500
## Treatment_F4 -0.688  0.500  0.500
## Treatment_F5 -0.688  0.500  0.500  0.500
## Treatment_F6 -0.688  0.500  0.500  0.500  0.500
## Treatment_F7 -0.688  0.500  0.500  0.500  0.500  0.500
## Treatment_F8 -0.688  0.500  0.500  0.500  0.500  0.500  0.500
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.966386478 -0.696480704  0.005957294  0.676724304  3.672408104
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 2 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC   logLik
##  9241.28 9300.972 -4609.64
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2414174
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.3018765  3.74345
##
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF   t-value p-value
## (Intercept) -6.792998 0.2650934 1463 -25.624926 0.0000
## Treatment_F2  7.504027 0.3661962 1463  20.491819 0.0000
## Treatment_F3  6.781470 0.3661962 1463  18.518678 0.0000
## Treatment_F4  4.521330 0.3661962 1463  12.346740 0.0000
## Treatment_F5  2.399954 0.3661962 1463   6.553736 0.0000
## Treatment_F6  3.360502 0.3661962 1463   9.176779 0.0000
## Treatment_F7  0.822955 0.3661962 1463   2.247305 0.0248
## Treatment_F8 -1.316800 0.3661962 1463  -3.595886 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.691
## Treatment_F3 -0.691  0.500
## Treatment_F4 -0.691  0.500  0.500
## Treatment_F5 -0.691  0.500  0.500  0.500
## Treatment_F6 -0.691  0.500  0.500  0.500  0.500
## Treatment_F7 -0.691  0.500  0.500  0.500  0.500  0.500
## Treatment_F8 -0.691  0.500  0.500  0.500  0.500  0.500  0.500
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.96085629 -0.70013942  0.01244471  0.68317827  3.67973419
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 3 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
## 9245.032 9310.093 -4610.516
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev: 0.2829815
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev: 0.3081544 3.89183
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_1
## Parameter estimates:
##      0      1
## 1.0000000 0.9257221
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF  t-value p-value
## (Intercept) -6.792998 0.2763890 1463 -24.577668 0.0000
## Treatment_F2 7.504027 0.3798038 1463 19.757642 0.0000
## Treatment_F3 6.781470 0.3798038 1463 17.855194 0.0000
## Treatment_F4 4.521330 0.3798038 1463 11.904383 0.0000
## Treatment_F5 2.399954 0.3659702 1463 6.557784 0.0000
## Treatment_F6 3.360502 0.3659702 1463 9.182447 0.0000
## Treatment_F7 0.822955 0.3659702 1463 2.248693 0.0247
## Treatment_F8 -1.316800 0.3659702 1463 -3.598107 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.687
## Treatment_F3 -0.687 0.500
## Treatment_F4 -0.687 0.500 0.500
## Treatment_F5 -0.713 0.519 0.519 0.519
## Treatment_F6 -0.713 0.519 0.519 0.519 0.539
## Treatment_F7 -0.713 0.519 0.519 0.519 0.539 0.539
## Treatment_F8 -0.713 0.519 0.519 0.519 0.539 0.539 0.539
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.0341454 -0.6879101 0.0066913 0.6750727 3.8171284
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21 210
```

## Model 4 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC    logLik
##  9238.455 9303.573 -4607.227
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2597347
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.321243 3.882077
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_1
## Parameter estimates:
##      0      1
## 1.000000 0.925956
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF   t-value p-value
## (Intercept) -6.792998 0.2753713 1463 -24.668501 0.0000
## Treatment_F2  7.504027 0.3797572 1463  19.760066 0.0000
## Treatment_F3  6.781470 0.3797572 1463  17.857385 0.0000
## Treatment_F4  4.521330 0.3797572 1463  11.905844 0.0000
## Treatment_F5  2.399954 0.3659680 1463   6.557824 0.0000
## Treatment_F6  3.360502 0.3659680 1463   9.182503 0.0000
## Treatment_F7  0.822955 0.3659680 1463   2.248707 0.0247
## Treatment_F8 -1.316800 0.3659680 1463  -3.598129 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.690
## Treatment_F3 -0.690  0.500
## Treatment_F4 -0.690  0.500  0.500
## Treatment_F5 -0.716  0.519  0.519  0.519
## Treatment_F6 -0.716  0.519  0.519  0.519  0.538
## Treatment_F7 -0.716  0.519  0.519  0.519  0.538  0.538
## Treatment_F8 -0.716  0.519  0.519  0.519  0.538  0.538  0.538
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.033006930 -0.691503829  0.007073227  0.678742238  3.824396907
