Counterintuitive Results From Observational Data: A Case Study and Discussion – Online Supplemental File

Summary: The following is a complete statistical output from the data above. This file includes the primary model results including the multiple regression models comparing mean, median, maximum and the categorical pain levels to the studied outcomes, included mortality and length of stay. Also included are the results from the sensitivity analysis in which all CABG patients were included and patients who expired in the hospital were excluded.

Table of Contents

Model 1: Mean pain vs Hospital LOS

Number of Observations Read	844
Number of Observations Used	844

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	11888	2377.65640	70.77	<.0001
Error	838	28155	33.59817		
Corrected Total	843	40044			

Root MSE	5.79639	R-Square	0.2969
Dependent Mean	8.58776	Adj R-Sq	0.2927
Coeff Var	67.49599		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	6.74721	1.70464	3.96	<.0001
mean_pain	1	-0.91633	0.12415	-7.38	<.0001
male	1	-1.78286	0.51402	-3.47	0.0006
age	1	0.00471	0.02021	0.23	0.8160
e_score	1	1.61599	0.12331	13.10	<.0001
oasis	1	0.09119	0.03159	2.89	0.0040

Model 2: Median Pain vs Hospital LOS

Number of Observations Read	844
Number of Observations Used	844

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	11808	2361.65507	70.09	<.0001
Error	838	28235	33.69364		
Corrected Total	843	40044			

Root MSE	5.80462	R-Square	0.2949
Dependent Mean	8.58776	Adj R-Sq	0.2907
Coeff Var	67.59182		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	5.51742	1.66209	3.32	0.0009
med_pain	1	-0.69605	0.09657	-7.21	<.0001
male	1	-1.75771	0.51489	-3.41	0.0007
age	1	0.01249	0.02011	0.62	0.5346
e_score	1	1.62356	0.12339	13.16	<.0001
oasis	1	0.08689	0.03159	2.75	0.0061

Model 3: Maximum pain vs Hospital LOS

Number of Observations Read	844
Number of Observations Used	844

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	10158	2031.60013	56.97	<.0001
Error	838	29886	35.66294		
Corrected Total	843	40044			

Root MSE	5.97185	R-Square	0.2537
Dependent Mean	8.58776	Adj R-Sq	0.2492
Coeff Var	69.53905		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1.28286	1.84430	0.70	0.4869
max_pain	1	0.14781	0.08819	1.68	0.0941
male	1	-1.91709	0.52929	-3.62	0.0003
age	1	0.03550	0.02098	1.69	0.0910
e_score	1	1.79329	0.12447	14.41	<.0001
oasis	1	0.06871	0.03250	2.11	0.0348

Model 4: Categorical Pain vs Hospital LOS

Number of Observations Read	844
Number of Observations Used	844

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	11727	2345.48240	69.41	<.0001
Error	838	28316	33.79014		
Corrected Total	843	40044			

Root MSE	5.81293	R-Square	0.2929
Dependent Mean	8.58776	Adj R-Sq	0.2886
Coeff Var	67.68854		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	6.47649	1.70556	3.80	0.0002
cat_pain	1	-2.26964	0.32289	-7.03	<.0001
male	1	-1.78270	0.51551	-3.46	0.0006
age	1	0.00679	0.02025	0.34	0.7376
e_score	1	1.62244	0.12372	13.11	<.0001
oasis	1	0.09063	0.03168	2.86	0.0043

Model 5: Mean pain vs 30-day mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	21
2	0	823

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	198.606	149.641
SC	203.344	178.070
-2 Log L	196.606	137.641

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	58.9644	5	<.0001
Score	72.0933	5	<.0001
Wald	40.8033	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-7.3196	2.3007	10.1217	0.0015
mean_pain	1	-0.7830	0.2078	14.1967	0.0002
age	1	0.0268	0.0255	1.0995	0.2944
male	1	0.5256	0.5659	0.8627	0.3530
e_score	1	0.4041	0.1115	13.1357	0.0003
oasis	1	0.0553	0.0356	2.4204	0.1198

