In [26]:

```
import pandas as pd
from lifelines import CoxPHFitter
import numpy as np
from lifelines.utils import concordance_index
from sklearn.preprocessing import StandardScaler
import matplotlib.pyplot as plt
from scipy.stats import chi2_contingency
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
import statsmodels.api as sm
from statsmodels.stats.outliers_influence import variance_inflation_factor

# Read the Excel file into a pandas DataFrame
data = pd.read_excel('DATA1.xlsx')

# Standardize the covariates
scaler = StandardScaler()
data_scaled = pd.DataFrame(scaler.fit_transform(data.drop(['Months', 'DEATH'], a

# Add the 'Months' and 'DEATH' columns back to the scaled data
data_scaled[['Months', 'DEATH']] = data[['Months', 'DEATH']]

# Create a CoxPHFitter object
cph = CoxPHFitter()

# Fit the Cox proportional hazards model with the standardized covariates
cph.fit(data_scaled, duration_col='Months', event_col='DEATH')

# Print the summary of the model
#cph.print_summary()
print(cph.summary)
```

```
                              coef  exp(coef)  se(coef)  coef lower 95%  \
covariate
AGE                       0.216087   1.241211  0.088512        0.042608
SEX                      -0.021036   0.979184  0.076603       -0.171175
CompositeStage            0.886563   2.426774  0.091961        0.706322
LNInvolment              -0.389643   0.677299  0.082473       -0.551287
Comorbidity              -0.043602   0.957335  0.081518       -0.203374
FamiliyHistoryOfCancer   -0.091921   0.912177  0.078631       -0.246035

                          coef upper 95%  exp(coef) lower 95%  \
covariate
AGE                             0.389567             1.043528
SEX                             0.129104             0.842674
CompositeStage                  1.066804             2.026525
LNInvolment                    -0.227998             0.576208
Comorbidity                     0.116170             0.815973
FamiliyHistoryOfCancer          0.062193             0.781895

                          exp(coef) upper 95%  cmp to         z             p  \
covariate
AGE                                  1.476342     0.0  2.441341  1.463281e-02
SEX                                  1.137808     0.0 -0.274607  7.836184e-01
CompositeStage                       2.906075     0.0  9.640625  5.385911e-22
LNInvolment                          0.796126     0.0 -4.724482  2.307032e-06
Comorbidity                          1.123187     0.0 -0.534877  5.927348e-01
FamiliyHistoryOfCancer               1.064168     0.0 -1.169018  2.423965e-01

                           -log2(p)
covariate
AGE                        6.094649
SEX                        0.351777
CompositeStage            70.653228
LNInvolment               18.725531
Comorbidity                0.754541
FamiliyHistoryOfCancer     2.044559
```

In [27]:
```
concordance_values = {}
for column in data_scaled.columns:
    try:
        concordance_value = concordance_index(data_scaled[column], -cph.predict_
        concordance_values[column] = concordance_value
    except ZeroDivisionError:
        concordance_values[column] = None

# Print the concordance values
for column, value in concordance_values.items():
    print("Concordance value for", column, ":", value)
```

```
Concordance value for DEATH : None
Concordance value for AGE : 0.5394435640077478
Concordance value for SEX : 0.7171007184305057
Concordance value for CompositeStage : 0.2753710776966591
Concordance value for LNInvolment : 0.780604368533421
Concordance value for Comorbidity : 0.7227260734780028
Concordance value for FamiliyHistoryOfCancer : 0.7396111129865307
Concordance value for Months : 0.7210922981622961
```