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 5 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
##  9244.828 9309.89 -4610.414
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2773583
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.3129494 3.690533
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_2
## Parameter estimates:
##      1      0
## 1.000000 1.122377
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF   t-value p-value
## (Intercept) -6.792998 0.2626536 1463 -25.862956 0.0000
## Treatment_F2  7.504027 0.3828316 1463  19.601376 0.0000
## Treatment_F3  6.781470 0.3601592 1463  18.829091 0.0000
## Treatment_F4  4.521330 0.3601592 1463  12.553698 0.0000
## Treatment_F5  2.399954 0.3601592 1463   6.663592 0.0000
## Treatment_F6  3.360502 0.3601592 1463   9.330602 0.0000
## Treatment_F7  0.822955 0.3601592 1463   2.284975 0.0225
## Treatment_F8 -1.316800 0.3601592 1463  -3.656161 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.645
## Treatment_F3 -0.686  0.470
## Treatment_F4 -0.686  0.470  0.500
## Treatment_F5 -0.686  0.470  0.500  0.500
## Treatment_F6 -0.686  0.470  0.500  0.500  0.500
## Treatment_F7 -0.686  0.470  0.500  0.500  0.500  0.500
## Treatment_F8 -0.686  0.470  0.500  0.500  0.500  0.500  0.500
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.020277946 -0.695355403  0.008397249  0.680910338  3.729216201
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 6 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC   logLik
## 9238.239 9303.358 -4607.12
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2538992
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.3258931 3.681852
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_2
## Parameter estimates:
##      1      0
## 1.000000 1.122112
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error   DF   t-value p-value
## (Intercept) -6.792998 0.2616372 1463 -25.963427 0.0000
## Treatment_F2  7.504027 0.3827933 1463  19.603336 0.0000
## Treatment_F3  6.781470 0.3601706 1463  18.828496 0.0000
## Treatment_F4  4.521330 0.3601706 1463  12.553301 0.0000
## Treatment_F5  2.399954 0.3601706 1463   6.663381 0.0000
## Treatment_F6  3.360502 0.3601706 1463   9.330307 0.0000
## Treatment_F7  0.822955 0.3601706 1463   2.284903 0.0225
## Treatment_F8 -1.316800 0.3601706 1463  -3.656046 0.0003
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.648
## Treatment_F3 -0.688  0.470
## Treatment_F4 -0.688  0.470  0.500
## Treatment_F5 -0.688  0.470  0.500  0.500
## Treatment_F6 -0.688  0.470  0.500  0.500  0.500
## Treatment_F7 -0.688  0.470  0.500  0.500  0.500  0.500
## Treatment_F8 -0.688  0.470  0.500  0.500  0.500  0.500  0.500
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -3.01521867 -0.70080747  0.01218647  0.68380139  3.73693989
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 7 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
## 9243.837 9314.32 -4608.919
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2813384
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.3156075 3.791468
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_3
## Parameter estimates:
##      1      0      2
## 1.0000000 1.0923229 0.9364811
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF   t-value p-value
## (Intercept) -6.792998 0.2696236 1463 -25.194374 0.0000
## Treatment_F2  7.504027 0.3874661 1463  19.366922 0.0000
## Treatment_F3  6.781470 0.3700093 1463  18.327834 0.0000
## Treatment_F4  4.521330 0.3700093 1463  12.219501 0.0000
## Treatment_F5  2.399954 0.3584507 1463   6.695351 0.0000
## Treatment_F6  3.360502 0.3700093 1463   9.082208 0.0000
## Treatment_F7  0.822955 0.3584507 1463   2.295865 0.0218
## Treatment_F8 -1.316800 0.3584507 1463  -3.673587 0.0002
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.655
## Treatment_F3 -0.686  0.477
## Treatment_F4 -0.686  0.477  0.500
## Treatment_F5 -0.708  0.493  0.516  0.516
## Treatment_F6 -0.686  0.477  0.500  0.500  0.516
## Treatment_F7 -0.708  0.493  0.516  0.516  0.533  0.516
## Treatment_F8 -0.708  0.493  0.516  0.516  0.533  0.516  0.533
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.944144074 -0.690473450  0.008688345  0.681536461  3.871657291