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	0.457	0.304	0.687
age	1.027	0.977	1.080
male	1.692	0.558	5.128
e_score	1.498	1.204	1.864
oasis	1.057	0.986	1.133

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	91.1	Somers' D	0.821
Percent Discordant	8.9	Gamma	0.821
Percent Tied	0.0	Tau-a	0.040
Pairs	17283	c	0.911

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.04	84	83.96
2	84	0	0.09	84	83.91
3	84	0	0.15	84	83.85
4	84	0	0.24	84	83.76
5	84	1	0.36	83	83.64
6	84	0	0.54	84	83.46
7	84	0	0.84	84	83.16
8	84	3	1.45	81	82.55
9	84	3	3.13	81	80.87
10	88	14	14.16	74	73.84

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
4.7470	8	0.7842

Model 6: Median Pain vs 30-day Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	21
2	0	823

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	198.606	158.742
SC	203.344	187.171
-2 Log L	196.606	146.742

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	49.8631	5	<.0001
Score	63.0052	5	<.0001
Wald	38.4675	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-8.9316	2.1971	16.5261	<.0001
med_pain	1	-0.4474	0.1612	7.7053	0.0055
age	1	0.0377	0.0253	2.2238	0.1359
male	1	0.5085	0.5589	0.8276	0.3630
e_score	1	0.4428	0.1083	16.7092	<.0001
oasis	1	0.0548	0.0348	2.4831	0.1151

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
med_pain	0.639	0.466	0.877
age	1.038	0.988	1.091
male	1.663	0.556	4.973
e_score	1.557	1.259	1.925
oasis	1.056	0.987	1.131

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	88.4	Somers' D	0.768
Percent Discordant	11.6	Gamma	0.768
Percent Tied	0.0	Tau-a	0.037
Pairs	17283	c	0.884

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.07	84	83.93
2	84	0	0.15	84	83.85
3	84	0	0.23	84	83.77
4	84	0	0.33	84	83.67
5	84	1	0.49	83	83.51
6	84	0	0.69	84	83.31
7	84	3	1.05	81	82.95
8	84	1	1.70	83	82.30
9	84	3	3.37	81	80.63
10	88	13	12.91	75	75.09

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.0151	8	0.6455

Model 7: Maximum pain vs 30-day Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	21
2	0	823

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	198.606	162.636
SC	203.344	191.065
-2 Log L	196.606	150.636

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	45.9693	5	<.0001
Score	61.5400	5	<.0001
Wald	39.1926	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-8.0597	2.2457	12.8804	0.0003
max_pain	1	-0.2081	0.0806	6.6669	0.0098
age	1	0.0276	0.0267	1.0721	0.3005
male	1	0.2187	0.5421	0.1628	0.6866
e_score	1	0.5779	0.1088	28.2346	<.0001
oasis	1	0.0587	0.0344	2.9173	0.0876

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
max_pain	0.812	0.693	0.951
age	1.028	0.976	1.083
male	1.244	0.430	3.601
e_score	1.782	1.440	2.206
oasis	1.060	0.991	1.134

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	86.8	Somers' D	0.736
Percent Discordant	13.2	Gamma	0.736
Percent Tied	0.0	Tau-a	0.036
Pairs	17283	c	0.868

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.14	84	83.86
2	84	0	0.24	84	83.76
3	84	1	0.36	83	83.64
4	84	1	0.47	83	83.53
5	84	0	0.62	84	83.38
6	84	0	0.84	84	83.16
7	84	0	1.17	84	82.83
8	84	2	1.75	82	82.25
9	84	4	3.21	80	80.79
10	88	13	12.20	75	75.80

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
5.0983	8	0.7470

Model 8: Categorical Pain vs 30-day Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	21
2	0	823

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	198.606	154.226
SC	203.344	182.654
-2 Log L	196.606	142.226

