BIOS 767 HW 4

Cheynna Crowley

2/19/2019

Question 13.2.1: Construct a test of the null hypothesis of no effect of treatment on changes in the log seizure rate based on the empirical standard errors.

Our Model: $log(Y_{ij}) = log(t) + \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \beta_4 x_{i4} + \beta_5 x_{i5} + \beta_6 x_{i6} + \beta_7 x_{i7} + \beta_8 x_{i8} + \beta_9 x_{i9}$

where:

log(t)=log time in weeks (offset)

x_{i1}=I(time=1)

x_{i2}=I(time=2)

x_{i3}=I(time=3)

x_{i4}=I(time=4)

x_{i5}=I(treatment=1)

x_{i6}=I(time=1 & treatment=1)

x_{i7}=I(time=2 & treatment=1)

x_{i8}=I(time=3 & treatment=1)

x_{i9}=I(time=4 & treatment=1)

H_0: Equal slopes at each time point between treatment and control

$H_0 : \beta_7 = \beta_8 = \beta_9 = 0$

H_1: otw

Parameter	Estimate	Standard Error	95% Confidence Limits	Z	Pvalue
Intercept	1.3476	0.1574	(1.0392,1.6560)	8.56	<.0001
time 1	0.1954	0.1345	(-0.0682,0.4590)	1.45	0.1463
time 2	0.0738	0.1018	(-0.1257,0.2732)	0.72	0.4685
time 3	0.1324	0.2697	(-0.3961,0.6609)	0.49	0.6235
time 4	0.0387	0.1018	(-0.1608,0.2381)	0.38	0.7038
treatment 1	0.0275	0.2218	(-0.4072,0.4622)	0.12	0.9012
time 1 *treatment	-0.1142	0.2887	(-0.6800,0.4517)	-0.40	0.6925
time 2 *treatment	-0.0115	0.1759	(-0.3562,0.3332)	-0.07	0.9477
time 3 *treatment	-0.1052	0.3310	(-0.7540,0.5436)	-0.32	0.7506
time 4 *treatment	-0.1986	0.2032	(-0.5970,0.1997)	-0.98	0.3284

Contrast Results:

Contrast	DF	Chi-Square	PValue	Type
B7=B8=B9=0	4	1.74	0.7835	Wald

By conducting a Wald Test from GEE, we found that the contrast corresponded to a $\chi^2_{obs,df=4} = 1.74$ with a

pvalue of 0.7835. Thus we fail to reject the null hypothesis and conclude that there is not significant evidence that the log-seizure rate differs by treatment group.

Question 13.2.2: What conclusions do you draw about the effect of treatment on changes in the log seizure rate?

As stated in 13.2.1, that there is not significant evidence that the log-seizure rate differs by treatment group.

Question 13.2.3: Repeat the analysis for Problem 13.2.1 using Ptime (instead of time as a categorical variable with five levels). Construct a test of the null hypothesis of no effect of treatment on changes in the log seizure rate based on the empirical standard errors.

Our Model: $log(Y_{ij}) = log(t) + \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3}$

where:

log(t)=log time in weeks (offset)

x_{i1}=ptime=I(post-baseline)

x_{i2}=treatment=I(treatment=1)

x_{i3}=ptime*treatment=I(post-baseline)xI(treatment=1)

$H_0 : \beta_3 = 0$

H_1: otw

Parameter	Estimate	Standard Error	95% Confidence Limits	Z	Pvalue
Intercept	1.1213	0.4794	(0.1817,2.0608)	2.34	0.0193
ptime	0.1244	0.1245	(-0.1197,0.3685)	1.00	0.3179
treatment	0.0718	0.5673	(-1.0401,1.1837)	0.13	0.8993
ptime*treatment	-0.1150	0.2509	(-0.6067,0.3768)	-0.46	0.6468

Contrast Results:

Contrast	DF	Chi-Square	PValue	Type
B3=0	1	0.21	0.6468	Wald

By conducting a Wald Test from GEE, we found that the contrast corresponded to a $\chi^2_{obs,df=1} = 0.21$ with a p-value of 0.6468. So we fail to reject the null hypothesis and conclude that the interaction of ptime and treatment is not significant (there is no effect of treatment on the changes in log seizure rate)

Question 13.2.4: From the results of the analysis for Problem 13.2.3, what conclusions do you draw about the effect of treatment on changes in log seizure rate?

As stated in 13.2.3, there is no significant difference between the rate of change of baseline measures and post-baseline measures between treatment groups.

Question 13.2.5: Repeat all of the analyses in Problems 13.2.1 to 13.2.4, excluding all of the repeated count data from patient 49. When the data from patient 49 are excluded, what conclusions do you draw about the effect of treatment on changes in the log seizure rate?

Repeat of 13.2.1

$H_0 : \beta_7 = \beta_8 = \beta_9 = 0$

H_1: otw

Parameter	Estimate	Standard Error	95% Confidence Limits	Z	Pvalue
Intercept	1.348	0.157	(1.039 ,1.656)	8.56	<.0001
time 1	0.195	0.135	(-0.068 ,0.459)	1.45	0.146
time 2	0.074	0.102	(-0.126 ,0.273)	0.72	0.469
time 3	0.132	0.270	(-0.396 ,0.661)	0.49	0.624
time 4	0.039	0.102	(-0.161 ,0.238)	0.38	0.704
treatment	-0.107	0.194	(-0.487 ,0.273)	-0.55	0.582
time*treatment	-0.431	0.209	(-0.841 ,-0.021)	-2.06	0.040
time*treatment	-0.131	0.171	(-0.465 ,0.203)	-0.77	0.443
time*treatment	-0.275	0.331	(-0.922 ,0.373)	-0.83	0.406
time*treatment	-0.390	0.162	(-0.708 ,-0.072)	-2.41	0.016

Contrast Results:

Contrast	DF	Chi-Square	PValue	Type
B7=B8=B9=0	4	7.86	0.097	Wald

By conducting a Wald Test from GEE, we found that the contrast corresponded to a $\chi^2_{obs,df=4} = 7.86$ with a pvalue of 0.0967. Thus we fail to reject the null hypothesis and conclude that there is not significant evidence that the log-seizure rate differs by treatment group.

Repeat of 13.2.3

$H_0 : \beta_3 = 0$

H_1: otw

Parameter	Estimate	Standard Error	95% Confidence Limits	Z	Pvalue
Intercept	1.3312	0.1611	(1.0154,1.6470)	8.26	<.0001
ptime	0.1141	0.0926	(-0.0675,0.2956)	1.23	0.2181
treatment	-0.1021	0.1959	(-0.4860,0.2819)	-0.52	0.6023
ptime*treatment	-0.3167	0.1494	(-0.6096,-0.0239)	-2.12	0.0340

Contrast Results:

Contrast	DF	Chi-Square	PValue	Type
B3=0	1	4.49	0.0340	Wald

By conducting a Wald Test from GEE, we found that the contrast corresponded to a $\chi^2_{obs,df=1} = 4.49$ with a p-value of 0.0340. Thus we reject the null hypothesis and conclude that the interaction of ptime and treatment is significant (there is a treatment effect on the changes in log seizure rate).