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```



## Model 8 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC    logLik
## 9237.242 9307.787 -4605.621
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev: 0.2580819
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev: 0.3283861 3.782394
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_3
## Parameter estimates:
##      1      0      2
## 1.0000000 1.0921336 0.9365649
## Fixed effects: change_systolic ~ Treatment_F
##      Value Std.Error  DF  t-value p-value
## (Intercept) -6.792998 0.2686169 1463 -25.288798 0.0000
## Treatment_F2 7.504027 0.3874260 1463 19.368931 0.0000
## Treatment_F3 6.781470 0.3700058 1463 18.328008 0.0000
## Treatment_F4 4.521330 0.3700058 1463 12.219617 0.0000
## Treatment_F5 2.399954 0.3584623 1463 6.695135 0.0000
## Treatment_F6 3.360502 0.3700058 1463 9.082295 0.0000
## Treatment_F7 0.822955 0.3584623 1463 2.295791 0.0218
## Treatment_F8 -1.316800 0.3584623 1463 -3.673469 0.0002
## Correlation:
##      (Intr) Trt_F2 Trt_F3 Trt_F4 Trt_F5 Trt_F6 Trt_F7
## Treatment_F2 -0.658
## Treatment_F3 -0.689 0.478
## Treatment_F4 -0.689 0.478 0.500
## Treatment_F5 -0.711 0.493 0.516 0.516
## Treatment_F6 -0.689 0.478 0.500 0.500 0.516
## Treatment_F7 -0.711 0.493 0.516 0.516 0.533 0.516
## Treatment_F8 -0.711 0.493 0.516 0.516 0.533 0.516 0.533
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.939503829 -0.694083619 0.009722537 0.683731093 3.879422539
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21 210
```

## Model 9 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC   logLik
##  9307.239 9339.788 -4647.62
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2653388
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.04628646 3.837436
##
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept)  0.349750 0.1960217 1468   1.784243  0.0746
## Mean_F_G_12 -3.715487 0.2417357 1468  -15.370036  0.0000
## Mean_F_G_13 -7.307363 0.2417357 1468  -30.228729  0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.74
## Mean_F_G_13 -0.74  0.60
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.884948181 -0.725185099 -0.008064828  0.674519918  3.330285349
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 10 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC    logLik
##  9302.189 9334.748 -4645.095
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2414128
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.06774655 3.834831
##
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF    t-value p-value
## (Intercept)  0.349750 0.1946249 1468    1.797048  0.0725
## Mean_F_G_12 -3.715487 0.2417876 1468   -15.366736  0.0000
## Mean_F_G_13 -7.307363 0.2417876 1468   -30.222238  0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.745
## Mean_F_G_13 -0.745  0.600
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.88063277 -0.72865225 -0.01038778  0.67703558  3.33161214
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 11 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
##  9306.51 9344.484 -4646.255
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:    0.278715
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.08297702 3.946248
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_1
## Parameter estimates:
##      0      1
## 1.0000000 0.9434589
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept) 0.349750 0.2020154 1468   1.731306  0.0836
## Mean_F_G_12 -3.757084 0.2447804 1468  -15.348796  0.0000
## Mean_F_G_13 -7.313622 0.2447804 1468  -29.878301  0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.750
## Mean_F_G_13 -0.750  0.619
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.965437989 -0.724688012 -0.002018857  0.670574141  3.440895627
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 12 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC   logLik
## 9301.501 9339.486 -4643.75
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2552653
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.09628534 3.942655
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_1