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	54.3800	5	<.0001
Score	69.7089	5	<.0001
Wald	42.5015	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-7.9103	2.2412	12.4572	0.0004
cat_pain	1	-1.5417	0.4355	12.5328	0.0004
age	1	0.0298	0.0255	1.3654	0.2426
male	1	0.5105	0.5639	0.8196	0.3653
e_score	1	0.4277	0.1127	14.4131	0.0001
oasis	1	0.0560	0.0345	2.6370	0.1044

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	0.214	0.091	0.502
age	1.030	0.980	1.083
male	1.666	0.552	5.031
e_score	1.534	1.230	1.913
oasis	1.058	0.988	1.132

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	90.7	Somers' D	0.814
Percent Discordant	9.3	Gamma	0.814
Percent Tied	0.0	Tau-a	0.040
Pairs	17283	c	0.907

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.07	84	83.93
2	85	0	0.14	85	84.86
3	84	0	0.23	84	83.77
4	84	0	0.37	84	83.63
5	84	0	0.52	84	83.48
6	84	1	0.69	83	83.31
7	84	0	1.02	84	82.98
8	84	2	1.51	82	82.49
9	84	3	2.93	81	81.07
10	87	15	13.52	72	73.48

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
2.8512	8	0.9433

Model 9: Mean Pain vs 1-yr Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	46
2	0	798

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	359.121	282.785
SC	363.859	311.214
-2 Log L	357.121	270.785

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	86.3361	5	<.0001
Score	100.3926	5	<.0001
Wald	64.9324	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-9.2928	1.6644	31.1714	<.0001
mean_pain	1	-0.3430	0.1105	9.6411	0.0019
age	1	0.0599	0.0191	9.8411	0.0017
male	1	0.3160	0.3883	0.6622	0.4158
e_score	1	0.4610	0.0834	30.5477	<.0001
oasis	1	0.0496	0.0243	4.1861	0.0408

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	0.710	0.571	0.881
age	1.062	1.023	1.102
male	1.372	0.641	2.936
e_score	1.586	1.347	1.867
oasis	1.051	1.002	1.102

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	85.2	Somers' D	0.704
Percent Discordant	14.8	Gamma	0.704
Percent Tied	0.0	Tau-a	0.073
Pairs	36708	c	0.852

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.23	84	83.77
2	84	0	0.49	84	83.51
3	84	0	0.78	84	83.22
4	84	3	1.11	81	82.89
5	84	2	1.50	82	82.50
6	84	1	2.04	83	81.96
7	84	3	2.94	81	81.06
8	84	3	4.67	81	79.33
9	84	10	7.86	74	76.14
10	88	24	24.36	64	63.64

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.7640	8	0.5623

Model 10: Median Pain vs 1-yr Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	46
2	0	798

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	359.121	289.827
SC	363.859	318.256
-2 Log L	357.121	277.827

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	79.2945	5	<.0001
Score	92.8046	5	<.0001
Wald	62.5204	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-10.0363	1.6198	38.3892	<.0001
med_pain	1	-0.1552	0.0835	3.4581	0.0629
age	1	0.0647	0.0190	11.5703	0.0007
male	1	0.2607	0.3844	0.4600	0.4976
e_score	1	0.4868	0.0828	34.5309	<.0001
oasis	1	0.0461	0.0239	3.7018	0.0544

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
med_pain	0.856	0.727	1.008
age	1.067	1.028	1.107
male	1.298	0.611	2.757
e_score	1.627	1.383	1.914
oasis	1.047	0.999	1.097

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	83.6	Somers' D	0.672
Percent Discordant	16.4	Gamma	0.672
Percent Tied	0.0	Tau-a	0.069
Pairs	36708	c	0.836

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.28	84	83.72
2	84	1	0.60	83	83.40
3	84	0	0.89	84	83.11
4	84	2	1.23	82	82.77
5	84	3	1.63	81	82.37
6	84	1	2.24	83	81.76
7	84	3	3.24	81	80.76
8	84	2	4.90	82	79.10
9	84	10	7.45	74	76.55
10	88	24	23.55	64	64.45