In [28]:
```
print("Catagorical data:\n")
data_scaled['Months'] = data_scaled['Months'].astype('category')
data_scaled['DEATH'] = data_scaled['DEATH'].astype('category')
```

```
data_scaled['AGE'] = data_scaled['AGE'].astype('category')
data_scaled['SEX'] = data_scaled['SEX'].astype('category')
data_scaled['CompositeStage'] = data_scaled['CompositeStage'].astype('category')
data_scaled['LNInvolment'] = data_scaled['LNInvolment'].astype('category')
data_scaled['Comorbidity'] = data_scaled['Comorbidity'].astype('category')
data_scaled['FamiliyHistoryOfCancer'] = data_scaled['FamiliyHistoryOfCancer'].as
print(data_scaled.head())
```

```
Catagorical data:

  DEATH       AGE       SEX CompositeStage LNInvolment Comorbidity  \
0     0 -0.588591 -1.233717       0.032170    1.604031    0.913359
1     0 -0.588591  0.810558      -2.174702   -0.623429    0.913359
2     0 -0.422086 -1.233717      -1.071266   -0.623429    0.913359
3     1 -0.172330  0.810558      -1.071266   -0.623429   -1.094860
4     0  0.993201  0.810558       0.032170    1.604031    0.913359

  FamiliyHistoryOfCancer Months
0              -0.383611     70
1              -0.383611     68
2              -0.383611     69
3              -0.383611     43
4              -0.383611     71
```

In [29]:
```
# Iterate over each column in the DataFrame
univariate_results = []
univariate_aic_bic = []
for column in data_scaled.columns:
    if data_scaled[column].dtype.name == 'category':
        for col in data.columns:
                if col not in ['Months', 'ID']:
                 cph_univariate = CoxPHFitter(penalizer=0.1)
                 cph_univariate.fit(data[['Months', 'ID', col]], duration_col='M
                 univariate_results.append((col, cph_univariate.print_summary())
```

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:16 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:16 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:17 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.1
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:18 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.1
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:19 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:20 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:21 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

```
Iteration 1: norm_delta = 0.77722, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 70.49318, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01332, step_size = 0.9500, log_lik = -1595.37158, new
ton_decrement = 0.02032, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00069, step_size = 0.9500, log_lik = -1595.35129, new
ton_decrement = 0.00005, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1595.35124, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1595.35
time fit was run	2023-08-21 06:36:22 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	
DEATH	1.50	4.49	0.13	1.24	1.76	3.46	5.82	0.00	11.35	<0.0(

Concordance	0.66
Partial AIC	3192.70
log-likelihood ratio test	135.66 on 1 df
-log2(p) of ll-ratio test	101.73

```
Iteration 1: norm_delta = 0.01879, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06380, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00085, step_size = 0.9500, log_lik = -1663.11614, new
ton_decrement = 0.00013, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00004, step_size = 0.9500, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11600, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	lo
AGE	-0.00	1.00	0.00	-0.01	0.01	0.99	1.01	0.00	-0.36	0.72	

Concordance	0.51
Partial AIC	3328.23
log-likelihood ratio test	0.13 on 1 df
-log2(p) of ll-ratio test	0.47

```
Iteration 1: norm_delta = 0.01792, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00095, step_size = 0.9500, log_lik = -1663.11915, new
ton_decrement = 0.00017, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11898, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.12
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z	p	log
SEX	0.04	1.04	0.11	-0.17	0.24	0.84	1.28	0.00	0.35	0.73	

Concordance	0.50
Partial AIC	3328.24
log-likelihood ratio test	0.12 on 1 df
-log2(p) of ll-ratio test	0.46

```
Iteration 1: norm_delta = 0.43056, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 27.12197, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.04153, step_size = 0.9500, log_lik = -1635.53782, new
ton_decrement = 0.22899, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00238, step_size = 0.9500, log_lik = -1635.30845, new
ton_decrement = 0.00074, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1635.30771, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1635.31
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	
CompositeStage	0.50	1.64	0.07	0.36	0.63	1.44	1.88	0.00	7.2