## Parameter estimates:
##      0      1
## 1.000000 0.943903
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept) 0.349750 0.2005733 1468   1.743753 0.0814
## Mean_F_G_12 -3.756755 0.2448066 1468  -15.345811 0.0000
## Mean_F_G_13 -7.313573 0.2448066 1468  -29.874906 0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.755
## Mean_F_G_13 -0.755  0.619
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.960386586 -0.726691876 -0.002773741  0.671735555  3.441648387
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 13 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
##  9305.891 9343.864 -4645.945
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:   0.2752928
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:   0.1072531 3.787028
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_2
## Parameter estimates:
##      1      0
## 1.000000 1.098897
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept) 0.315780 0.2025365 1468   1.559125 0.1192
## Mean_F_G_12 -3.681516 0.2451975 1468  -15.014493 0.0000
## Mean_F_G_13 -7.273393 0.2451975 1468  -29.663407 0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.752
## Mean_F_G_13 -0.752  0.621
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.922464926 -0.725541650 -0.001505371  0.678745823  3.371304117
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 14 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC    logLik
## 9300.877 9338.862 -4643.438
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2517395
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.1178508 3.784734
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_2
## Parameter estimates:
##      1      0
## 1.000000 1.098277
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept) 0.315982 0.2011198 1468   1.571113 0.1164
## Mean_F_G_12 -3.681718 0.2452291 1468  -15.013385 0.0000
## Mean_F_G_13 -7.273595 0.2452291 1468  -29.660412 0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.757
## Mean_F_G_13 -0.757  0.621
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.918029032 -0.723086778 -0.003653514  0.678693209  3.372764198
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```

## Model 15 Results

```
## Linear mixed-effects model fit by REML
## Data: systolic_g
##      AIC      BIC    logLik
## 9307.053 9350.451 -4645.527
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2773595
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.09251709 3.843391
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_3
## Parameter estimates:
##      1      0      2
## 1.0000000 1.0826403 0.9656962
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF   t-value p-value
## (Intercept) 0.321124 0.2041113 1468   1.573279 0.1159
## Mean_F_G_12 -3.711038 0.2466833 1468 -15.043735 0.0000
## Mean_F_G_13 -7.282522 0.2456139 1468 -29.650285 0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.754
## Mean_F_G_13 -0.757  0.626
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.877272430 -0.718082574 -0.001251214  0.677830413  3.445847432
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```



## Model 16 Results

```
## Linear mixed-effects model fit by maximum likelihood
## Data: systolic_g
##      AIC      BIC    logLik
##  9302.047 9345.459 -4643.023
##
## Random effects:
## Formula: ~1 | Hospital_F
##      (Intercept)
## StdDev:  0.2539179
##
## Formula: ~1 | Doctor_F %in% Hospital_F
##      (Intercept) Residual
## StdDev:  0.1046657 3.840771
##
## Variance function:
## Structure: Different standard deviations per stratum
## Formula: ~1 | Var_F_G_3
## Parameter estimates:
##      1      0      2
## 1.0000000 1.0821049 0.9658686
## Fixed effects: change_systolic ~ Mean_F_G_1
##      Value Std.Error  DF  t-value p-value
## (Intercept) 0.321302 0.2026922 1468  1.58517 0.1131
## Mean_F_G_12 -3.711090 0.2467063 1468 -15.04255 0.0000
## Mean_F_G_13 -7.282681 0.2456418 1468 -29.64756 0.0000
## Correlation:
##      (Intr) M_F_G_12
## Mean_F_G_12 -0.759
## Mean_F_G_13 -0.762  0.626
##
## Standardized Within-Group Residuals:
##      Min      Q1      Med      Q3      Max
## -2.872891302 -0.719535809 -0.004692772  0.676807015  3.447007760
##
## Number of Observations: 1680
## Number of Groups:
##      Hospital_F Doctor_F %in% Hospital_F
##      21          210
```