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.6165	8	0.5785

Model 11: Maximum Pain vs 1-yr Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	46
2	0	798

Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	359.121	289.427
SC	363.859	317.856
-2 Log L	357.121	277.427

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	79.6942	5	<.0001
Score	93.2270	5	<.0001
Wald	62.4345	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-9.4442	1.6770	31.7153	<.0001
max_pain	1	-0.1205	0.0591	4.1619	0.0413
age	1	0.0596	0.0194	9.3917	0.0022
male	1	0.1720	0.3776	0.2074	0.6488
e_score	1	0.5437	0.0822	43.7465	<.0001
oasis	1	0.0487	0.0241	4.0913	0.0431

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
max_pain	0.887	0.790	0.995
age	1.061	1.022	1.103
male	1.188	0.567	2.490
e_score	1.722	1.466	2.023
oasis	1.050	1.002	1.101

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	83.1	Somers' D	0.663
Percent Discordant	16.9	Gamma	0.663
Percent Tied	0.0	Tau-a	0.068
Pairs	36708	c	0.831

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	1	0.29	83	83.71
2	84	0	0.58	84	83.42
3	85	2	0.90	83	84.10
4	84	1	1.23	83	82.77
5	84	0	1.68	84	82.32
6	84	4	2.26	80	81.74
7	84	2	3.16	82	80.84
8	84	4	4.75	80	79.25
9	84	8	7.94	76	76.06
10	87	24	23.21	63	63.79

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
7.4004	8	0.4941

Model 12: Categorical Pain vs 1-yr Mortality

Number of Observations Read	844
Number of Observations Used	844

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	46
2	0	798

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	359.121	284.013
SC	363.859	312.442
-2 Log L	357.121	272.013

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	85.1076	5	<.0001
Score	99.4422	5	<.0001
Wald	64.6025	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-9.4525	1.6507	32.7923	<.0001
cat_pain	1	-0.7994	0.2680	8.8971	0.0029
age	1	0.0605	0.0190	10.1350	0.0015
male	1	0.3156	0.3878	0.6624	0.4157
e_score	1	0.4689	0.0836	31.4847	<.0001
oasis	1	0.0501	0.0241	4.3314	0.0374

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	0.450	0.266	0.760
age	1.062	1.024	1.103
male	1.371	0.641	2.932
e_score	1.598	1.357	1.883
oasis	1.051	1.003	1.102

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	85.1	Somers' D	0.702
Percent Discordant	14.9	Gamma	0.702
Percent Tied	0.0	Tau-a	0.072
Pairs	36708	c	0.851

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	84	0	0.25	84	83.75
2	84	0	0.52	84	83.48
3	84	0	0.78	84	83.22
4	84	4	1.12	80	82.88
5	84	1	1.55	83	82.45
6	84	1	2.11	83	81.89
7	84	1	3.14	83	80.86
8	84	5	4.69	79	79.31
9	84	10	7.81	74	76.19
10	88	24	24.03	64	63.97

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
12.1299	8	0.1455

Sensitivity Model 1: Mean pain vs Hospital LOS

All CABG patients included

Number of Observations Read	1889
Number of Observations Used	1889

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	13989	2797.85361	96.07	<.0001
Error	1883	54838	29.12252		
Corrected Total	1888	68827			

Root MSE	5.39653	R-Square	0.2033
Dependent Mean	9.05966	Adj R-Sq	0.2011
Coeff Var	59.56654		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	6.13876	1.07024	5.74	<.0001
mean_pain	1	-0.70945	0.08044	-8.82	<.0001
male	1	-1.08190	0.29793	-3.63	0.0003
age	1	0.01732	0.01270	1.36	0.1728
e_score	1	1.13959	0.07364	15.47	<.0001
oasis	1	0.07134	0.01895	3.76	0.0002

