### Wald Statistics

Response: y

<table>
<thead>
<tr>
<th>Factor</th>
<th>Chi-Square</th>
<th>d.f.</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>treat (Factor+Higher Order Factors)</td>
<td>5.62</td>
<td>10</td>
<td>0.8462</td>
</tr>
<tr>
<td>All Interactions</td>
<td>1.30</td>
<td>8</td>
<td>0.9956</td>
</tr>
<tr>
<td>age (Factor+Higher Order Factors)</td>
<td>65.99</td>
<td>12</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>All Interactions</td>
<td>1.30</td>
<td>8</td>
<td>0.9956</td>
</tr>
<tr>
<td>Nonlinear (Factor+Higher Order Factors)</td>
<td>2.23</td>
<td>9</td>
<td>0.9872</td>
</tr>
<tr>
<td>treat:age (Factor+Higher Order Factors)</td>
<td>1.30</td>
<td>8</td>
<td>0.9956</td>
</tr>
<tr>
<td>Nonlinear</td>
<td>0.99</td>
<td>6</td>
<td>0.9858</td>
</tr>
<tr>
<td>Nonlinear Interaction: f(A,B) vs. AB</td>
<td>0.99</td>
<td>6</td>
<td>0.9858</td>
</tr>
<tr>
<td>TOTAL NONLINEAR</td>
<td>2.23</td>
<td>9</td>
<td>0.9872</td>
</tr>
<tr>
<td>TOTAL NONLINEAR + INTERACTION</td>
<td>2.57</td>
<td>11</td>
<td>0.9953</td>
</tr>
<tr>
<td>TOTAL</td>
<td>69.06</td>
<td>14</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

The plot shows the log odds against age, with a trend indicating increasing odds as age increases. The shaded area represents the confidence interval.
Wald Statistics  Response: y

Factor       Chi-Square d.f. P
  treat (Factor+Higher Order Factors)  1450.39  6  <.0001
  All Interactions 62.79     4   <.0001
  age (Factor+Higher Order Factors)  226.49  6  <.0001
  All Interactions  62.79  4   <.0001
  Nonlinear (Factor+Higher Order Factors)  160.05  3   <.0001
  bp  351.28  3 <.0001
  Nonlinear 1.44     2 0.487
  treat * age (Factor+Higher Order Factors)  62.79  4  <.0001
  Nonlinear 23.33  2 <.0001
  Nonlinear Interaction : f(A,B) vs. AB 23.33  2 <.0001
  TOTAL NONLINEAR  160.93  5 <.0001
  TOTAL NONLINEAR + INTERACTION  198.46  7 <.0001
  TOTAL  1898.67  11 <.0001
help("anova.rms")

Partial R^2

<table>
<thead>
<tr>
<th></th>
<th>x1</th>
<th>x2</th>
<th>x1 * x2</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>0.0</td>
<td>0.1</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>b</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.7</td>
</tr>
</tbody>
</table>
help("anova.rms")

partial R^2

x1 * x2

TOTAL

x1

x2

a

b

a

b

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6

0.0 0.1 0.2 0.3 0.4 0.5 0.6
help("anova.rms")

partial $R^2$

TOTAL

x1 * x2

x2

x1

a

b

partial $R^2$

0.0 0.1 0.2 0.3 0.4 0.5 0.6
Ranks and 0.95 Confidence Limits for $\chi^2 - \text{d.f.}$
Survival Probability

\begin{figure}
\centering
\includegraphics{plot.png}
\caption{Survival Probability for different age groups.}
\end{figure}

- cut2(age, g = 2) = [41.1, 69.9)
- cut2(age, g = 2) = [69.9, 96.5]
Histogram of beta

Frequency

Beta

0.0 0.5 1.0 1.5 2.0

0 1 2 3 4 5 6 7
Normal Q–Q Plot

Sample Quantiles vs. Theoretical Quantiles
help("bootcov")

age

log odds

−5

30 40 50 60 70

age

help("bootcov")
Normal Q–Q Plot

Theoretical Quantiles

Intercept

Coefficient of sex=male

Coefficient of age

Coefficient of age^2

Coefficient of sex=male * age

Coefficient of sex=male * age^2
help("bootcov")

log odds

age

30 40 50 60 70
Adjusted to: blood.pressure=119.3
Adjusted to: blood.pressure=119.3
Adjusted to: blood.pressure=119.3
Adjusted to: blood.pressure=119.3
Adjusted to: blood.pressure=119.3 sex=female
Adjusted to: blood.pressure=119.3 sex=female

Total Cholesterol, mg/dl

Age

Adjusted to: blood.pressure=119.3 sex=female
help("calibrate")

0.05 0.10 0.15 0.20

Predicted 2 Day Survival

Fraction Surviving 2 Day

Black: observed  Gray: ideal
Blue: optimism corrected

B=20 based on observed–predicted
Mean |error|=0.018  0.9 Quantile=0.039
B = 40 repetitions, boot

Mean absolute error = 0.023 n = 200
help("contrast")
Drug − Placebo

age

35 40 45 50 55 60 65
Years
Survival Probability
0.0 0.2 0.4 0.6 0.8 1.0
Female
Male
Adjusted to: age=48.8
help("cph")

-2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5

Time

Beta(t) for age

Beta(t) for age plot with time on the x-axis.
Beta(t) for age
Beta(t) for age
Beta(t) for sex=Male
Adjusted to: sex = Male
Kaplan–Meier 5-Year Survival

n=1000 d=139, avg. 100 patients per group
Log Hazard Ratio

Event: e
Adjusted to: blood pressure = 119.3, cholesterol = 200.5

Adjusted to: blood pressure = 119.3, cholesterol = 200.5
help("lm")

Adjusted to:
- blood.pressure = 119.3
- cholesterol = 200.5
Points

age

cholesterol (sex=female)

cholesterol (sex=male)

blood.pressure

Total Points

Linear Predictor
help("nomogram")

Points

cholesterol
(age=20)

cholesterol
(age=40)

cholesterol
(age=60)

sex

Total Points

Linear Predictor

-1.4 -1 -0.6 0 0.4 0.8 1.2 1.6
Penalty

Information Criterion

Solid: AIC_c  Dotted: AIC  Dashed: BIC
Penalty Information Criterion

Solid: AIC_c
Adjusted to: blood.pressure=119.3 cholesterol=200.5

Age

log odds

male
dashed line

female

---

help("plot.Predict")

Adjusted to: blood.pressure=119.3 cholesterol=200.5
Adjusted to: blood.pressure=119.3 cholesterol=200.5

Age

log odds

Log odds of a certain condition as a function of age, adjusted for blood pressure and cholesterol levels.
Adjusted to: blood.pressure = 119.3, cholesterol = 200.5
Adjusted to: blood.pressure=119.3 cholesterol=200.5
<table>
<thead>
<tr>
<th>Age</th>
<th>Blood Pressure: 160</th>
<th>Blood Pressure: 140</th>
<th>Blood Pressure: 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Cholesterol: 180</td>
<td>Cholesterol: 180</td>
<td>Cholesterol: 180</td>
</tr>
<tr>
<td>40</td>
<td>Cholesterol: 200</td>
<td>Cholesterol: 200</td>
<td>Cholesterol: 200</td>
</tr>
<tr>
<td>60</td>
<td>Cholesterol: 180</td>
<td>Cholesterol: 180</td>
<td>Cholesterol: 180</td>
</tr>
<tr>
<td>70</td>
<td>Cholesterol: 200</td>
<td>Cholesterol: 200</td>
<td>Cholesterol: 200</td>
</tr>
</tbody>
</table>

Log odds range from -1 to 1.
Adjusted to: blood pressure = 119.3, sex = female, cholesterol = 200.5
help("plot.Predict")
Adjusted to: x2 = 0.494

Predicted Mean on y-scale
help("predictrms")

cholesterol

linear.predictors

−6  −4  −2  0  2  4  6

100 150 200 250 300

a  b  c

female

age

male

−6  −4  −2  0  2  4  6

100 150 200 250 300

a  b  c

female

age

male

−6  −4  −2  0  2  4  6

100 150 200 250 300

a  b  c

female

age

male
help("predictrms")

\[ \text{logit} \]

\[ bp^{1.5} \]
help("predictnms")

sqrt(bp - 60)

logit
Adjusted to: sex=Female
\[ S(\hat{X}, \hat{\beta}) \]
help(psm)
lam(times, 0)
Survival Probability

```
Survival Probability

-10.0 -8.8 -7.6 -6.4 -5.2 -4.0 -2.8 -1.6 -0.4 0.8 2.0

0.0 0.2 0.4 0.6 0.8 1.0

cut2(age, g = 2)=[15.3,49.8)
cut2(age, g = 2)=[49.8,81.8]
```
Residual Survival Probability

\[ x = [15.3, 49.8) \]

\[ x = [49.8, 81.8] \]
Smoothed Martingale Residuals

![Graph of Smoothed Martingale Residuals](image)

- Graph 1: Residuals plotted against time, showing a slight upward trend.
- Graph 2: Residuals plotted against time, showing a horizontal pattern.
- Graph 3: Residuals plotted against time, showing a downward trend.

Help function: `help(residuals.cph)`
Partial Residual

Partial Residual

help("residuals.lrm")
Prevalence of U: 0.5
Odds Ratio

blood.pressure – 130.58:109.58

age – 70:50

cholesterol – 216.53:183.73

sex – male:female

Adjusted to: sex=female age=60 cholesterol=200.48
help("survplot")

log Survival Time in Years

log(-log Survival Probability)

-2 -1 0 1 2 3

-5 -4 -3 -2 -1 0 1 2

female

male

Adjusted to: age=48.8
Survival Probability

Years

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

0.0 0.2 0.4 0.6 0.8 1.0

male

female
Survival Probability

- Female
- Male

Adjusted to: age=48.8
Survival Probability vs. Years

- Males (solid line)
- Females (dotted line)

Adjusted to: age=48.8
Survival Probability

Years

0.0 0.2 0.4 0.6 0.8 1.0

39.1 46.0 52.5 59.9
sex=female − sex=male

Years

Difference in Survival Probability

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
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<td>Dxy</td>
<td>0.321</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>C (ROC)</td>
<td>0.660</td>
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<td>R2</td>
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<td>Q</td>
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<tr>
<td>Brier</td>
<td>0.232</td>
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<tr>
<td>Intercept</td>
<td>0.052</td>
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<tr>
<td>Slope</td>
<td>0.957</td>
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<td>Emax</td>
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<tr>
<td>Sz</td>
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<tr>
<td>Scp</td>
<td>0.885</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
帮组 `val.prob` 为您提供了以下信息。

- **Group [0.0131,0.526)**
  - n: 50
  - Pavg: 0.364
  - Obs: 0.36
  - ChiSq: 0.0
  - Eavg: 0.049
  - Eavg/P90: 0.178
  - Med OR: 1.23
  - B: 0.637
  - B ChiSq: 0.220

- **Group [0.5260,0.993]**
  - n: 50
  - Pavg: 0.590
  - Obs: 0.62
  - ChiSq: 1.9
  - Eavg: 0.056
  - Eavg/P90: 0.207
  - Med OR: 1.08
  - B: 0.514
  - B ChiSq: 0.244

- **Overall**
  - n: 100
  - Pavg: 0.477
  - Obs: 0.49
  - ChiSq: 0.1
  - Eavg: 0.026
  - Eavg/P90: 0.065
  - Med OR: 1.09
  - B: 0.660
  - B ChiSq: 0.252

图表显示了实际概率与预测概率的关系，以及不同组别的统计结果。
Predicted Probability of Surviving 1 Year

Actual Probability of Surviving 1 Year

n=1000 d=187, avg. 100 patients per group
Predicted $\Pr[T \leq \text{observed } T]$
\( F(T|X, T \leq C) - 0.5F(C|X) \)
$F(T|X, T \leq C) - 0.5F(C|X)$

- $[16.3, 45.4)\$
- $[45.4, 55.0)\$
- $[55.0, 88.9]$
Lowess-smoothed Estimates with True Regression Functions

![Graph showing Lowess-smoothed estimates with true regression functions for different age groups. The graph displays two curves: one for true females and one for true males. The y-axis represents the value of dz, and the x-axis represents age, ranging from 40 to 70. The curves illustrate the relationship between age and dz, highlighting the differences between males and females.]
Spline Fits with True Regression Functions

log odds

age

female

male

True female

True male

female
Calibration of Unpenalized Model

B = 25 repetitions, boot
Mean absolute error = 0.017 n = 500
Penalized Spline Fits with True Regression Functions
Adjusted to: age=50.3 sex=male
Adjusted to: age=50.3 sex=male
Calibration of Penalized Model

B = 40 repetitions, boot
Mean absolute error = 0.017 n = 500
χ² − df

age

treat

num.diseases

cholesterol

 treat * cholesterol
Adjusted to: treat=a cholesterol=200
<table>
<thead>
<tr>
<th>num.diseases</th>
<th>treat</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>b</td>
<td>c</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>age</th>
<th>cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>30, 40, 50, 60, 70</td>
<td>140, 160, 180, 200, 220, 240, 260</td>
</tr>
</tbody>
</table>

Log odds

-1 0 1
Adjusted to: cholesterol=200.5, num.diseases=2
Adjusted to: treat=a num.diseases=2

<table>
<thead>
<tr>
<th>Total Cholesterol, mg/dl</th>
<th>-1.5</th>
<th>-1.0</th>
<th>-0.5</th>
<th>0.0</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>220</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>240</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Age

Adjusted to: treat=a num.diseases=2
Adjusted to: treat=a cholesterol=200.5 age=49.56
Adjusted to: \( \text{num.diseases}=2 \), \( \text{sex}=\text{male} \)

<table>
<thead>
<tr>
<th>Age</th>
<th>log odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>-0.5</td>
</tr>
<tr>
<td>40</td>
<td>0.0</td>
</tr>
<tr>
<td>50</td>
<td>0.5</td>
</tr>
<tr>
<td>60</td>
<td>1.0</td>
</tr>
<tr>
<td>70</td>
<td>1.5</td>
</tr>
</tbody>
</table>

- cholesterol: 170
- cholesterol: 200
- cholesterol: 230

Adjusted to: num.diseases=2  sex= male
Adjusted to: num.diseases=2 sex=male

Age

Adjusted to: num.diseases=2 sex=male
help("zzz.rmsOverview")
Adjusted to: age=48.99
Fraction Surviving 1 Years

Predicted 1 Year Survival

Black: observed  Gray: ideal  Blue: optimism corrected

Mean |error|=0.009  0.9 Quantile=0.019
help("zzzrmsOverview")

Time

Beta(t) for age
$\beta(t)$ for age'
help("zzzrmsOverview")

0 2 4 6 8 10 12 14

−30 −20 −10 0 10 20

Time

Beta(t) for age
Odds Ratio

x1 − 15.2:5.75

x2 − 7.25:2.75

x3 − 1:0

x3 − 2:0
Predicted $\Pr(y=1)$

Mean absolute error = 0.103

$B = 10$ repetitions, boot

Mean absolute error = 0.103 $n = 20$
\[ \chi^2 - df \]

-1.5  -1.0  -0.5  0.0

x1  x2  x3
Points

x1

x2

x3

Total Points

Linear Predictor
B= 10 repetitions, boot

Mean absolute error=0.056 n=20
Days

0 2 4 6 8 10 12 14 16 18 20

0.0 0.2 0.4 0.6 0.8 1.0

x3=0

x3=1

x3=2
Adjusted to: $x_2 = 5$ $x_3 = 0$
Predicted 5 Day Survival

n=20 d=20 p=5, 10 subjects per group
Gray: ideal
Based on observed–predicted
Adjusted to: \(x_2 = 5\), \(x_3 = 0\)

5 Day Survival Probability

- 0.2
- 0.4
- 0.6
- 0.8

x_1

Adjusted to: \(x_2 = 5\), \(x_3 = 0\)
Adjusted to: $x_2 = 5 \times x_3 = 0$