

Warfarin Data

Set up new ID variable

```
library(foreign)
warfarin <- read.dta("curated.dta")

n <- length (warfarin$INR)
J <- length(unique(warfarin$id))

warfarin$new.id <- rep (NA, n)
for (j in 1:J){
  warfarin$new.id[warfarin$id==unique(warfarin$id)[j]] <- j
}
```

Varying intercepts with an individual-level predictor

```
M1 <- lmer (INR ~ time + (1 | new.id), data=warfarin)
```

```
summary(M1)
```

```
   AIC   BIC logLik deviance REMLdev
285.7 299.5 -138.9   265.8   277.7
```

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.049223	0.22186
Residual		0.154351	0.39288

```
Number of obs: 228, groups: new.id, 59
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	2.08644	0.05568	37.47
time	-0.14222	0.01038	-13.70

```
Correlation of Fixed Effects:
```

```
  (Intr)
time -0.710
```

Varying intercepts with individual- and group-level predictors

```
M2 <- lmer (INR ~ time + baseline_inr + (1 | new.id),
           data=warfarin)
```

```
summary(M2)
```

```
   AIC   BIC logLik deviance REMLdev
232.4 249.5 -111.2   204.8   222.4
```

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.00000	0.00000
	Residual	0.14566	0.38165

```
Number of obs: 228, groups: new.id, 59
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	1.25618	0.09767	12.862
time	-0.13709	0.00977	-14.032
baseline_inr	0.37038	0.03945	9.388

Varying intercepts with individual- and group-level predictors

```
Correlation of Fixed Effects:  
      (Intr) time  
time      -0.369  
baseline_nr -0.884 -0.024
```

```
M3 <- lmer (INR ~ time + baseline_inr + age +
           gender + (1 | new.id), data=warfarin)
```

```
summary(M3)
```

```
   AIC   BIC logLik deviance REMLdev
236.7 260.4 -111.4   191.1   222.7
```

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.00000	0.00000
	Residual	0.14516	0.38100

```
Number of obs: 216, groups: new.id, 56
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	1.325305	0.167162	7.928
time	-0.138721	0.010213	-13.583
baseline_inr	0.369672	0.041297	8.952
age	-0.001740	0.002441	-0.713
genderM	0.030835	0.056956	0.541

Correlation of Fixed Effects:

	(Intr)	time	bsln_n	age	
time		-0.208			
baseline_nr	-0.411		-0.034		
age	-0.761	0.003		-0.183	
genderM	-0.516	-0.057	0.116		0.342

```
M4 <- lmer (INR ~ time + baseline_inr + age + gender +
           race + ethnicity + (1 | new.id), data=warfarin)
```

```
summary(M4)
```

```
   AIC   BIC logLik deviance REMLdev
 242.8 273.2 -112.4   189.8   224.8
```

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.00000	0.00000
Residual		0.14568	0.38168

```
Number of obs: 216, groups: new.id, 56
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	1.597503	0.297883	5.363
time	-0.139711	0.010270	-13.604
baseline_inr	0.366790	0.041516	8.835
age	-0.001431	0.002461	-0.581
genderM	0.021808	0.057635	0.378
raceWHITE	-0.118933	0.175234	-0.679
ethnicityNONHISP	-0.161200	0.175908	-0.916

Correlation of Fixed Effects:

	(Intr)	time	bsln_n	age	gendrM	rWHITE
time	-0.188					
baseline_nr	-0.276	-0.028				
age	-0.331	-0.007	-0.188			
genderM	-0.404	-0.044	0.122	0.320		
raceWHITE	-0.583	0.052	-0.006	-0.081	0.095	
ethnNONHISP	-0.615	0.072	0.083	-0.084	0.109	0.050

Transformation of outcome variable

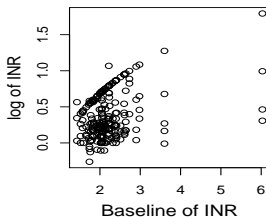
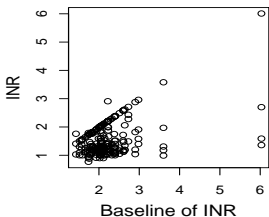
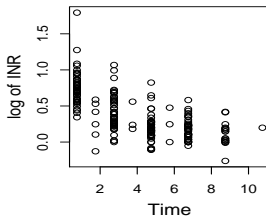
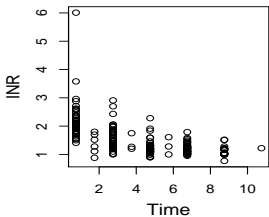
```
par(mfrow=c(2,2),mar=c(3,2,2,3),oma=c(3,3,2,2))
plot(INR ~ time, data=warfarin)
mtext(side=1,line=2.5,"Time",cex=1.1)
mtext(side=2,line=2.5,"INR")
```

```
plot(log(INR) ~ time, data=warfarin)
mtext(side=1,line=2.5,"Time",cex=1.1)
mtext(side=2,line=2.5,"log of INR")
```

```
plot(INR ~ baseline_inr, data=warfarin)
mtext(side=1,line=2.5,"Baseline of INR",cex=1.1)
mtext(side=2,line=2.5,"INR")
```

```
plot(log(INR) ~ baseline_inr, data=warfarin)
mtext(side=1,line=2.5,"Baseline of INR",cex=1.1)
mtext(side=2,line=2.5,"log of INR")
```

Scatterplot



Transformation of outcome variable

```
M5 <- lmer (log(INR) ~ time + (1 | new.id), data=warfarin)
```

```
summary(M5)
```

AIC	BIC	logLik	deviance	REMLdev
-36.15	-22.44	22.08	-58.81	-44.15

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.016804	0.12963
Residual		0.034898	0.18681

```
Number of obs: 228, groups: new.id, 59
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	0.715244	0.028276	25.30
time	-0.087544	0.004968	-17.62

```
Correlation of Fixed Effects:
```

	(Intr)
time	-0.666

Transformation of outcome variable

```
M6 <- lmer (log(INR) ~ time + baseline_inr +
           (1 | new.id), data=warfarin)
```

```
summary(M6)
```

```
      AIC      BIC logLik deviance REMLdev
-61.34 -44.19  35.67  -92.15  -71.34
```

```
Random effects:
```

Groups	Name	Variance	Std.Dev.
new.id	(Intercept)	0.0057067	0.075543
	Residual	0.0349385	0.186918

```
Number of obs: 228, groups: new.id, 59
```

```
Fixed effects:
```

	Estimate	Std. Error	t value
(Intercept)	0.351234	0.059813	5.872
time	-0.085828	0.004891	-17.550
baseline_inr	0.163271	0.024907	6.555

Transformation of outcome variable

```
Correlation of Fixed Effects:  
      (Intr) time  
time      -0.293  
baseline_nr -0.911 -0.023
```