Sensitivity Model 2: Mean Pain vs 30-day Mortality

All CABG patient included

Number of Observations Read	1889
Number of Observations Used	1889

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	38
2	0	1851

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	374.103	324.079
SC	379.647	357.342
-2 Log L	372.103	312.079

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	60.0235	5	<.0001
Score	66.7408	5	<.0001
Wald	53.0781	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-6.5574	1.5435	18.0499	<.0001
mean_pain	1	-0.5241	0.1328	15.5838	<.0001
age	1	0.0188	0.0180	1.0847	0.2977
male	1	-0.0844	0.3616	0.0545	0.8154
e_score	1	0.3246	0.0785	17.0945	<.0001
oasis	1	0.0482	0.0244	3.9116	0.0480

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	0.592	0.456	0.768
age	1.019	0.984	1.056
male	0.919	0.452	1.867
e_score	1.384	1.186	1.614
oasis	1.049	1.000	1.101

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	81.1	Somers' D	0.622
Percent Discordant	18.9	Gamma	0.622
Percent Tied	0.0	Tau-a	0.025
Pairs	70338	c	0.811

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	190	1	0.26	189	189.74
2	189	0	0.51	189	188.49
3	189	0	0.76	189	188.24
4	189	2	1.01	187	187.99
5	189	1	1.39	188	187.61
6	189	0	1.90	189	187.10
7	189	8	2.71	181	186.29
8	189	2	4.04	187	184.96
9	189	4	6.87	185	182.13
10	187	20	18.56	167	168.44

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
19.2358	8	0.0136

Sensitivity Model 3: Mean Pain vs 1-yr Mortality

All CABG patients included

Number of Observations Read	1889
Number of Observations Used	1889

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	104
2	0	1785

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	807.244	702.254
SC	812.788	735.517
-2 Log L	805.244	690.254

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	114.9898	5	<.0001
Score	129.4134	5	<.0001
Wald	104.6689	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-7.8571	0.9995	61.7908	<.0001
mean_pain	1	-0.1076	0.0684	2.4728	0.1158
age	1	0.0413	0.0118	12.2649	0.0005
male	1	-0.0289	0.2302	0.0158	0.9000
e_score	1	0.4230	0.0523	65.3771	<.0001
oasis	1	0.0366	0.0150	5.9631	0.0146

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	0.898	0.785	1.027
age	1.042	1.018	1.066
male	0.971	0.619	1.525
e_score	1.527	1.378	1.691
oasis	1.037	1.007	1.068

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	78.6	Somers' D	0.572
Percent Discordant	21.4	Gamma	0.572
Percent Tied	0.0	Tau-a	0.060
Pairs	185640	c	0.786

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	189	0	1.37	189	187.63
2	189	3	2.35	186	186.65
3	189	2	3.27	187	185.73
4	189	6	4.21	183	184.79
5	189	4	5.28	185	183.72
6	189	5	6.86	184	182.14
7	189	11	8.87	178	180.13
8	189	13	11.86	176	177.14
9	189	14	18.27	175	170.73
10	188	46	41.67	142	146.33

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.0183	8	0.6452

Sensitivity Model 4: Categorical Pain vs Hospital LOS

All CABG patients included

Number of Observations Read	1889
Number of Observations Used	1889

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	13724	2744.72524	93.79	<.0001
Error	1883	55103	29.26359		
Corrected Total	1888	68827			

Root MSE	5.40958	R-Square	0.1994
Dependent Mean	9.05966	Adj R-Sq	0.1973
Coeff Var	59.71064		

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	5.70144	1.06297	5.36	<.0001
cat_pain	1	-1.70596	0.20636	-8.27	<.0001
male	1	-1.04945	0.29877	-3.51	0.0005
age	1	0.02149	0.01266	1.70	0.0900
e_score	1	1.14537	0.07384	15.51	<.0001
oasis	1	0.07046	0.01900	3.71	0.0002