Concordance	0.63
Partial AIC	3272.62
log-likelihood ratio test	55.74 on 1 df
-log2(p) of ll-ratio test	43.46

```
Iteration 1: norm_delta = 0.13600, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 3.86282, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01328, step_size = 0.9500, log_lik = -1659.23281, new
ton_decrement = 0.03364, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00074, step_size = 0.9500, log_lik = -1659.19915, new
ton_decrement = 0.00010, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1659.19905, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1659.20
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
LNInvolment	-0.32	0.73	0.11	-0.54	-0.09	0.58	0.91	0.00	-2.77

Concordance	0.56
Partial AIC	3320.40
log-likelihood ratio test	7.96 on 1 df
-log2(p) of ll-ratio test	7.71

```
Iteration 1: norm_delta = 0.06577, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.79658, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00275, step_size = 0.9500, log_lik = -1662.38897, new
ton_decrement = 0.00141, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.38756, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1662.39
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cmp to	z
Comorbidity	-0.13	0.88	0.10	-0.33	0.07	0.72	1.08	0.00	-1.26

Concordance	0.53
Partial AIC	3326.78
log-likelihood ratio test	1.58 on 1 df
-log2(p) of ll-ratio test	2.26

```
Iteration 1: norm_delta = 0.02937, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.15086, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00064, step_size = 0.9500, log_lik = -1663.03168, new
ton_decrement = 0.00008, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.03161, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
```

model	lifelines.CoxPHFitter
duration col	'Months'
event col	'ID'
penalizer	0.1
l1 ratio	0.0
baseline estimation	breslow
number of observations	343
number of events observed	343
partial log-likelihood	-1663.03
time fit was run	2023-08-21 06:36:23 UTC

	coef	exp(coef)	se(coef)	coef lower 95%	coef upper 95%	exp(coef) lower 95%	exp(coef) upper 95%	cr
FamiliyHistoryOfCancer	0.09	1.09	0.16	-0.22	0.39	0.80	1.48	0.

Concordance	0.50
Partial AIC	3328.06
log-likelihood ratio test	0.30 on 1 df
-log2(p) of ll-ratio test	0.77

In [36]:
```
univariate_aic_bic = []
for column in data.columns:
    if column not in ['Months', 'ID']:
        cph_univariate = CoxPHFitter()
        cph_univariate.fit(data[['Months', 'ID', column]], duration_col='Months'
        log_likelihood = cph_univariate.log_likelihood_
        num_params = cph_univariate.params_.shape[0]
        n = data.shape[0]
        aic = -2 * log_likelihood + 2 * num_params
        bic = -2 * log_likelihood + num_params * np.log(n)
        univariate_aic_bic.append((column, aic, bic))

# Print the AIC and BIC values for each column
for column, aic, bic in univariate_aic_bic:
    print(f"Column: {column}\n")
    print(f"AIC: {aic}")
    print(f"BIC: {bic}\n")
```

```
Iteration 1: norm_delta = 0.91112, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 82.63783, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.02267, step_size = 0.9500, log_lik = -1583.96297, new
ton_decrement = 0.04759, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00124, step_size = 0.9500, log_lik = -1583.91536, new
ton_decrement = 0.00014, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1583.91522, new
ton_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.02076, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.07049, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00091, step_size = 0.9500, log_lik = -1663.10952, new
ton_decrement = 0.00014, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.10939, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.10939, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.01971, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.06654, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00106, step_size = 0.9500, log_lik = -1663.11307, new
ton_decrement = 0.00019, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00005, step_size = 0.9500, log_lik = -1663.11288, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.11288, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.48773, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 30.72344, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.05587, step_size = 0.9500, log_lik = -1631.64613, new
ton_decrement = 0.35292, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00348, step_size = 0.9500, log_lik = -1631.29166, new
ton_decrement = 0.00134, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1631.29032, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.14816, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 4.20839, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01602, step_size = 0.9500, log_lik = -1658.85988, new
ton_decrement = 0.04409, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00092, step_size = 0.9500, log_lik = -1658.81571, new
ton_decrement = 0.00014, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1658.81557, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.07252, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.87838, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00291, step_size = 0.9500, log_lik = -1662.30867, new
ton_decrement = 0.00144, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00014, step_size = 0.9500, log_lik = -1662.30723, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1662.30723, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.03257, step_size = 0.9500, log_lik = -1663.17959, new
ton_decrement = 0.16726, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00051, step_size = 0.9500, log_lik = -1663.01626, new
ton_decrement = 0.00004, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00003, step_size = 0.9500, log_lik = -1663.01622, new
ton_decrement = 0.00000, seconds_since_start = 0.0
```

```
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -1663.01621, new
ton_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Column: DEATH

AIC: 3169.8304419552614
BIC: 3173.6681724024274

Column: AGE

AIC: 3328.218771299256
BIC: 3332.056501746422

Column: SEX

AIC: 3328.2257541098875
BIC: 3332.0634845570535

Column: CompositeStage

AIC: 3264.5806308751635
BIC: 3268.4183613223295

Column: LNInvolment

AIC: 3319.6311402665274
BIC: 3323.4688707136934

Column: Comorbidity

AIC: 3326.6144504776853
BIC: 3330.4521809248513

Column: FamiliyHistoryOfCancer

AIC: 3328.03242999161
BIC: 3331.870160438776
```

