Final Model - goodness of fit and predictive ability

The LOGISTIC Procedure

Model Information

Data Set	WORK.TIMESINCEVAX	
Response Variable	breakthrough	breakthrough
Number of Response Levels	2	
Model	binary logit	
Optimization Technique	Fisher's scoring	

Number of Observations Read	3084648
Number of Observations Used	3084648

Response Profile

Ordered Value	breakthrough	Total Frequency
1	1	29677
2	0	3054971

Probability modeled is breakthrough=1.

Class Level Information

Class	Value	Design Variables	
vaccination_code	Janssen	1	0
	Moderna	0	1
	Pfizer	0	0

Model Convergence Status

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

Deviance and Pearson Goodness-of-Fit Statistics

Criterion	Value	DF	Value/DF	Pr > ChiSq
Deviance	5548.6582	79E3	0.0699	1.0000
Pearson	52957809.3	79E3	666.7902	<.0001

Number of unique profiles: 79437

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	334698.88	6462.445
SC	334711.82	6656.574
-2 Log L	334696.88	6432.445

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R-Square 0.1010 Max-rescaled R-Square 0.9818

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	328264.438	14	<.0001
Score	1688010.73	14	<.0001
Wald	2520.8233	14	<.0001

Joint Tests

Effect	DF	Wald Chi-Square	Pr > ChiSq
followup_time	1	1444.7465	<.0001
time_since_vax	1	1463.7601	<.0001
age	1	49.9358	<.0001
age*age	1	13.7074	0.0002
vaccination_code	2	38.6258	<.0001
followup_*time_since	1	398.0801	<.0001
time_since_vax*age	1	51.1583	<.0001
time_sinc*vaccinatio	2	10.1679	0.0062
followup_*vaccinatio	2	8.9438	0.0114
follow*time_s*vaccin	2	34.8542	<.0001

NOTE: Under full-rank parameterizations, Type 3 effect tests are replaced by joint tests. The joint test for an effect is a test that all the parameters associated with that effect are zero. Such joint tests might not be equivalent to Type 3 effect tests under GLM parameterization.

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq

Intercept		1	-23.0658	1.2610	334.5755	<.0001
followup_time		1	-6.2586	0.1647	1444.7465	<.0001
time_since_vax		1	198.2	5.1803	1463.7601	<.0001
age		1	0.1296	0.0183	49.9358	<.0001
age*age		1	-0.00062	0.000168	13.7074	0.0002
vaccination_code	Janssen	1	3.3370	1.6436	4.1221	0.0423
vaccination_code	Moderna	1	-14.6574	2.8275	26.8733	<.0001
followup_*time_since		1	-0.0290	0.00145	398.0801	<.0001
time_since_vax*age		1	-0.0138	0.00193	51.1583	<.0001
time_sinc*vaccinatio	Janssen	1	41.1984	18.7468	4.8295	0.0280
time_sinc*vaccinatio	Moderna	1	27.3625	10.5957	6.6689	0.0098
followup_*vaccinatio	Janssen	1	-1.4022	0.5981	5.4963	0.0191
followup_*vaccinatio	Moderna	1	-0.7028	0.3251	4.6724	0.0307
follow*time_s*vaccin	Janssen	1	0.00648	0.00302	4.5886	0.0322
follow*time_s*vaccin	Moderna	1	-0.0190	0.00378	25.1540	<.0001

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Association of Predicted Probabilities and Observed Responses

Percent Concordant	99.7	Somers' D	0.994
Percent Discordant	0.3	Gamma	0.994
Percent Tied	0.0	Tau-a	0.019
Pairs	90662374367	c	0.997

Partition for the Hosmer and Lemeshow Test

		breakthrough = 1		breakthrough = 0	
Group	Total	Observed	Expected	Observed	Expected
1	816735	25	0.82	816710	816734.2
2	320271	35	1.35	320236	320269.6
3	309303	47	4.13	309256	309298.9
4	321827	23	7.76	321804	321819.2
5	313146	11	10.42	313135	313135.6
6	312607	5	12.73	312602	312594.3
7	308654	22	24.60	308632	308629.4
8	382105	29509	29614.90	352596	352490.1

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
2034.9463	6	<.0001