Sensitivity Model 5: Categorical Pain vs 30-day Mortality

All CABG patients included

Number of Observations Read	1889
Number of Observations Used	1889

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	38
2	0	1851

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	374.103	327.406
SC	379.647	360.669
-2 Log L	372.103	315.406

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	56.6967	5	<.0001
Score	64.5808	5	<.0001
Wald	53.1142	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-6.9727	1.5104	21.3116	<.0001
cat_pain	1	-1.1138	0.2957	14.1909	0.0002
age	1	0.0213	0.0180	1.3982	0.2370
male	1	-0.0529	0.3617	0.0214	0.8836
e_score	1	0.3400	0.0788	18.6130	<.0001
oasis	1	0.0482	0.0243	3.9417	0.0471

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	0.328	0.184	0.586
age	1.022	0.986	1.058
male	0.948	0.467	1.927
e_score	1.405	1.204	1.640
oasis	1.049	1.001	1.100

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	80.4	Somers' D	0.607
Percent Discordant	19.6	Gamma	0.607
Percent Tied	0.0	Tau-a	0.024
Pairs	70338	c	0.804

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	189	0	0.31	189	188.69
2	189	1	0.60	188	188.40
3	189	1	0.90	188	188.10
4	189	1	1.21	188	187.79
5	189	3	1.57	186	187.43
6	189	0	2.04	189	186.96
7	189	5	2.67	184	186.33
8	189	3	3.91	186	185.09
9	189	7	6.63	182	182.37
10	188	17	18.17	171	169.83

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
6.3800	8	0.6047

Sensitivity Model 6: Categorical pain vs 1-yr Mortality

All CABG patients included

Number of Observations Read	1889
Number of Observations Used	1889

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	104
2	0	1785

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	807.244	701.692
SC	812.788	734.955
-2 Log L	805.244	689.692

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	115.5518	5	<.0001
Score	129.8715	5	<.0001
Wald	104.8178	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-7.8363	0.9896	62.7055	<.0001
cat_pain	1	-0.3017	0.1725	3.0581	0.0803
age	1	0.0411	0.0117	12.3074	0.0005
male	1	-0.0158	0.2305	0.0047	0.9454
e_score	1	0.4232	0.0522	65.6557	<.0001
oasis	1	0.0367	0.0150	5.9893	0.0144

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	0.740	0.527	1.037
age	1.042	1.018	1.066
male	0.984	0.626	1.547
e_score	1.527	1.378	1.691
oasis	1.037	1.007	1.068

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	78.7	Somers' D	0.574
Percent Discordant	21.3	Gamma	0.574
Percent Tied	0.0	Tau-a	0.060
Pairs	185640	c	0.787

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	189	1	1.36	188	187.64
2	189	1	2.33	188	186.67
3	189	5	3.23	184	185.77
4	189	3	4.18	186	184.82
5	189	6	5.32	183	183.68
6	189	6	6.81	183	182.19
7	189	10	8.84	179	180.16
8	189	12	11.88	177	177.12
9	189	16	18.34	173	170.66
10	188	44	41.71	144	146.29

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
3.0321	8	0.9323

Sensitivity Model 7: Mean pain vs Hospital Length of Stay

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	12848	2569.60206	91.82	<.0001
Error	1861	52078	27.98408		
Corrected Total	1866	64926			

Root MSE	5.29000	**R-Square**	0.1979
Dependent Mean	9.01968	**Adj R-Sq**	0.1957
Coeff Var	58.64951		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	6.06474	1.05804	5.73	<.0001
mean_pain	1	-0.70050	0.07969	-8.79	<.0001
male	1	-0.95798	0.29392	-3.26	0.0011
age	1	0.01991	0.01256	1.58	0.1132
e_score	1	1.11301	0.07288	15.27	<.0001
oasis	1	0.06609	0.01871	3.53	0.0004