In [31]:

```python
# Calculate p-values for each variable
p_values = []
summaries = []
for col in data.columns:
    if col not in ['Months', 'DEATH']:
        cph_univariate = CoxPHFitter(penalizer=0.1)
        cph_univariate.fit(data[['Months', 'DEATH', col]], duration_col='Months'
        p_values.append((col, cph_univariate.summary['p'][col]))
        summaries.append((col, cph_univariate.summary))

# Sort the p-values list in ascending order
p_values.sort(key=lambda x: x[1])

# Get the significant variable with the lowest p-value
significant_variable_pvalue = p_values[0][0]
significant_variable_pvalue_value = data[significant_variable_pvalue].iloc[0]

# Find the summary of the significant variable
significant_variable_summary = None
for summary in summaries:
    if summary[0] == significant_variable_pvalue:
```

```
        significant_variable_summary = summary[1]
        break

# Print the summary of the significant variable's operations
if significant_variable_summary is not None:
    print(significant_variable_summary)

print(f"\nSignificant variable based on p-value: {significant_variable_pvalue}")
#print(f"Value of the significant variable: {significant_variable_pvalue_value}"
```

```
Iteration 1: norm_delta = 0.35071, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 15.41644, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.01406, step_size = 0.9500, log_lik = -928.49246, newt
on_decrement = 0.02456, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00073, step_size = 0.9500, log_lik = -928.46793, newt
on_decrement = 0.00007, seconds_since_start = 0.1
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -928.46787, newt
on_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.09094, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 0.84604, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00646, step_size = 0.9500, log_lik = -942.84679, newt
on_decrement = 0.00411, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00033, step_size = 0.9500, log_lik = -942.84269, newt
on_decrement = 0.00001, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -942.84268, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.02152, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 0.04824, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00117, step_size = 0.9500, log_lik = -943.65238, newt
on_decrement = 0.00014, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00006, step_size = 0.9500, log_lik = -943.65224, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -943.65224, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.60207, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 33.86694, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.06882, step_size = 0.9500, log_lik = -909.00329, newt
on_decrement = 0.38483, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00442, step_size = 0.9500, log_lik = -908.61639, newt
on_decrement = 0.00154, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -908.61485, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.20088, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 4.61862, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.02598, step_size = 0.9500, log_lik = -938.91722, newt
on_decrement = 0.06679, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00161, step_size = 0.9500, log_lik = -938.85015, newt
on_decrement = 0.00025, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -938.84989, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.07263, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 0.54710, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00311, step_size = 0.9500, log_lik = -943.15727, newt
on_decrement = 0.00102, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00016, step_size = 0.9500, log_lik = -943.15625, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -943.15625, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
Iteration 1: norm_delta = 0.02707, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 0.07765, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.00205, step_size = 0.9500, log_lik = -943.62205, newt
on_decrement = 0.00043, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00011, step_size = 0.9500, log_lik = -943.62163, newt
on_decrement = 0.00000, seconds_since_start = 0.0
```

```
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -943.62163, newt
on_decrement = 0.00000, seconds_since_start = 0.0
Convergence success after 4 iterations.
                    coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
CompositeStage  0.707114   2.028129  0.087683        0.535259        0.878968

                exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
CompositeStage              1.70789             2.408414     0.0  8.064462

                            p   -log2(p)
covariate
CompositeStage  7.355908e-16  50.271946

Significant variable based on p-value: CompositeStage
```