Sensitivity Model 8: Mean Pain vs 30-day Mortality

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Response Profile		
Ordered Value	**X30_day**	**Total Frequency**
1	1	16
2	0	1851

Model Fit Statistics		
Criterion	**Intercept Only**	**Intercept and Covariates**
AIC	186.166	172.675
SC	191.699	205.868
-2 Log L	184.166	160.675

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	23.4914	5	0.0003
Score	27.1882	5	<.0001
Wald	23.1706	5	0.0003

Analysis of Maximum Likelihood Estimates					
Parameter	**DF**	**Estimate**	**Standard Error**	**Wald Chi-Square**	**Pr > ChiSq**
Intercept	1	-10.2879	2.4688	17.3652	<.0001
mean_pain	1	-0.2196	0.1777	1.5273	0.2165
age	1	0.0500	0.0295	2.8652	0.0905
male	1	0.0170	0.5518	0.0009	0.9755
e_score	1	0.3972	0.1162	11.6884	0.0006
oasis	1	0.0394	0.0358	1.2124	0.2709

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	0.803	0.567	1.137
age	1.051	0.992	1.114
male	1.017	0.345	2.999
e_score	1.488	1.185	1.868
oasis	1.040	0.970	1.116

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	79.7	Somers' D	0.593
Percent Discordant	20.3	Gamma	0.593
Percent Tied	0.0	Tau-a	0.010
Pairs	29616	c	0.797

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	187	0	0.13	187	186.87
2	187	0	0.26	187	186.74
3	187	0	0.38	187	186.62
4	187	2	0.50	185	186.50
5	188	1	0.65	187	187.35
6	187	0	0.88	187	186.12
7	187	2	1.21	185	185.79
8	187	2	1.71	185	185.29
9	187	0	2.68	187	184.32
10	183	9	7.60	174	175.40

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
9.8622	8	0.2748

Sensitivity Model 9: Mean Pain vs 1-yr Mortality

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	82
2	0	1785

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	674.905	591.678
SC	680.437	624.870
-2 Log L	672.905	579.678

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	93.2272	5	<.0001
Score	104.3845	5	<.0001
Wald	86.3856	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-9.1906	1.1351	65.5626	<.0001
mean_pain	1	0.0267	0.0738	0.1307	0.7177
age	1	0.0530	0.0135	15.5081	<.0001
male	1	-0.00300	0.2564	0.0001	0.9907
e_score	1	0.4467	0.0577	59.9324	<.0001
oasis	1	0.0309	0.0165	3.5163	0.0608

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
mean_pain	1.027	0.889	1.187
age	1.054	1.027	1.083
male	0.997	0.603	1.648
e_score	1.563	1.396	1.750
oasis	1.031	0.999	1.065

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	78.8	Somers' D	0.575
Percent Discordant	21.2	Gamma	0.575
Percent Tied	0.0	Tau-a	0.048
Pairs	146370	c	0.788

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	187	1	0.99	186	186.01
2	187	1	1.75	186	185.25
3	187	2	2.46	185	184.54
4	187	3	3.26	184	183.74
5	187	6	4.20	181	182.80
6	187	1	5.35	186	181.65
7	187	11	7.02	176	179.98
8	187	13	9.26	174	177.74
9	187	8	14.23	179	172.77
10	184	36	33.49	148	150.51

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
11.9787	8	0.1522

Sensitivity Model 10: Categorical Pain vs Hospital LOS

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	12579	2515.76531	89.44	<.0001
Error	1861	52348	28.12873		
Corrected Total	1866	64926			

Root MSE	5.30365	R-Square	0.1937
Dependent Mean	9.01968	Adj R-Sq	0.1916
Coeff Var	58.80089		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	5.63343	1.05160	5.36	<.0001
cat_pain	1	-1.68014	0.20479	-8.20	<.0001
male	1	-0.92734	0.29477	-3.15	0.0017
age	1	0.02397	0.01253	1.91	0.0559
e_score	1	1.11908	0.07308	15.31	<.0001
oasis	1	0.06514	0.01875	3.47	0.0005

Sensitivity Model 11: Categorical Pain vs 30-day Mortality

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Response Profile		
Ordered Value	X30_day	Total Frequency
1	1	16
2	0	1851

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	186.166	173.641
SC	191.699	206.834
-2 Log L	184.166	161.641

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	22.5254	5	0.0004
Score	26.1846	5	<.0001
Wald	22.6468	5	0.0004

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-10.7032	2.4542	19.0199	<.0001
cat_pain	1	-0.3439	0.4230	0.6607	0.4163
age	1	0.0531	0.0296	3.2079	0.0733
male	1	0.0324	0.5518	0.0035	0.9531
e_score	1	0.4126	0.1162	12.6022	0.0004
oasis	1	0.0375	0.0354	1.1222	0.2894

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	0.709	0.309	1.625
age	1.055	0.995	1.118
male	1.033	0.350	3.046
e_score	1.511	1.203	1.897
oasis	1.038	0.969	1.113

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	79.6	Somers' D	0.592
Percent Discordant	20.4	Gamma	0.592
Percent Tied	0.0	Tau-a	0.010
Pairs	29616	c	0.796

Partition for the Hosmer and Lemeshow Test					
		X30_day = 1		X30_day = 0	
Group	Total	Observed	Expected	Observed	Expected
1	187	0	0.15	187	186.85
2	188	0	0.28	188	187.72
3	188	1	0.40	187	187.60
4	187	1	0.53	186	186.47
5	187	0	0.69	187	186.31
6	187	1	0.92	186	186.08
7	187	2	1.23	185	185.77
8	187	1	1.72	186	185.28
9	187	2	2.66	185	184.34
10	182	8	7.42	174	174.58

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
3.4540	8	0.9027

Sensitivity Model 12: Categorical Pain vs 1-yr Mortality

Excluding in hospital mortality

Number of Observations Read	1867
Number of Observations Used	1867

Response Profile		
Ordered Value	X1_yr	Total Frequency
1	1	82
2	0	1785

Model Fit Statistics		
Criterion	Intercept Only	Intercept and Covariates
AIC	674.905	591.769
SC	680.437	624.962
-2 Log L	672.905	579.769

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	93.1360	5	<.0001
Score	104.3571	5	<.0001
Wald	86.3552	5	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-9.1205	1.1300	65.1401	<.0001
cat_pain	1	0.0376	0.1909	0.0389	0.8436
age	1	0.0524	0.0134	15.2784	<.0001
male	1	-0.00484	0.2565	0.0004	0.9850
e_score	1	0.4444	0.0574	59.9633	<.0001
oasis	1	0.0312	0.0165	3.5868	0.0582

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
cat_pain	1.038	0.714	1.509
age	1.054	1.026	1.082
male	0.995	0.602	1.645
e_score	1.560	1.394	1.745
oasis	1.032	0.999	1.066

Association of Predicted Probabilities and Observed Responses			
Percent Concordant	78.8	Somers' D	0.576
Percent Discordant	21.2	Gamma	0.576
Percent Tied	0.0	Tau-a	0.048
Pairs	146370	c	0.788

Partition for the Hosmer and Lemeshow Test					
		X1_yr = 1		X1_yr = 0	
Group	Total	Observed	Expected	Observed	Expected
1	187	1	1.00	186	186.00
2	187	1	1.75	186	185.25
3	187	2	2.47	185	184.53
4	187	3	3.26	184	183.74
5	187	6	4.20	181	182.80
6	187	1	5.36	186	181.64
7	187	9	7.01	178	179.99
8	187	15	9.27	172	177.73
9	187	9	14.22	178	172.78
10	184	35	33.48	149	150.52

Hosmer and Lemeshow Goodness-of-Fit Test		
Chi-Square	DF	Pr > ChiSq
11.3564	8	0.1823