In [32]:
```
print("Catagorical data:\n")
data[significant_variable_pvalue] = data[significant_variable_pvalue].astype('ca

# Print the categorical variable
print(f"\nCategorical variable: {data[significant_variable_pvalue]}")

# Get the summary of the categorical variable
categorical_variable_summary = data[significant_variable_pvalue].describe()

# Print the summary of the categorical variable
print(f"\nSummary of the categorical variable:\n{categorical_variable_summary}")
```

```
Catagorical data:


Categorical variable: 0      3
1      1
2      2
3      2
4      3
      ..
338    3
339    2
340    2
341    4
342    4
Name: CompositeStage, Length: 343, dtype: category
Categories (4, int64): [1, 2, 3, 4]

Summary of the categorical variable:
count     343
unique      4
top         4
freq      123
Name: CompositeStage, dtype: int64
```

In [33]:
```
cph_multivariate = CoxPHFitter(penalizer=0.1)
cph_multivariate.fit(data[['Months', 'DEATH', significant_variable_pvalue]], dur
multivariate_summary = cph_multivariate.summary

# Print the summary of the multivariate analysis
print(f"\nMultivariate analysis summary:\n{multivariate_summary}")
```

```
Iteration 1: norm_delta = 0.60207, step_size = 0.9500, log_lik = -943.70062, newt
on_decrement = 33.86694, seconds_since_start = 0.0
Iteration 2: norm_delta = 0.06882, step_size = 0.9500, log_lik = -909.00329, newt
on_decrement = 0.38483, seconds_since_start = 0.0
Iteration 3: norm_delta = 0.00442, step_size = 0.9500, log_lik = -908.61639, newt
on_decrement = 0.00154, seconds_since_start = 0.0
Iteration 4: norm_delta = 0.00000, step_size = 1.0000, log_lik = -908.61485, newt
on_decrement = 0.00000, seconds_since_start = 0.1
Convergence success after 4 iterations.

Multivariate analysis summary:
                     coef  exp(coef)  se(coef)  coef lower 95%  coef upper 95%  \
covariate
CompositeStage  0.707114   2.028129  0.087683        0.535259        0.878968

                exp(coef) lower 95%  exp(coef) upper 95%  cmp to         z  \
covariate
CompositeStage              1.70789             2.408414     0.0  8.064462

                            p   -log2(p)
covariate
CompositeStage  7.355908e-16  50.271946
```

In [35]:
```python
log_likelihood = cph_multivariate.log_likelihood_

# Calculate the number of parameters
num_parameters = len(cph_multivariate.params_)

# Calculate the AIC value
n = len(data)  # number of observations
aic_value = -2 * log_likelihood + 2 * num_parameters

# Calculate the BIC value
bic_value = -2 * log_likelihood + np.log(n) * num_parameters

# Get the column names
column_names = [significant_variable_pvalue]

# Print the AIC and BIC values with column names
print(f"Column Names: {column_names}")
print(f"AIC value: {aic_value}")
print(f"BIC value: {bic_value}")
```

```
Column Names: ['CompositeStage']
AIC value: 1819.2296914692981
BIC value: 1823.0674219164641
```

In [37]:
```python
c_index = cph_multivariate.concordance_index_

# Get the column names
column_names = [significant_variable_pvalue]

# Print the column names and concordance index
print(f"Column Names: {column_names}")
print(f"Concordance Index: {c_index}")
```

```
Column Names: ['CompositeStage']
Concordance Index: 0.6820927111294652
```

In [ ]: