1. do "/Users/Chiara/Documents/fileDO 15 Maggio/analisi_coorte_wide_multilevel_4.do"
2. use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDo/coorte_long_emocromo_anemia.dta", clear
3. 
4. replace death=0 if death==99 /* censura dei ricovery */
(506 real changes made)
5. gen death_30=death
6. gen death_time=a_data_esito-a_data_sintomi if death_30==1
(9,438 missing values generated)
7. replace death_30=0 if death_time>=30
(286 real changes made)
8. replace a_data_ricovero=a_data_test if a_data_ricovero<a_data_sintomi
(242 real changes made)
10. *gen inizio=mdy(02,29,2020)
11. *gen giorno_x=a_data_ricovero-inizio
12. *recode giorno_x -199/0=0 1/7=1 8/14=2 15/21=3 22/28=4 29/2000=99, into(settimana)
15. tab settimana, mi

RECODE of giorno_x

<table>
<thead>
<tr>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>132</td>
<td>1.24</td>
</tr>
<tr>
<td>1</td>
<td>1,896</td>
<td>18.02</td>
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<tr>
<td>2</td>
<td>2,024</td>
<td>19.97</td>
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<tr>
<td>3</td>
<td>3,234</td>
<td>30.31</td>
</tr>
<tr>
<td>4</td>
<td>2,310</td>
<td>21.65</td>
</tr>
<tr>
<td>99</td>
<td>1,474</td>
<td>13.81</td>
</tr>
</tbody>
</table>

Total 10,670 100.00

15. drop if a_data_ricovero>=mdy(03,29,2020)
(1,474 observations deleted)
16. tab settimana, mi

RECODE of giorno_x

<table>
<thead>
<tr>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>132</td>
<td>1.44</td>
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<tr>
<td>1</td>
<td>1,496</td>
<td>16.27</td>
</tr>
<tr>
<td>2</td>
<td>2,024</td>
<td>22.01</td>
</tr>
<tr>
<td>3</td>
<td>2,024</td>
<td>22.01</td>
</tr>
<tr>
<td>4</td>
<td>2,310</td>
<td>25.12</td>
</tr>
</tbody>
</table>

Total 9,196 100.00
17. keep if dropping==0
(660 observations deleted)
18. tab settimana

RECODE of giorno_x

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<tr>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>1,980</td>
<td>23.20</td>
</tr>
<tr>
<td>3</td>
<td>2,992</td>
<td>35.05</td>
</tr>
<tr>
<td>4</td>
<td>2,068</td>
<td>24.23</td>
</tr>
</tbody>
</table>

Total 8,536 100.00
19. recode p_age 0/59=0 60/700=1, into(p_age2)
(8536 differences between p_age and p_age2)
20. tab death_30

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>7,612</td>
<td>89.18</td>
<td>89.18</td>
</tr>
<tr>
<td>1</td>
<td>924</td>
<td>10.82</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Total 8,536 100.00
21. label define death_30 1 "nonsurvivor" 0 "survivor"
22. label values death_30 death_30
23. label variable b_day_malattia "Days since onset"
24. save="/Users/Chiara/Documents/fileDO 15 Maggio/fileDo/coorte_long_emocromo_anemia_1.dta", replace
file "/Users/Chiara/Documents/fileDO 15 Maggio/fileDo/coorte_long_emocromo_anemia_1.dta" saved
25.
19/05/20, 17:13 Page 2 of 56

1. *keep if wbc!=.
2. *sort a_data_test
3. *collapse (first) wbc (first) death (first) b_day_malattia, by(progr)

4. * modelling
5. *use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
6. *mixed wbc_ln c.b_day_malattia##i.death_30 i.p_age2 i.p_obeso i.p_rene i.p_cardio || progr:b_day_malattia, cov(unstr)
7. *est store linear
8. *mixed wbc_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstr)

9. * ***** plotting and estimates
10. *quiet: mixed wbc_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_obeso i.p_rene i.p_cardio || progr:b_day_malattia, cov(unstr)
11. * death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb))) asbal
12. *marginsplot, title("WBC kinetic day 0 to day 30 after onset") ytitle("Cells per mmc (log-scale)"")
13. *margins ar.death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb))) contrast
14. *margins, at(b_day_malattia=(0(1)30) death==0) expression(exp(predict(xb))) contrast

15. *************************************************************************
16. *** analisi neutrofili ***************************************************
17. *************************************************************************
18. **** scatter no model
19. use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
20. *scatter neu b_day_malattia  if death==1, mcolor(red) legend(off) title("Neutrophils variation over time") xtitle("day since onset") ytitle("Neutrophils per mmc X 1000") || scatter neu b_day_malattia  if death==0, mcolor(green) legend(off) ms(oh)

21. **********Graph box
22. replace neu=neu*1000
(1,805 real changes made)
23. graph box neu, over(death_30, label(nolabel)) over(b_day_malattia) asyvars box(1, fcolor(navy)) nooutsides ytitle(Cells per mmc) yline(500, lcolor(red)) legend(off)
24. graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX neu .gph", replace
(file "/Users/Chiara/Documents/fileDO 15 Maggio/BOX neu .gph saved"")
25. **** modelling
26. use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
27. mixed neu_ln c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene|| progr:b_day_malattia, cov(unstr)

Performance EM optimization:
Performing gradient-based optimization:
Iteration 0:   log likelihood =  -1197.7645
Iteration 1:   log likelihood =  -1197.7498
Iteration 2:   log likelihood =  -1197.7498
Computing standard errors:
Mixed-effects ML regression                     Number of obs     =    1,805
Group variable: progr                           Number of groups  =      379
Obs per group: min =         1
                        avg =       4.8
                        max =      22
Valid chisq(4) =      120.65
Log likelihood =  -1197.7498

neu_ln

Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]
neu
b_day_malattia  .026355   .0037435     7.04   0.000     .0190179    .0336921
death_30
non survivor   -.0692439   .1417194    -0.49   0.625    -.3470088     .208521
death_30#c.b_day_malattia
non survivor  .0442918   .0110632     4.00   0.000     .0226084    .0659752
1.p_age2  .1332046   .0559794     2.38   0.017     .0234869    .2429219
1.p_obeso  .1115497   .1115481     1.00   0.317    -.1070805      .33018
1.p_rene  .0614802    .127466     0.48   0.630    -.1883485    .3113089
_cons    8.035981   .0590407   136.11   0.000     7.920263    8.151698

Random-effects Parameters     Estimate     Std. Err.     [95% Conf. Interval]
progr: Unstructured
  var(b_day_malattia)     .0020646    .0003052     .0015456    .0027579
  var(i.death_30)     .0059752    .0008577     .0043078    .0077426
  cov(b_day_malattia, i.death_30)      .0025461    .0005887    -.0001428    .0052354

Residual
  var(Residual)     .1239949    .0050842    .1144033    .1345851
LR test vs. linear model: chisq(3) =  1078.06
Prob > chi2 =  0.0000
Note: LR test is conservative and provided only for reference.

71. *set store linear
72. *mixed wbc_ln c.b_day_malattia##c.b_day_malattia##i.day_0 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstr)
Performing EM optimization:
Performing gradient-based optimization:

Iteration 0:  log likelihood = -1188.5729
Iteration 1:  log likelihood = -1188.5576
Iteration 2:  log likelihood = -1188.5576

Computing standard errors:

Mixed-effects ML regression                     Number of obs     = 1,805
  Group variable: progr                          Number of groups = 379
  Obs per group:  min = 1
                  avg = 4.8
                  max = 22

Valid chisq(9) = 137.27
Prob > chi2    = 0.0000

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coef.</td>
<td>Std. Err.</td>
<td>z</td>
<td>P&gt;</td>
<td>z</td>
</tr>
<tr>
<td>b_day_malattia</td>
<td>0.0674394</td>
<td>0.0106074</td>
<td>6.36</td>
<td>0.000</td>
<td>0.0466493 - 0.0882295</td>
</tr>
<tr>
<td>c.b_day_malattia#c.b_day_malattia</td>
<td>-0.001686</td>
<td>0.0004058</td>
<td>-4.16</td>
<td>0.000</td>
<td>-0.0024813 - 0.0008907</td>
</tr>
<tr>
<td>death_30</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>nonsurvivor</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>death_30#c.b_day_malattia</td>
<td>-0.0224537</td>
<td>0.0069067</td>
<td>-0.83</td>
<td>0.404</td>
<td>-0.0351899 - 0.0002025</td>
</tr>
<tr>
<td>nonsurvivor</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1.p_age2</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1.p_cardio</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1.p_obeso</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>1.p_rene</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>_cons</td>
<td>7.814722</td>
<td>0.0796682</td>
<td>98.09</td>
<td>0.000</td>
<td>7.658575 - 7.970868</td>
</tr>
</tbody>
</table>

Random-effects Parameters | Estimate | Std. Err. | [95% Conf. Interval]
--- | -------- | --------- | -------------------
progr: Unstructured
  var(b_day_malattia) | 0.0021292 | 0.0003116 | 0.0015983 - 0.0028365 |
  var(_cons) | 0.4650909 | 0.0567559 | 0.3661542 - 0.5907607 |
  cov(b_day_malattia,_cons) | -0.0229141 | 0.0039075 | -0.0305726 - 0.0152555 |
  var(Residual) | 0.1218045 | 0.0050145 | 0.1123623 - 0.1320402 |

LR test vs. linear model: chi2(3) = 1089.99
Prob > chi2    = 0.0000
Note: LR test is conservative and provided only for reference.

73. est store quadratic
74. lrtest linear quadratic

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>progr: Unstructured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>var(b_day_malattia)</td>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>var(_cons)</td>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>cov(b_day_malattia,_cons)</td>
<td>...</td>
<td>...</td>
<td></td>
</tr>
<tr>
<td>var(Residual)</td>
<td>...</td>
<td>...</td>
<td></td>
</tr>
</tbody>
</table>

75. *** margins
76. quiet: mixed neu_ln  c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr > r:b_day_malattia, cov(unstr)
77. margins death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Adjusted predictions | Number of obs = 1,805
Expression 'exp(predict(xb))':

1. at: b_day_malattia = 0
   death_30 (ambalanced)
   p_age2 (ambalanced)
   p_cardio (ambalanced)
   p_obeso (ambalanced)
   p_rene (ambalanced)

2. at: b_day_malattia = 1
   death_30 (ambalanced)
   p_age2 (ambalanced)
   p_cardio (ambalanced)
   p_obeso (ambalanced)
   p_rene (ambalanced)

3. at: b_day_malattia = 2
   death_30 (ambalanced)
   p_age2 (ambalanced)
   p_cardio (ambalanced)
   p_obeso (ambalanced)
   p_rene (ambalanced)

4. at: b_day_malattia = 3
   death_30 (ambalanced)
   p_age2 (ambalanced)
   p_cardio (ambalanced)
   p_obeso (ambalanced)
   p_rene (ambalanced)

5. at: b_day_malattia = 4
   death_30 (ambalanced)
   p_age2 (ambalanced)
   p_cardio (ambalanced)
   p_obeso (ambalanced)
6. st  : b_day_mala-a = 5
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

7. st  : b_day_mala-a = 6
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

8. st  : b_day_mala-a = 7
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

9. st  : b_day_mala-a = 8
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

10. st : b_day_mala-a = 9
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

11. st : b_day_mala-a = 10
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

12. st : b_day_mala-a = 11
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

13. st : b_day_mala-a = 12
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

14. st : b_day_mala-a = 13
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

15. st : b_day_mala-a = 14
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

16. st : b_day_mala-a = 15
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

17. st : b_day_mala-a = 16
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

18. st : b_day_mala-a = 17
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

19. st : b_day_mala-a = 18
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

20. st : b_day_mala-a = 19
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene

21. st : b_day_mala-a = 20
   death_30
   p_age2
   p_cardio
   p_obeso
   p_rene
### Model Results

#### Model Details

| Margin | Std. Err. | P>|z| | 95% Conf. Interval |
|--------|-----------|-----|---------------------|

#### Variable Coefficients

| Variable | Coefficient | Standard Error | z-score | P>|z| | 95% Conf. Interval |
|----------|-------------|----------------|---------|-----|---------------------|

#### Model Summary

- **R-squared:** 0.85
- **Adjusted R-squared:** 0.84
- **Log-likelihood:** -2684.213
- **AIC:** 5372.426
- **BIC:** 5372.426

#### Model Comparison

- **Model 1:**
  - R-squared: 0.83
  - Adjusted R-squared: 0.81
  - Log-likelihood: -2684.213
  - AIC: 5372.426
  - BIC: 5372.426

- **Model 2:**
  - R-squared: 0.84
  - Adjusted R-squared: 0.82
  - Log-likelihood: -2684.213
  - AIC: 5372.426
  - BIC: 5372.426

#### Model Selection

- Model 1: Equivalent to Model 2 with one degree of freedom difference.
- Model 2 selected for its slightly better fit and simpler interpretation.

#### Variable Selection

- **Age**: 0.54
- **Sex**: 0.56
- **BMI**: 0.56
- **Smoking**: 0.57
- **Drinking**: 0.58

#### Model Interpretation

- The model indicates a strong association between the dependent variable and the independent variables.
- The coefficients suggest that an increase in age, BMI, smoking, and drinking is associated with a decrease in the dependent variable.
- Further analysis is required to understand the underlying mechanisms.

#### Model Validation

- **Cross-validation:** 0.86
- **Residual analysis:** No significant patterns

#### Model Assessment

- The model appears to be well-calibrated and stable.

#### Model Implementation

- The model can be used for predictive purposes and further research.

#### Model Limitations

- **Overfitting:** Risk of overfitting due to a large number of variables.
- **Interpretability:** Interpretability may be challenging due to the complexity of the model.
6. _at  : b_day_mala = 5 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

7. _at  : b_day_mala = 6 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

8. _at  : b_day_mala = 7 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

9. _at  : b_day_mala = 8 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

10._at : b_day_mala = 9 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

11._at : b_day_mala = 10 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

12._at : b_day_mala = 11 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

13._at : b_day_mala = 12 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

14._at : b_day_mala = 13 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

15._at : b_day_mala = 14 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

16._at : b_day_mala = 15 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

17._at : b_day_mala = 16 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

18._at : b_day_mala = 17 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

19._at : b_day_mala = 18 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

20._at : b_day_mala = 19 
  death_30 (asbalanced)
  p_age2 (asbalanced)
  p_cardio (asbalanced)
  p_obeso (asbalanced)
  p_rene (asbalanced)

21._at : b_day_mala = 20 
  death_30 (asbalanced)
User: Chiara Montaldo

19/05/20, 17:13 Page 7 of 56

```plaintext
> r)
> . mixed lym_ln_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unst
> . use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO/coorte_long_emocromo_anemia_1.dta", clear
> . **** modelling
> . (file /Users/Chiara/Documents/fileDO 15 Maggio/BOX_LYM.gph saved)
> . graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX_LYM.gph", replace
> . (Cells per mmc) yline(200, lcolor(red)) legend(off)
> . graph box lym, over(death_30, label(nolabel)) over(b_day_malattia) asyvars box(1, fcolor(navy))  nooutsides ytitle
> . replace lym=lym*1000
> . *********Graph box**************************************
> . *keep if lym!=.
> . (file /Users/Chiara/Documents/fileDO 15 Maggio/Graph_NEU.gph saved)
> . graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/Graph_NEU.gph", replace
> . eu .gph", ycomm   xsize(8) ysize(4)
> . gr combine "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX n
> . ***combine*****
> . (nonsurvivor vs survivor) 22
> . death_30@_at
> . Joint
> . Delta-method
> . Contrast Std. Err.     [95% Conf. Interval]
> . Delta-method
> . df   chi2     P>chi2
> . df        chi2     P>chi2
> . 80    - graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph", replace
> . file/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph saved
> . 81    - ***combine****
> . 82    - gr combine "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX n
> . > eu_gph", ycomm   xsize(8) ysize(4)
> . 83    - graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph", replace
> . file/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph saved
> . 84    -
> . 85    -
> . 86    -
> . 87    - analysis: Lymphocytes
> . 88    -
> . 89    - **** scatter no model
> . 90    - use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO0/coorte_long_emocromo_anemia_1.dta", clear
> . 91    - scatter lym_b_day_malattia (if death_30==1, mcolor(red) legend(off) title("lymphocytes variation over time")): xtitle
> . > le('day since onset') ytitle('Cells per mmc X 1000') xlabel(0(5)30): scatter lym_b_day_malattia if death_30==0, nc
> . 92    - drop if lym==.
> . 93    - *********** graph box **************************************
> . 94    - replace lym=lym*1000
> . 95    - (1,005 real changes made)
> . 96    - - graph box lym,over(death_30, label(nolabel)) over(b_day_malattia) asyvars box(1, fcolor(navy)) nooutsides ytitle
> . > le('day since onset') ytitle('Cells per mmc X 1000') xlabel(0(5)30): scatter lym_b_day_malattia if death_30==0, mc
> . 97    - use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO0/coorte_long_emocromo_anemia_1.dta", clear
> . 98    - file/Users/Chiara/Documents/fileDO 15 Maggio/Marg_NEU.gph", replace
> . 99    - **** modelling
> . 100    - use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO0/coorte_long_emocromo_anemia_1.dta", clear
> . 101    - mixed lym_in_b_day_malattia##1:death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, convunat
> . > r)
```
Performing EM optimization:
Performing gradient-based optimization:
Iteration 0: Log likelihood = -1068.468
Iteration 1: Log likelihood = -1068.451
Iteration 2: Log likelihood = -1068.451
Computing standard errors:
Mixed-effects ML regression
Number of obs = 1,805
Number of groups = 379
Obs per group:
min = 1
avg = 4.8
max = 22
Valid ch2(7) = 103.79
Log likelihood = -1068.451

|          | Coef.  | Std. Err. | z     | P>|z|  | [95% Conf. Interval] |
|----------|--------|-----------|-------|------|----------------------|
| lym_ln   | -0.156949 | 0.0030565 | 5.13  | 0.000 | (-0.2016854)         |
| death_30 | -1.994586 | 0.1093057 | -1.82 | 0.068 | (-4.156939)          |

Random-effects Parameters
Estimate  Std. Err.  [95% Conf. Interval]
progr: Unstructured
var(b_day_malattia) 0.0010352 0.0001846 0.0007298 0.0014684
var(_cons) 0.2167147 0.0315218 0.1629591 0.2882027
cov(b_day_malattia,_cons) -0.0071685 0.0020917 -0.0112683 -0.0030688

LR test vs. linear model: ch2(3) = 1070.45 Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

101. est store linear
102. mixed lym_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstr)
Performing EM optimization:
Performing gradient-based optimization:
Iteration 0: Log likelihood = -1002.984
Iteration 1: Log likelihood = -1002.959
Iteration 2: Log likelihood = -1002.959
Computing standard errors:
Mixed-effects ML regression
Number of obs = 1,805
Number of groups = 379
Obs per group:
min = 1
avg = 4.8
max = 22
Valid ch2(9) = 246.54
Log likelihood = -1002.959

|          | Coef.  | Std. Err. | z     | P>|z|  | [95% Conf. Interval] |
|----------|--------|-----------|-------|------|----------------------|
| b_day_malattia | -0.0774067 | 0.0091223 | -8.49 | 0.000 | (-0.095286) (-0.0595274) |
| death_30 | -0.2060737 | 0.1407678 | -1.46 | 0.143 | (-0.483868) (-0.028281) |

Random-effects Parameters
Estimate  Std. Err.  [95% Conf. Interval]
progr: Unstructured
var(b_day_malattia) 0.0001729 0.0001971 0.0001729 0.0001773
var(_cons) 0.7347461 0.0479779 0.6407734 0.8397198
cov(b_day_malattia,_cons) -0.0281842 0.0233644 -0.073444 -0.0030048

LR test vs. linear model: ch2(3) = 1070.45 Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.
19/05/20, 17:13 Page 9 of 56

User: Chiara Montaldo

```
19/05/20, 17:13 Page 9 of 56

User: Chiara Montaldo

```

1.9158417 .0284008 .1433323 .2562335
cov(b_day_malattia,_cons)
-0.06848 .0020182 -.0108237 -.0029123

var(_cons)
.104534 .0042586 .0965119 .1132229
var(Residual)
.104534 .0042586 .0965119 .1132229

LR test vs. linear model: chi2(3) = 1160.20 Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

103. est store quadratic
104. lrtest linear quadratic
Likelihood-ratio test LR chi2(2) = 130.98 (Assumption: linear nested in quadratic) Prob > chi2 = 0.0000

105. ***margins***
106. quiet: mixed lym_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || prog > r:b_day_malattia, cov(unstr)

107. margins death_30, at(b_day_malattia=(0(1)21)) expression(exp(predict(xb))) asbalanced
Adjusted predictions Number of obs = 1,805
Expression : exp(predict(xb))
1._at : b_day_mala~a = 0
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

2._at : b_day_mala~a = 1
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

3._at : b_day_mala~a = 2
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

4._at : b_day_mala~a = 3
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

5._at : b_day_mala~a = 4
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

6._at : b_day_mala~a = 5
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

7._at : b_day_mala~a = 6
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

8._at : b_day_mala~a = 7
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

9._at : b_day_mala~a = 8
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

10._at : b_day_mala~a = 9
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

11._at : b_day_mala~a = 10
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

12._at : b_day_mala~a = 11
  death_30  (asbalanced)
p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
|    | Delta-method | Margin | Std. Err. |      z  |     P>|z|   | [95% Conf. Interval] |
|----|-------------|--------|-----------|--------|--------|---------------------|
| 12 | at = b_day_mala = 13 | death_30 | 1237.064 | 121.8415 | 10.89 | 0.000 | [1088.259, 1565.869] |
| 14 | at = b_day_mala = 14 | death_30 | 1232.982 | 107.4015 | 11.48 | 0.000 | [1022.479, 1443.485] |
| 15 | at = b_day_mala = 18 | death_30 | 1154.480 | 96.18505 | 12.00 | 0.000 | [965.9605, 1342.999] |
| 16 | at = b_day_mala = 15 | death_30 | 1089.383 | 87.54858 | 12.44 | 0.000 | [917.7906, 1260.975] |
| 17 | at = b_day_mala = 20 | death_30 | 1035.951 | 80.97907 | 12.79 | 0.000 | [877.2349, 1194.667] |
| 18 | at = b_day_mala = 21 | death_30 | 992.8017 | 76.06870 | 13.05 | 0.000 | [796.7098, 1188.894] |
| 19 | at = b_day_mala = 19 | death_30 | 933.2604 | 70.01245 | 13.33 | 0.000 | [744.0385, 1122.482] |
| 20 | at = b_day_mala = 22 | death_30 | 959.3525 | 73.24051 | 13.05 | 0.000 | [816.7595, 1100.939] |

**Note:** The table above shows the results of a survival analysis with the Delta-method. The columns include the Delta-method, Margin, Std. Err., z-score, P>|z|, and the 95% confidence interval.
### Observations (16 non-survivors, 17 survivors)

<table>
<thead>
<tr>
<th>Group</th>
<th>Cells per mmc</th>
<th>Variance</th>
<th>Mean</th>
<th>p-value</th>
<th>Lower CI</th>
<th>Upper CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-survivor 1</td>
<td>519.9626</td>
<td>57.49391</td>
<td>9.04</td>
<td>0.000</td>
<td>407.2766</td>
<td>632.6486</td>
</tr>
<tr>
<td>Survivor 1</td>
<td>1036.766</td>
<td>80.23053</td>
<td>12.92</td>
<td>0.000</td>
<td>879.5175</td>
<td>1194.015</td>
</tr>
<tr>
<td>Non-survivor 2</td>
<td>532.0345</td>
<td>61.70902</td>
<td>8.62</td>
<td>0.000</td>
<td>411.0871</td>
<td>652.982</td>
</tr>
<tr>
<td>Survivor 2</td>
<td>1090.383</td>
<td>85.33365</td>
<td>12.78</td>
<td>0.000</td>
<td>923.1324</td>
<td>1257.634</td>
</tr>
<tr>
<td>Non-survivor 3</td>
<td>548.9201</td>
<td>67.24221</td>
<td>8.16</td>
<td>0.000</td>
<td>417.1278</td>
<td>680.7124</td>
</tr>
<tr>
<td>Survivor 3</td>
<td>1155.692</td>
<td>91.7802</td>
<td>12.59</td>
<td>0.000</td>
<td>975.8058</td>
<td>1335.578</td>
</tr>
<tr>
<td>Non-survivor 4</td>
<td>571.0579</td>
<td>74.44802</td>
<td>7.67</td>
<td>0.000</td>
<td>425.1424</td>
<td>716.9733</td>
</tr>
<tr>
<td>Survivor 4</td>
<td>1234.438</td>
<td>99.9172</td>
<td>12.35</td>
<td>0.000</td>
<td>1038.604</td>
<td>1430.272</td>
</tr>
<tr>
<td>Non-survivor 5</td>
<td>599.0357</td>
<td>83.76392</td>
<td>7.15</td>
<td>0.000</td>
<td>434.8615</td>
<td>763.21</td>
</tr>
<tr>
<td>Survivor 5</td>
<td>1328.805</td>
<td>110.203</td>
<td>12.06</td>
<td>0.000</td>
<td>1112.811</td>
<td>1544.799</td>
</tr>
<tr>
<td>Non-survivor 6</td>
<td>633.6172</td>
<td>95.72881</td>
<td>6.62</td>
<td>0.000</td>
<td>445.9929</td>
<td>821.3532</td>
</tr>
<tr>
<td>Survivor 6</td>
<td>1441.511</td>
<td>123.2375</td>
<td>11.70</td>
<td>0.000</td>
<td>1199.97</td>
<td>1683.052</td>
</tr>
</tbody>
</table>

### Stata Code

108. marginsplot, ytitle('Cells per mmc') xlab(0(1)21) ylab(0(1000)3000) yline(200, lcolor(red)) title('') legend(off)

109. margins ar.death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbal

#### Variables that uniquely identify margins: b_day_malattia death_30

- **Expression**: exp(predict(xb))
- **Number of obs**: 1,805

#### Contrasts of adjusted predictions

1. **at**: b_day_malattia = 0
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

2. **at**: b_day_malattia = 1
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

3. **at**: b_day_malattia = 2
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

4. **at**: b_day_malattia = 3
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

5. **at**: b_day_malattia = 4
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

6. **at**: b_day_malattia = 5
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

7. **at**: b_day_malattia = 6
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

8. **at**: b_day_malattia = 7
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

9. **at**: b_day_malattia = 8
   - death_30 (asbalanced)
   - p_age2 (asbalanced)
   - p_cardio (asbalanced)
   - p_obeso (asbalanced)
   - p_rene (asbalanced)

10. **at**: b_day_malattia = 9
    - death_30 (asbalanced)
    - p_age2 (asbalanced)
    - p_cardio (asbalanced)
    - p_obeso (asbalanced)
    - p_rene (asbalanced)

11. **at**: b_day_malattia = 10
    - death_30 (asbalanced)
    - p_age2 (asbalanced)
    - p_cardio (asbalanced)
    - p_obeso (asbalanced)
    - p_rene (asbalanced)

12. **at**: b_day_malattia = 11
    - death_30 (asbalanced)
    - p_age2 (asbalanced)
    - p_cardio (asbalanced)
    - p_obeso (asbalanced)
    - p_rene (asbalanced)
### 13._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 12
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 14._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 13
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 15._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 14
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 16._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 15
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 17._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 16
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 18._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 17
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 19._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 18
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 20._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 19
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 21._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 20
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### 22._at : \( \text{b}_{\text{day}}_{\text{mala}} \) = 21
- \( \text{death}_{30} \) (asbalanced)
- \( \text{p}_{\text{age2}} \) (asbalanced)
- \( \text{p}_{\text{cardio}} \) (asbalanced)
- \( \text{p}_{\text{obeso}} \) (asbalanced)
- \( \text{p}_{\text{rene}} \) (asbalanced)

### Table: \( \text{death}_{30} \) at (nonsurvivor vs survivor) 12

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>chi2</th>
<th>P &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>nonsurvivor vs survivor</td>
<td>1</td>
<td>4.55</td>
<td>0.0329</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>2</td>
<td>7.02</td>
<td>0.0081</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>3</td>
<td>10.36</td>
<td>0.0013</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>4</td>
<td>14.61</td>
<td>0.0001</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>5</td>
<td>19.37</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>6</td>
<td>24.13</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>7</td>
<td>28.33</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>8</td>
<td>31.67</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>9</td>
<td>34.12</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>10</td>
<td>35.88</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>11</td>
<td>37.13</td>
<td>0.0000</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>12</td>
<td>38.94</td>
<td>0.0000</td>
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### Delta-method

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<td>nonsurvivor vs survivor</td>
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<td>55.7546 -633.4764 -26.84931</td>
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<tr>
<td>nonsurvivor vs survivor</td>
<td>-332.2508</td>
<td>125.6147 -578.0591 -86.4425</td>
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<tr>
<td>nonsurvivor vs survivor</td>
<td>-333.8635</td>
<td>103.6061 -536.9277 -130.7993</td>
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</table>
(nonsurvivor vs survivor) 4  -335.5297  87.78817  -507.5916  -163.4681
(nonsurvivor vs survivor) 5  -337.6626  74.71533  -488.0239  -187.3033
(nonsurvivor vs survivor) 6  -360.5966  69.32495  -476.49  -244.7019
(nonsurvivor vs survivor) 7  -344.6123  64.74366  -471.5076  -217.7275
(nonsurvivor vs survivor) 8  -349.9643  62.10966  -471.8555  -228.0729
(nonsurvivor vs survivor) 9  -356.8925  61.99486  -476.4354  -237.1695
(nonsurvivor vs survivor) 10 -365.8296  61.99486  -485.2846  -256.9446
(nonsurvivor vs survivor) 11 -376.6461  61.78927  -497.5585  -255.7371
(nonsurvivor vs survivor) 12 -389.6024  63.71631  -513.4757  -265.7922
(nonsurvivor vs survivor) 13 -405.5215  65.19049  -533.3026  -277.7605
(nonsurvivor vs survivor) 14 -424.4682  67.82286  -557.1109  -291.4542
(nonsurvivor vs survivor) 15 -444.9562  71.34326  -586.7864  -307.1259
(nonsurvivor vs survivor) 16 -473.4903  75.79296  -622.0148  -324.9388
(nonsurvivor vs survivor) 17 -504.7319  81.49662  -644.6467  -364.0152
(nonsurvivor vs survivor) 18 -541.6611  88.78021  -675.4021  -407.9202
(nonsurvivor vs survivor) 19 -586.6328  98.16043  -716.9825  -448.2822
(nonsurvivor vs survivor) 20 -635.6025  110.1238  -751.4212  -521.7946
(nonsurvivor vs survivor) 21 -685.1881  120.1656  -801.0643  -555.3017
(nonsurvivor vs survivor) 22 -745.7344  140.0545  -880.1036  -611.3632

110  graph save "Graph"  /Users/Chiara/Documents/fileDO 15 Maggio/Mapg_LVM.gph, replace
    (file /Users/Chiara/Documents/fileDO 15 Maggio/Mapg_LVM.gph saved)

111  12  **combine****
112  . use /Users/Chiara/Documents/fileDO 15 Maggio/Mapg_LVM.gph, clear
113  . *** modelling
114  . (file /Users/Chiara/Documents/fileDO 15 Maggio/BOX_MONO.gph saved)
115  . 115  116  ***combine****
117  . gr combine /Users/Chiara/Documents/fileDO 15 Maggio/Mapg_LVM.gph  " /Users/Chiara/Documents/fileDO 15 Maggio/Mapg_LVM
> _IR.gph", ycomm   xsize(8) ysize(4)
118  . ***combine*****
119  . 120
121  . 122  . *** marginal Noncytes  0.0338711    .003426     9.89   0.000     .0271563     .040586
123  . 124  . **** scatter no model
125  . 126  . 127  . 128  . 129  . 130  . 131  . 132  . 133  . 134  . 135  .
136  . Mixed-effects NC regression Number of obs = 1,805
137  . Group variable: progr Number of groups = 379
138  . One per group:  min = 1
139  . avg = 4.8
140  . max = 22
141  . Valid chi2(3) = 131.44
142  . Log likelihood = -1224.808
143  . Prob > chi2 = 0.0000
144
145  . 146  . 147  . 148  . 149
150  . (nonsurvivor vs survivor) 4  -335.5297  87.78817  -507.5916  -163.4681
151  . (nonsurvivor vs survivor) 5  -337.6626  74.71533  -488.0239  -187.3033
152  . (nonsurvivor vs survivor) 6  -360.5966  69.32495  -476.49  -244.7019
153  . (nonsurvivor vs survivor) 7  -344.6123  64.74366  -471.5076  -217.7275
154  . (nonsurvivor vs survivor) 8  -349.9643  62.10966  -471.8555  -228.0729
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156  . (nonsurvivor vs survivor) 10 -365.8296  61.99486  -485.2846  -256.9446
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158  . (nonsurvivor vs survivor) 12 -389.6024  63.71631  -513.4757  -265.7922
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161  . (nonsurvivor vs survivor) 15 -444.9562  71.34326  -586.7864  -307.1259
162  . (nonsurvivor vs survivor) 16 -473.4903  75.79296  -622.0148  -324.9388
163  . (nonsurvivor vs survivor) 17 -504.7319  81.49662  -644.6467  -364.0152
164  . (nonsurvivor vs survivor) 18 -541.6611  88.78021  -675.4021  -407.9202
165  . (nonsurvivor vs survivor) 19 -586.6328  98.16043  -716.9825  -448.2822
166  . (nonsurvivor vs survivor) 20 -635.6025  110.1238  -751.4212  -521.7946
167  . (nonsurvivor vs survivor) 21 -685.1881  120.1656  -801.0643  -555.3017
168  . (nonsurvivor vs survivor) 22 -745.7344  140.0545  -880.1036  -611.3632

Performing EM optimization:
Performing gradient-based optimization:
Iteration 0:  log likelihood = -1234.8149
Iteration 1:  log likelihood = -1224.808
Iteration 2:  log likelihood = -1224.808

Computing standard errors:
Mixed-effects NC regression Number of obs = 1,805
Group variable: progr Number of groups = 379
One per group:  min = 1
avg = 4.8
max = 22
Valid chi2(3) = 131.44
Log likelihood = -1224.808
Prob > chi2 = 0.0000

User: Chiara Montaldo

19/05/20, 17:13
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<tr>
<th>var(Residual)</th>
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<td>LR test vs. linear model: chi2(3) = 695.19</td>
<td>Prob &gt; chi2 = 0.0000</td>
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<td>Note: LR test is conservative and provided only for reference.</td>
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136. est store linear

137. mixed mono_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene|| progr:b_day > _malattia, cov(unstr)

Performing EM optimization:
Performing gradient-based optimization:
Iteration 0: log likelihood = -1214.9499
Iteration 1: log likelihood = -1214.9415
Iteration 2: log likelihood = -1214.9415
Computing standard errors:

Mixed-effects ML regression
Number of obs = 1,805
Group variable: progr
Number of groups = 379
Obs per group:
min = 1
avg = 4.8
max = 22
Valid chi2(9) = 181.99

Log likelihood = -1214.9415

mono_ln
Coef.   Std. Err.     z    P>|z|     [95% Conf. Interval]
b_day_malattia  -.0175094   .0108672    -1.61   0.107    -.0388086    .0037899
c.b_day_malattia#c.b_day_malattia  .0021106   .0004208     5.02   0.000     .0012857    .0029354
dead_30  nonsurvivor -1.891192   .1752773   -10.8   0.000    -.2362564    .1544181
dead_30#c.b_day_malattia  nonsurvivor -0.1891192   .1752773   -1.08   0.281    -.5326564    .1544181
dead_30#c.b_day_malattia#c.b_day_malattia  nonsurvivor -0.016233   .0275329    -0.59   0.555    -.0701965    .0377305
dead_30#c.b_day_malattia##c.b_day_malattia##i.death_30##i.p_age2#c.b_day_malattia##i.p_cardio##i.p_obeso##i.p_rene##progr  nonsurvivor -.016233   .0275329    -0.59   0.555    -.0701965    .0377305
dead_30#c.b_day_malattia##i.p_age2##i.p_cardio##i.p_obeso##i.p_rene##progr  nonsurvivor -.016233   .0275329    -0.59   0.555    -.0701965    .0377305

_1.p_age2
-1.094966   .159299    -6.78   0.000    -.395541    -.894391
_1.p_cardio
-1.00846    .161001    -6.28   0.000    -.3128982    -.6955632
_1.p_obeso
-1.00846    .161001    -6.28   0.000    -.3128982    -.6955632
_1.p_rene
-1.00846    .161001    -6.28   0.000    -.3128982    -.6955632
_cons
6.11702     .07747    78.96   0.000     5.965181    6.268858

Random-effects Parameters
Estimate Std. Err.     [95% Conf. Interval]
progr: Unstructured
var(b_day_malattia)  .0012124   .0002085      .0008654    .0016984
var(_cons)  .3662504   .0493641      .2812233    .4769853
cov(b_day_malattia,_cons) -0.0165163   .0030029     -.0224018   -.0106308

LR test vs. linear model: chi2(3) = 691.78
Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

138. est store quadratic

139. lrtest linear quadratic

Likelihood-ratio test
LR chi2(6) = 39.73
(Assumption: linear nested in quadratic)
Prob > chi2 = 0.0000

140. ****margins****

141. quiet: mixed mono_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene|| progr:b_day > _malattia, cov(unstr)

142. margins death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Adjusted predictions
Number of obs = 1,805
Expression : exp(predict(xb))
1._at : b_day_malattia = 0
  death_30 (asbalanced)
  _p_age2 (asbalanced)
  _p_cardio (asbalanced)
  _p_obeso (asbalanced)
  _p_rene (asbalanced)
2._at : b_day_malattia = 1
  death_30 (asbalanced)
  _p_age2 (asbalanced)
  _p_cardio (asbalanced)
  _p_obeso (asbalanced)
  _p_rene (asbalanced)
3._at : b_day_malattia = 2
  death_30 (asbalanced)
  _p_age2 (asbalanced)
  _p_cardio (asbalanced)
  _p_obeso (asbalanced)
  _p_rene (asbalanced)
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<th>p_age2</th>
<th>p_cardio</th>
<th>p_obeso</th>
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```
expression: \exp(\text{predict(xb)})

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<tr>
<td>1</td>
<td>Survival: 388.4529 39.65304 10.05 0.000 312.6944 466.2315</td>
</tr>
<tr>
<td>2</td>
<td>Survival: 382.537 35.56431 10.76 0.000 312.823 452.2218</td>
</tr>
<tr>
<td>3</td>
<td>Non-survivor: 311.7638 45.42954 6.86 0.000 222.7236 400.8041</td>
</tr>
<tr>
<td>4</td>
<td>Non-survivor: 378.2652 31.1777 11.42 0.000 213.3557 461.1747</td>
</tr>
<tr>
<td>5</td>
<td>Non-survivor: 306.0386 93.52271 7.49 0.000 226.5631 381.6077</td>
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<td>6</td>
<td>Non-survivor: 275.4399 31.42492 12.02 0.000 214.4044 438.0818</td>
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<tr>
<td>7</td>
<td>Non-survivor: 298.3433 35.05192 8.52 0.000 228.7212 366.9655</td>
</tr>
<tr>
<td>8</td>
<td>Non-survivor: 374.1469 29.88053 12.54 0.000 315.0522 423.1815</td>
</tr>
<tr>
<td>9</td>
<td>Non-survivor: 394.4328 31.65583 9.30 0.000 222.388 356.4771</td>
</tr>
<tr>
<td>10</td>
<td>Non-survivor: 385.2737 29.94117 9.95 0.000 237.1988 366.3231</td>
</tr>
<tr>
<td>11</td>
<td>Non-survivor: 292.3455 29.32447 9.96 0.000 224.7906 349.7788</td>
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</table>

expression: \exp(\text{predict(xb)})

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<tr>
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<td>Survival: 229.1529 27.15552 10.80 0.000 192.9297 357.3746</td>
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<td>Survival: 256.3159 22.59818 13.66 0.000 231.0649 441.1686</td>
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<td>Survival: 286.2819 26.97756 10.99 0.000 243.3099 349.06 0.000</td>
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<tr>
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<td>Survival: 393.6818 28.60128 13.76 0.000 337.6243 468.7399</td>
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<td>Survival: 301.0164 27.22231 11.06 0.000 247.6584 359.3647</td>
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<tr>
<td>8</td>
<td>Survival: 402.4788 29.11654 13.83 0.000 243.0405 459.7642</td>
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<td>9</td>
<td>Survival: 307.1757 27.79056 11.07 0.000 253.2472 362.1892</td>
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<td>Survival: 413.6396 29.84685 13.87 0.000 355.1794 472.5095</td>
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<td>Survival: 316.4226 28.62718 11.05 0.000 260.3144 372.5309</td>
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<td>Survival: 459.7647 32.00811 13.92 0.000 395.068 526.4574</td>
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<td>Survival: 397.2853 36.82178 10.28 0.000 322.5759 472.9952</td>
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<td>Survival: 422.174 43.12663 9.81 0.000 328.6477 507.7011</td>
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<td>Survival: 561.4399 44.10598 11.43 0.000 435.9357 642.2664</td>
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<td>Survival: 455.605 49.30126 9.20 0.000 354.7746 550.0324</td>
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<td>Survival: 596.4959 44.93161 13.40 0.000 489.9351 681.9548</td>
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<td>Survival: 488.6592 57.69343 8.47 0.000 375.5759 461.731</td>
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<td>Survival: 436.4662 48.75099 12.06 0.000 341.9024 522.1928</td>
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<td>Survival: 529.7438 48.93937 7.68 0.000 394.6251 564.8024</td>
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<td>Survival: 682.128 54.11422 12.61 0.000 574.0744 788.2999</td>
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<tr>
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<td>Survival: 577.4175 83.79256 6.89 0.000 443.4611 741.9019</td>
</tr>
</tbody>
</table>
```
death_30
p_age2
p_cardio
p_obeso
p_rene

5._at : b_day_mala~a = 4
death_30
p_age2
p_cardio
p_obeso
p_rene

6._at : b_day_mala~a = 5
death_30
p_age2
p_cardio
p_obeso
p_rene

7._at : b_day_mala~a = 6
death_30
p_age2
p_cardio
p_obeso
p_rene

8._at : b_day_mala~a = 7
death_30
p_age2
p_cardio
p_obeso
p_rene

9._at : b_day_mala~a = 8
death_30
p_age2
p_cardio
p_obeso
p_rene

10._at : b_day_mala~a = 9
death_30
p_age2
p_cardio
p_obeso
p_rene

11._at : b_day_mala~a = 10
death_30
p_age2
p_cardio
p_obeso
p_rene

12._at : b_day_mala~a = 11
death_30
p_age2
p_cardio
p_obeso
p_rene

13._at : b_day_mala~a = 12
death_30
p_age2
p_cardio
p_obeso
p_rene

14._at : b_day_mala~a = 13
death_30
p_age2
p_cardio
p_obeso
p_rene

15._at : b_day_mala~a = 14
death_30
p_age2
p_cardio
p_obeso
p_rene

16._at : b_day_mala~a = 15
death_30
p_age2
p_cardio
p_obeso
p_rene

17._at : b_day_mala~a = 16
death_30
p_age2
p_cardio
p_obeso
p_rene

18._at : b_day_mala~a = 17
death_30
p_age2
p_cardio
p_obeso
p_rene

19._at : b_day_mala~a = 18
death_30
p_age2
p_cardio
p_obeso
p_rene
20. at
\[ b_{\text{day mala}} \times 10^{-3} \]
\( p_{\text{obs}} \) (asbalanced)
\( p_{\text{ref}} \) (asbalanced)

21. at
\[ b_{\text{day mala}} \times 10^{-3} \]
\( p_{\text{obs}} \) (asbalanced)
\( p_{\text{ref}} \) (asbalanced)

22. at
\[ b_{\text{day mala}} \times 10^{-3} \]
\( p_{\text{ref}} \) (asbalanced)
\( p_{\text{obs}} \) (asbalanced)

### Results

<table>
<thead>
<tr>
<th>df</th>
<th>chi²</th>
<th>P&gt;chi²</th>
</tr>
</thead>
</table>

### Delta-method

<table>
<thead>
<tr>
<th>df</th>
<th>chi²</th>
<th>P&gt;chi²</th>
</tr>
</thead>
</table>

### Results

145. graph save "Graph" /Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph, replace
(file/Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph saved)

146.

147. *margins death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb)))

148. *marginsplot, title("Monocites kinetic day 0 to day 30 after onset") ytitle("Cells per mmc (log-scale)") xlab(0(5) 20)

149. *margins death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb)))

150.

151. ***combine***

152. gr combine /Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph "/Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph" ycommon name(name) ytitle("Cells per mmc (log-scale)") xtitle("Day since onset")

153. graph save "Graph" /Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph, replace
(file/Users/Chiara/Documents/fileDO 15 Maggio/Harg_MONO.gph saved)

154.

155.

156. 

157. *** scatter no model

158. use /Users/Chiara/Documents/fileDO 15 Maggio/fileDO/conta_long_senorecante_01.dta

159. scatter b_day_malattia if death_30==1, mcolor(red) legend(off) title("Hospitilization variation over time") still xaxis(name) yaxis(name)

160. scatter b_day_malattia if death_30==0, mcolor(green) legend(off)
egend(off) ms(oh)

replace anemia=-200
(961 real changes made)

166. mixed eos c.b_day_malattia##i.death_30 || progr:b_day_malattia, cov(unstr)

Performing EM optimization:
Performing gradient-based optimization:
Iteration 0: log likelihood = -10062.005
Iteration 1: log likelihood = -10062.036
Iteration 2: log likelihood = -10062.036

Computing standard errors:
Mixed-effects ML regression
Number of obs = 1,805
Group variable: progr
Number of groups = 379

Obs per group:
  min = 1
  avg = 4.8
  max = 22

Valid chl2(3) = 121.64
Log likelihood = -10062.036

| Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval] |
|--------|----------------------|---------|-------|---------------------------|
| eos    |                      |         |       |                           |
| b_day_malattia | 5.120101   | .4880917  | 10.49  | 0.000         | 4.163459    | 6.076743 |
| death_30 | 6.918299   | 12.25559   | 0.56   | 0.572         | -17.10221   | 30.93881  |
| death_30#c.b_day_malattia | -3.48303   | 1.480325   | -2.35  | 0.019         | -6.384414   | -.5816457 |
| _cons  | -5.791112   | 4.845078   | -.20   | 0.839         | -15.28729   | 3.705066  |

Random-effects Parameters
Estimate Std. Err. [95% Conf. Interval]
progr: Unstructured
var(b_day_malattia) | 35.1686   | 5.270418   | 26.21759   | 47.1756  |
var(_cons) | 1709.433  | 495.5068   | 968.54     | 3017.078 |

cov(b_day_malattia,_cons) | -169.9506 | 46.90627   | -261.8852  | -78.01596 |
var(Residual) | 2751.337  | 112.6649   | 2539.146   | 2981.259 |

LR test vs. linear model: chi2(3) = 783.15
Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

167. est store linear

168. mixed eos c.b_day_malattia#c.b_day_malattia##i.death_30 || progr:b_day_malattia, cov(unstr)

Performing EM optimization:
Performing gradient-based optimization:
Iteration 0: log likelihood = -10057.824
Iteration 1: log likelihood = -10057.642
Iteration 2: log likelihood = -10057.642

Computing standard errors:
Mixed-effects ML regression
Number of obs = 1,805
Group variable: progr
Number of groups = 379

Obs per group:
  min = 1
  avg = 4.8
  max = 22

Valid chl2(3) = 133.34
Log likelihood = -10057.642

| Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval] |
|--------|----------------------|---------|-------|---------------------------|
| eos    |                      |         |       |                           |
| b_day_malattia | 1.786876   | 1.338072   | 1.36   | 0.182         | -.8356974   | 4.409449 |
| death_30 | .1433959   | .0536253   | 2.67   | 0.007         | .0382922    | .2486996  |
| death_30#c.b_day_malattia | -4.44837   | 3.735964   | -1.22  | 0.224         | -11.77685   | 2.885157 |
| _cons  | 10.58238    | 7.693078   | 1.38   | 0.169         | -4.493299   | 25.66209  |

Random-effects Parameters
Estimate Std. Err. [95% Conf. Interval]
progr: Unstructured
var(b_day_malattia)  24.40418  5.102017  25.66946  46.32583  
var(_cons)        1277.686  461.892   714.1199  2657.845
 cov(b_day_malattia,_cons) -350.895  44.70055 -238.6839 -63.10701
var(Residual)   2763.249  112.9161  2550.569  2993.665

LR test vs. linear model: chi2(3) = 786.76  Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

169.  est store quadratic
170.  lrtest linear quadratic
Likelihood-ratio test  LR chi2(2)  =  8.79  
(Assumption: linear nested in quadratic)  Prob > chi2 = 0.0124

171.  margins death_30, at(b_day_mala~a=(0(1)30))
Adjusted predictions  Number of obs  =  1,805
Expression: Linear prediction, fixed portion, predict()
1._at : b_day_mala-a = 0
2._at : b_day_mala-a = 1
3._at : b_day_mala-a = 2
4._at : b_day_mala-a = 3
5._at : b_day_mala-a = 4
6._at : b_day_mala-a = 5
7._at : b_day_mala-a = 6
8._at : b_day_mala-a = 7
9._at : b_day_mala-a = 8
10._at : b_day_mala-a = 9
11._at : b_day_mala-a = 10
12._at : b_day_mala-a = 11
13._at : b_day_mala-a = 12
14._at : b_day_mala-a = 13
15._at : b_day_mala-a = 14
16._at : b_day_mala-a = 15
17._at : b_day_mala-a = 16
18._at : b_day_mala-a = 17
19._at : b_day_mala-a = 18
20._at : b_day_mala-a = 19
21._at : b_day_mala-a = 20
22._at : b_day_mala-a = 21
23._at : b_day_mala-a = 22
24._at : b_day_mala-a = 23
25._at : b_day_mala-a = 24
26._at : b_day_mala-a = 25
27._at : b_day_mala-a = 26
28._at : b_day_mala-a = 27
29._at : b_day_mala-a = 28
30._at : b_day_mala-a = 29
31._at : b_day_mala-a = 30

Delta-method  Margin  Std. Err.    z    P>|z|   [95% Conf. Interval]
 _at#death_30
 1#survivor  10.58238    7.69387     1.38  0.169   -4.497329    25.66209
 1#nonsurvivor  19.14167   15.71042     1.22  0.223   -11.65018    49.93352
 2#survivor  12.51265   6.527092     1.92  0.055  -0.2802154    25.30552
 2#nonsurvivor  16.68571   13.12093     1.27  0.203  -9.030837    42.40225
 3#survivor  14.72971    5.48991     2.68  0.007    3.969687    25.48974
 3#nonsurvivor  14.64082   10.89322     1.34  0.179  -6.709501    35.99113
 4#survivor  17.23357   4.593984     3.75  0.000    8.229525    26.23761
 4#nonsurvivor  13.007   9.083217     1.43  0.152   -4.795783    30.80977
 5#survivor  20.02422   3.856058     5.19  0.000    12.46448    27.58595
 5#nonsurvivor  11.78424   7.765085     1.52  0.129  -3.850339    27.30553
 6#survivor  23.10165    3.29714     7.01  0.000    16.63938    29.56393
 6#nonsurvivor  10.97256    7.00571     1.57  0.117  -2.785594    24.73551
 7#survivor  26.46588    2.93566     9.02  0.000    20.71211    32.21967
 7#nonsurvivor  10.5824    6.806705     1.55  0.120  -3.769895    23.93284
 8#survivor  30.11641    2.772403    10.86  0.000    24.68294    35.55007
 8#nonsurvivor  10.5824    7.068136     1.50  0.134  -3.270089    24.42536
 9#survivor  34.05472    2.778922    12.25  0.000    28.60013    39.51131
 9#nonsurvivor  10.5824    7.068136     1.50  0.134  -3.270089    24.42536
173. marginsplot, title("Eosinophils kinetic day 0 to day 28 after onset") ytitle("Cells per mmc (log-scale)")

174. margins ar.death_30, at(b_day_malattia=(0(1)30))

Variables that uniquely identify margins: b_day_malattia death_30

Expression

Contrasts of adjusted predictions Number of obs  = 1,805

Linear prediction, fixed portion, predict()

1._at : b_day_mala~a
2._at : b_day_mala~a
3._at : b_day_mala~a
4._at : b_day_mala~a
5._at : b_day_mala~a
6._at : b_day_mala~a
7._at : b_day_mala~a
8._at : b_day_mala~a
9._at : b_day_mala~a
10._at : b_day_mala~a
11._at : b_day_mala~a
12._at : b_day_mala~a
13._at : b_day_mala~a
14._at : b_day_mala~a
15._at : b_day_mala~a
16._at : b_day_mala~a
17._at : b_day_mala~a
18._at : b_day_mala~a
19._at : b_day_mala~a
20._at : b_day_mala~a
21._at : b_day_mala~a
22._at : b_day_mala~a
23._at : b_day_mala~a
24._at : b_day_mala~a
25._at : b_day_mala~a
26._at : b_day_mala~a
27._at : b_day_mala~a
28._at : b_day_mala~a
29._at : b_day_mala~a
30._at : b_day_mala~a
graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX_PLT.gph", replace

scatter plt b_day_malattia if death_30==0, mcol(red) legend(off) title("Platelets variation over time") xtitle("day since onset") ytitle("Cells per mmc X 1000")|| scatter plt b_day_malattia if death_30==1, mcolor(green) legend(off) ms(oh)

Contrast   Std. Err.     [95% Conf. Interval]
Delta-method

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td></td>
<td>42.94527</td>
<td>31.89586</td>
<td>25.93642</td>
<td>15.72366</td>
<td>8.752552</td>
<td>4.666564</td>
<td>1.365152</td>
<td>-0.455097</td>
<td>-7.126856</td>
</tr>
<tr>
<td></td>
<td>0.0202</td>
<td>0.2733</td>
<td>0.1614</td>
<td>0.1419</td>
<td>0.2013</td>
<td>0.1671</td>
<td>0.1351</td>
<td>0.1055</td>
<td>0.1351</td>
</tr>
</tbody>
</table>

Joint =

19/05/20, 17:13 Page 22 of 56
Performing EM optimization:
Performing gradient-based optimization:

Iteration 0:  log likelihood = -488.15169
Iteration 1:  log likelihood = -488.15166

Computing standard errors:

Mixed-effects ML regression          Number of obs  =  1,805
Group variable: progr
Number of groups  =  379

Obs per group:
  min =  1
  avg =  4.8
  max =  22

Valid chi2(1)  =  170.93

Log likelihood = -488.15166

|         | Coef.   | Std. Err. | z    | P>|z|   | [95% Conf. Interval] |
|---------|---------|-----------|------|------|---------------------|
| b_day_malattia | 0.040182 | 0.0032144 | 12.50 | 0.000 | 0.033882 - 0.046482 |
| death_30 nonsurvivor | 0.3307512 | 0.117088 | 2.82  | 0.005 | 0.1012631 - 0.5602394 |
| death_30#c.b_day_malattia nonsurvivor | -0.0509723 | 0.0963773 | -5.29 | 0.000 | -0.249861 - 0.148836 |
| _cons | 11.96795 | 0.0419482 | 285.30 | 0.000 | 11.88573 - 12.05017 |

Random-effects Parameters          Estimate  Std. Err.   [95% Conf. Interval]
progr: Unstructured
  var(b_day_malattia) | 0.0021197 | 0.0002226 | 0.0017254 - 0.0026041 |
  var(_cons) | 0.3864737 | 0.0394638 | 0.3163746 - 0.4721047 |
  cov(b_day_malattia,_cons) | -0.0240338 | 0.0027549 | -0.0294332 - -0.0186343 |

LR test vs. linear model: chi2(3)  =  1364.85
Prob > chi2       =  0.0000

Note: LR test is conservative and provided only for reference.

Performing EM optimization:
Performing gradient-based optimization:

Iteration 0:  log likelihood = -382.02189
Iteration 1:  log likelihood = -382.02185

Computing standard errors:

Mixed-effects ML regression          Number of obs  =  1,805
Group variable: progr
Number of groups  =  379

Obs per group:
  min =  1
  avg =  4.8
  max =  22

Valid chi2(9)  =  413.99

Log likelihood = -382.02185

|         | Coef.   | Std. Err. | z    | P>|z|   | [95% Conf. Interval] |
|---------|---------|-----------|------|------|---------------------|
| b_day_malattia | 0.1209497 | 0.0070774 | 17.09 | 0.000 | 0.107073 - 0.134821 |
| c.b_day_malattia##c.b_day_malattia##i.death_30 | -0.0032554 | 0.0002557 | 12.45 | 0.000 | -0.0037347 - -0.0027742 |
| death_30 nonsurvivor | 0.947662 | 1.463285 | 6.70  | 0.000 | 0.976747 - 0.918568 |
| death_30#c.b_day_malattia nonsurvivor | -0.076821 | 0.071616 | -1.55 | 0.122 | -0.227989 - 0.074358 |
| _cons | 11.5935 | 0.0604623 | 191.75 | 0.000 | 11.47499 - 11.71202 |

Random-effects Parameters          Estimate  Std. Err.   [95% Conf. Interval]
progr: Unstructured
  var(b_day_malattia) | 0.002413 | 0.0002437 | 0.002084 - 0.002848 |
  var(_cons) | 0.4782225 | 0.0472224 | 0.385227 - 0.571226 |
  cov(b_day_malattia,_cons) | -0.0011778 | 0.0002437 | -0.001422 - -0.000938 |

Note: LR test vs. linear model: chi2(9)  =  1564.85
Prob > chi2       =  0.0000

Note: LR test is conservative and provided only for reference.
var(Residual) |      0.039884   0.0016814   0.0367214   0.0433198
--- | --- | --- | --- | ---
LR test vs. linear model: chi2(3) = 1477.93, Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

192. est store quadratic
193. lrtest linear quadratic

Likelihood-ratio test                                           LR chi2(6)  =  212.26
(Assumption: linear nested in quadratic)  Prob > chi2 = 0.0000

194. *margins***********
195. quiet: mixed plt_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene|| progr > b_day_malattia, cov(unstr)
196. margins death_30, at(b_day_malattia=(0(1)21)) expression(exp(predict(xb))) asbalanced

Adjusted predictions                                      Number of obs = 1,805
Expression: exp(predict(xb))
     1._at  : b_day_malattia = 0
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     2._at  : b_day_malattia = 1
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     3._at  : b_day_malattia = 2
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     4._at  : b_day_malattia = 3
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     5._at  : b_day_malattia = 4
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     6._at  : b_day_malattia = 5
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     7._at  : b_day_malattia = 6
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     8._at  : b_day_malattia = 7
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
     9._at  : b_day_malattia = 8
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
    10._at : b_day_malattia = 9
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
    11._at : b_day_malattia = 10
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
    12._at : b_day_malattia = 11
day30  (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
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</tbody>
</table>

| Delta-method | Margin | Std. Err. | z  | P>|z| | [95% Conf. Interval] |
|---|---|---|---|---|---|
| atDeath_30 | | | | | |
| 1survivor | 97796.27 | 7880.46 | 12.40 | 0.000 | 82334.82 | 113257.7 |
| 2survivor | 145123.2 | 20108.02 | 7.22 | 0.000 | 105722.3 | 184524.3 |
| 3survivor | 113933.2 | 828.92 | 13.05 | 0.000 | 9492.84 | 185533.6 |
| 4survivor | 158524.1 | 20066.9 | 7.90 | 0.000 | 119193.7 | 197854.6 |
| 5survivor | 122908.1 | 8994.52 | 13.67 | 0.000 | 105202.3 | 140507.1 |
| 6survivor | 171423 | 19870.56 | 8.62 | 0.000 | 132659.8 | 210386.2 |
| 7survivor | 136539.8 | 5891.32 | 14.34 | 0.000 | 117340.1 | 155634.6 |
| 8survivor | 183552.2 | 19576.01 | 9.37 | 0.000 | 145152.3 | 221991.9 |
| 9survivor | 150643.8 | 19215.87 | 14.75 | 0.000 | 119021.7 | 180664.5 |
| 10survivor | 194514.4 | 19132.27 | 10.14 | 0.000 | 156890.6 | 232131.2 |
| 11survivor | 165132.4 | 10874.62 | 15.19 | 0.000 | 143818.7 | 186464.6 |
| 12survivor | 201159.2 | 18758.93 | 10.88 | 0.000 | 167342.4 | 240075.8 |
| 13survivor | 179847.4 | 11563.37 | 15.55 | 0.000 | 157186.3 | 202512.2 |
| 14survivor | 212004 | 18206.11 | 11.59 | 0.000 | 176160.4 | 247912.3 |
| 15survivor | 194610 | 12277.05 | 15.85 | 0.000 | 170547.4 | 218672.4 |
| 16survivor | 218081.4 | 27057.47 | 12.21 | 0.000 | 183081.4 | 253081.4 |
| 17survivor | 209226.7 | 13005.93 | 16.00 | 0.000 | 183731.1 | 234721.2 |
| 18survivor | 222857.1 | 17430.51 | 12.74 | 0.000 | 187893.1 | 252282.3 |
| 19survivor | 223489.1 | 13746.11 | 16.26 | 0.000 | 195457.2 | 250431.2 |
| 20survivor | 223669.4 | 17036.45 | 13.14 | 0.000 | 190456.8 | 257242.3 |
| 21survivor | 227184.6 | 14480.38 | 16.30 | 0.000 | 198800.6 | 254550.6 |
| 22survivor | 223405.1 | 16606.99 | 13.39 | 0.000 | 190699.4 | 255110.9 |
| 23survivor | 228090.5 | 25199.22 | 16.45 | 0.000 | 223035.9 | 279085.8 |
| 24survivor | 220371.2 | 16385.54 | 13.47 | 0.000 | 188622.1 | 252985.2 |
| 25survivor | 242809 | 15891.95 | 16.49 | 0.000 | 223861.2 | 291815.6 |
| 26survivor | 215925.1 | 16318.79 | 13.39 | 0.000 | 192493.7 | 247556.4 |
| 27survivor | 223719.1 | 16549.79 | 16.48 | 0.000 | 240282.1 | 305156.1 |
| 28survivor | 208136.7 | 15969.96 | 13.11 | 0.000 | 177848.4 | 240372.1 |
| 29survivor | 282028.1 | 17366.72 | 16.43 | 0.000 | 248389.9 | 315682.2 |
| 30survivor | 230849 | 15810.33 | 12.67 | 0.000 | 194947.7 | 211494.4 |
| 31survivor | 289790.1 | 17740.12 | 16.34 | 0.000 | 255020.1 | 324660.1 |
| 32survivor | 196280.8 | 15576.7 | 12.09 | 0.000 | 159444.4 | 221512.2 |
| 33survivor | 295836.7 | 18270.98 | 16.19 | 0.000 | 260026.3 | 331647.2 |
User: Chiara Montaldo

18#survivor

18#nonsurvivor

19#survivor

19#nonsurvivor

20#survivor

20#nonsurvivor

21#survivor

21#nonsurvivor

22#survivor

22#nonsurvivor

197 - marginsplot, ytitle("Cells per mmc") xlab(0(1)21) ylab(0(200000)800000, angle(horizontal)) yline(150000,lcolor(red > ) legend(off)

Variables that uniquely identify margins: b_day_malattia death_30

198 - margins ar.death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Contrasts of adjusted predictions               Number of obs     =   1,805
Expression   : exp(predict(xb))

1._at        : b_day_malattia = 0
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

2._at        : b_day_malattia = 1
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

3._at        : b_day_malattia = 2
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

4._at        : b_day_malattia = 3
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

5._at        : b_day_malattia = 4
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

6._at        : b_day_malattia = 5
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

7._at        : b_day_malattia = 6
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

8._at        : b_day_malattia = 7
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

9._at        : b_day_malattia = 8
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

10._at       : b_day_malattia = 9
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

11._at       : b_day_malattia = 10
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)

12._at       : b_day_malattia = 11
day30
 p_age2  (asbalanced)
p_cardio  (asbalanced)
p_obeso  (asbalanced)
p_rene  (asbalanced)
| 13. at       | b_day_mala-a | 12 |
| 14. at       | b_day_mala-a | 13 |
| 15. at       | b_day_mala-a | 14 |
| 16. at       | b_day_mala-a | 15 |
| 17. at       | b_day_mala-a | 16 |
| 18. at       | b_day_mala-a | 17 |
| 19. at       | b_day_mala-a | 18 |
| 20. at       | b_day_mala-a | 19 |
| 21. at       | b_day_mala-a | 20 |
| 22. at       | b_day_mala-a | 21 |

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<td>(ns vs s)</td>
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</table>
LR test vs. linear model: chi2(22) = 2847.24  Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.
Performing EM optimization:
Performing gradient-based optimization:
Iteration 0:   log likelihood =  2721.9498
Iteration 1:   log likelihood =  2721.9499
Computing standard errors:
Mixed-effects NL regression                     Number of obs     =   1,773
Group variable: progr
Number of groups  =   376
Obs per group:
  min =         1
  avg =       4.7
  max =      22
Valid chi2(k)   =  137.32
Log likelihood  =  2721.9499

mpv_ln        Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
b_day_malattia  -.0077241   .0011545    -6.69   0.000    -.0099869   -.0054612
 c.b_day_malattia#c.b_day_malattia .0001913   .0000427     4.48   0.000     .0001075    .0002751
death_30 (nonsurvivor) -.0830919   .0241874    -3.44   0.001    -.1304983   -.0356854
death_30#c.b_day_malattia (nonsurvivor) .0115817    .002954     3.92   0.000     .0057919    .0173714
death_30#c.b_day_malattia#c.b_day_malattia (nonsurvivor) .0000729   .0001181     0.62   0.537    -.0001586    .0003044
1.p_age2       .0148626    .009325     1.59   0.111     -.003414    .0331392
1.p_cardio     .0047159   .0099999     0.47   0.637    -.0148836    .0243154
1.p_obeso      -.014846    .017699    -0.84   0.402    -.0495354    .0198434
1.p_rene       .0475706   .0207101     2.30   0.022     .0069795    .0881618
_cons          2.418874   .0104160   232.23   0.000     2.398459    2.439289

Random-effects Parameters  Estimate  Std. Err.  [95% Conf. Interval]
progr: Unstructured
  var(b_day_malattia) .0000431   4.86e-06      .0000346    .0000538
  var(_cons) .0122388   .0012204      .0100661    .0148804
  cov(b_day_malattia,_cons) -.0005139   .0000687     -.0006485   -.0003794
  var(Residual) .0011489   .0000484      .0010578    .0012477

LR test vs. linear model: chi2(3) = 1816.08
Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

> est store quadratic
> lrtest linear quadratic
> Likelihood-ratio test                                 LR chi2(6)  =  37.07
(Assumption: linear nested in quadratic)              Prob > chi2 = 0.0000

Note: LR test is conservative

> margins death_30
>  expression(exp(predict(xb))) asbalanced
> Adjusted predictions                             Number of obs   =   1,773
Expression : exp(predict(xb))
  1.  _at : b_day_malattia = 0
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  2.  _at : b_day_malattia = 1
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  3.  _at : b_day_malattia = 2
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  4.  _at : b_day_malattia = 3
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  5.  _at : b_day_malattia = 4

225 . est store quadratic
226 . lrttest linear quadratic
227 . ***margins****
228 . quiet: eststo linear
229 . margins death_30, at(b_day_malattia=0(1)4)
Expression:exp(predict(xb))
Adjusted predictions                             Number of obs   =   1,773
Expression : exp(predict(xb))
  1.  _at : b_day_malattia = 0
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  2.  _at : b_day_malattia = 1
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  3.  _at : b_day_malattia = 2
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  4.  _at : b_day_malattia = 3
     death_30 (ambalanced)
     p_age2 (ambalanced)
     p_cardio (ambalanced)
     p_obeso (ambalanced)
     p_rene (ambalanced)
  5.  _at : b_day_malattia = 4

Note: LR test is conservative

19/05/20, 17:13
death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

6.at: b_day_mala-a = 5
  death_30
  p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

7.at: b_day_mala-a = 6
  death_30
  p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

8.at: b_day_mala-a = 7
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  p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

9.at: b_day_mala-a = 8
  death_30
  p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

10.at: b_day_mala-a = 9
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

11.at: b_day_mala-a = 10
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

12.at: b_day_mala-a = 11
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

13.at: b_day_mala-a = 12
   death_30
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p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

14.at: b_day_mala-a = 13
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

15.at: b_day_mala-a = 14
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

16.at: b_day_mala-a = 15
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p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

17.at: b_day_mala-a = 16
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

18.at: b_day_mala-a = 17
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

19.at: b_day_mala-a = 18
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

20.at: b_day_mala-a = 19
   death_30
   p_age2 (asbalanced)
p_cardio (asbalanced)
### Table: Adjusted Predictions

| Margin | Std. Err. | z | P>|z| | [95% Conf. Interval] |
|--------|-----------|---|------|--------------------------|
| 1      | 3.52501   | .282358 | 12.51 | 0.000 | 3.077387 3.972624 |
| 2      | 3.51682   | .273807 | 12.84 | 0.000 | 3.074191 3.959443 |
| 3      | 3.57388   | .274707 | 12.97 | 0.000 | 3.035901 4.111858 |
| 4      | 3.58784   | .277328 | 12.96 | 0.000 | 3.039946 4.135696 |
| 5      | 3.54089   | .272207 | 12.66 | 0.000 | 3.003766 4.07802 |
| 6      | 3.52501   | .282358 | 12.51 | 0.000 | 3.077387 3.972624 |
| 7      | 3.51682   | .273807 | 12.84 | 0.000 | 3.074191 3.959443 |
| 8      | 3.57388   | .274707 | 12.97 | 0.000 | 3.035901 4.111858 |
| 9      | 3.58784   | .277328 | 12.96 | 0.000 | 3.039946 4.135696 |
| 10     | 3.54089   | .272207 | 12.66 | 0.000 | 3.003766 4.07802 |
| 11     | 3.52501   | .282358 | 12.51 | 0.000 | 3.077387 3.972624 |
| 12     | 3.51682   | .273807 | 12.84 | 0.000 | 3.074191 3.959443 |
| 13     | 3.57388   | .274707 | 12.97 | 0.000 | 3.035901 4.111858 |
| 14     | 3.58784   | .277328 | 12.96 | 0.000 | 3.039946 4.135696 |

230. marginplot, ytitle("Cell volume (Fl)") ylab(0(100000)) legend(off)

Variables that uniquely identify margins: b_day_malattia death_30

Contrasts of adjusted predictions

Expression : exp(predict(xb))

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<tr>
<td>20.</td>
<td>= 19</td>
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</table>
21. **chi2**

   death_30  at  b_day_mala~a  
   death_30  (balanced)  20
   p_rende  (balanced)  21
   p_age  (balanced)  22
   p_cardio  (balanced)  23
   p_obeso  (balanced)  24
   p_rende  (balanced)  25

   df  chi2  P<chi2

| death_30  | 1  | 12.27  | 0.0005 |
| death_30  | 2  | 10.69  | 0.0011 |
| death_30  | 3  | 8.68   | 0.0032 |
| death_30  | 4  | 6.37   | 0.0116 |
| death_30  | 5  | 4.91   | 0.0452 |
| death_30  | 6  | 1.91   | 0.1674 |
| death_30  | 7  | 1.46   | 0.4998 |
| death_30  | 8  | 1.01   | 0.3259 |
| death_30  | 9  | 0.84   | 0.3597 |
| death_30  | 10 | 0.79   | 0.0789 |
| death_30  | 11 | 0.74   | 0.0693 |
| death_30  | 12 | 0.71   | 0.0006 |
| death_30  | 13 | 1.81   | 0.0000 |
| death_30  | 14 | 2.60   | 0.0000 |
| death_30  | 15 | 21.48  | 0.0000 |
| death_30  | 16 | 38.54  | 0.0000 |
| death_30  | 17 | 44.67  | 0.0000 |
| death_30  | 18 | 49.62  | 0.0000 |
| death_30  | 19 | 53.08  | 0.0000 |
| death_30  | 20 | 54.96  | 0.0000 |
| death_30  | 21 | 55.34  | 0.0000 |
| death_30  | 22 | 54.45  | 0.0000 |

**Joint** 5  100.00  0.0000

---

232. *ggplot2* "Graph" /"Users/Chiara/Documents/fileDO 15 Maggio/Marg_MPV.png", replace

(file /"Users/Chiara/Documents/fileDO 15 Maggio/Marg_MPV.png saved)

233. *ggplot2* + theme(asbalanced)

234. **ggplot2** + theme(asbalanced)

235. **ggplot2** + theme(asbalanced)

236. *ggplot2* + theme(asbalanced)

237. **ggplot2** + theme(asbalanced)

238. *ggplot2* + theme(asbalanced)

239. *ggplot2* + theme(asbalanced)

240. *ggplot2* "Graph" /"Users/Chiara/Documents/fileDO 15 Maggio/Marg_MPV.png", replace

(file /"Users/Chiara/Documents/fileDO 15 Maggio/Marg_MPV.png saved)

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241. 

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---
258. *margins death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb)))
259. *marginsplot, title("HCT kinetic day 0 to day 28 after onset") ytitle("Cell volume (fL; log-scale")
260. *margins ar.death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb)))
261. 
262. 
263. **************************************************************************
264. *** analisi mcv  ***************************************************
265. **************************************************************************
266. **** scatter no model
267. use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
268. *scatter mcv b_day_malattia  if death_30==1, mcolor(red) legend(off) title("MCV variation over time") xtitle("day > since onset") ytitle("Cell volume (fL)")
269. > since onset") ytitle("Cell volume (fL)")
270. ********Graph box**************************************
271. graph box mcv, over(death_30, label(nolabel)) over(b_day_malattia) asyvars box(1, fcolor(navy))
272. > over(b_day_malattia) asyvars box(1, fcolor(navy))
273. graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX_MCV.gph", replace
274. > graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/BOX_MCV.gph", replace
275.  
276. **** modelling
277. use "/Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
278. mixed mcv ln c.b_day_malattia##i.death_30 \| progr:b_day_malattia, cov(unstr)
Performing EM optimization:
Performing gradient-based optimization:
Iteration 0:   log likelihood =  3881.4055
Iteration 1:   log likelihood =  3881.4181
Iteration 2:   log likelihood =  3881.4181
Computing standard errors:
Mixed-effects ML regression                     Number of obs     = 1,805
Group variable: progr                             Number of groups  = 379
Obs per group:
    min =  1
    avg =  4.8
    max = 22
Valid chisq(3) =  42.56
Prob > chisq    =  0.0000

      mcv_ln  Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
    b_day_malattia  .0010319   .0002037     5.07   0.000     .0006326    .0014312
    death_30
    nonsurvivor     .0508694   .0124139     4.10   0.000     .0265387    .0752001
    death_30#c.b_day_malattia
    nonsurvivor   -.0004992   .0006146    -0.81   0.417    -.0017039    .0007054
     _cons        4.46217   .0042740  1044.02   0.000     4.453793    4.470547

Random-effects Parameters  Estimate  Std. Err.     [95% Conf. Interval]
    progr: Unstructured
   var(b_day_malattia)        5.90e-06   8.62e-07     4.48e-06    7.90e-06
   var(c.mcv)                .0000006   .0000016     -.0000014   -.0000002
   cov(b_day_malattia,mcv)   -.0000066   .0000148     -.0000095   -.0000037
   var(_cons)                .0050395   .0003017     .0044481    .0056777
   var(Residual)             .0002965   .0000122     .0002735    .0003213
   LR test vs. linear model: chisq(3) = 3647.86
Prob > chisq    =  0.0000
Note: LR test is conservative and provided only for reference.

276.  est store linear
277. mixed mcv ln c.b_day_malattia##c.b_day_malattia##i.death_30 || progr:b_day_malattia, cov(unstr)
Performing EM optimization:
Performing gradient-based optimization:
Iteration 0:   log likelihood =  3895.8695
Iteration 1:   log likelihood =  3895.8837
Iteration 2:   log likelihood =  3895.8837
Computing standard errors:
Mixed-effects ML regression                     Number of obs     = 1,805
Group variable: progr                             Number of groups  = 379
Obs per group:
    min =  1
    avg =  4.8
    max = 22
Valid chisq(9) =  71.94
Prob > chisq    =  0.0000

      mcv_ln  Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
    b_day_malattia  -.0001139   .0005479    -0.21   0.835    -.0011878    .000956
   c.b_day_malattia  .0000442   .0002026     2.25   0.025     5.93e-06   .0000865

death_30 nonsurvivor
  0.0263266  0.0142429  1.85  0.065  -.001589  0.0542422

death_30#c.b_day_malattia nonsurvivor
  -.0002287  .0000565  -4.05  0.000  -.0003394  -.000118

death_30#c.b_day_malattia#c.b_day_malattia nonsurvivor
  .0046663  .0014023  3.33  0.001  .0019179  .0074147

1.p_age2
  .0119403  .0072937  1.64  0.102  -.0023551  .0262357

1.p_cardio
  -.0194012  .0078147  -2.48  0.013  -.0347176  -.0040847

1.p_obeso
  -.0174175  .0139158  -1.25  0.211  -.0446919  .009857

1.p_rene
  .0361034  .0162436  2.22  0.026  .0042665  .0679404

_cons
  4.467564  .0063685  701.51  0.000  4.455082  4.480046

Random-effects Parameters  Estimate Std. Err.    [95% Conf. Interval]
  progr: Unstructured
   var(b_day_malattia)     6.05e-06    8.73e-07    4.56e-06    8.03e-06
   var(_cons)              .0048844   .0004193   .0041281   .0057794
   cov(b_day_malattia, _cons) -.0000698  .0000149   -.000099   -.0000406
   var(Residual)           .000292   .000012    .0002693  .0003165

LR test vs. linear model: chi2(3) = 3601.78 Prob > chi2 = 0.0000
Note: LR test is conservative and provided only for reference.

278. est store quadratic
279. lrtest linear quadratic

Likelihood-ratio test                                 LR chi2(6) = 28.93
(Assumption: linear nested in quadratic)              Prob > chi2 = 0.0001

280. ****margins*********
281. quiet: mixed mcv_ln  c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene|| progr:
   b_day_malattia, cov(unstr)
282. margins death_30, at(b_day_mala~(0(1)21))  expression(exp(predict(xb))) asbal

Adjusted predictions                            Number of obs     = 1,805
Expression  : exp(predict(xb))

1._at    : b_day_mala = 0
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

2._at    : b_day_mala = 1
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

3._at    : b_day_mala = 2
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

4._at    : b_day_mala = 3
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

5._at    : b_day_mala = 4
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

6._at    : b_day_mala = 5
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

7._at    : b_day_mala = 6
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

8._at    : b_day_mala = 7
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
   p_obeso (asbalanced)
   p_rene (asbalanced)

9._at    : b_day_mala = 8
   death_30 (asbalanced)
   p_age2 (asbalanced)
   p_cardio (asbalanced)
Delta-method
Margin Std. Err.  z P>|z|  [95% Conf. Interval]
_at#death_30
1#survivor 87.63465   .9886045    88.64   0.000     85.69702    89.57228
1#nonsurvivor 89.97241   1.302937    69.05   0.000      87.4187    92.52612
2#survivor 87.62872   .9752644    89.85   0.000     85.71723     89.5402
2#nonsurvivor 90.36644   1.259146    71.77   0.000     87.89856    92.83432
3#survivor 87.63088   .9646516    90.84   0.000      85.7402    89.52156
3#nonsurvivor 90.72909   1.224892    74.07   0.000     88.32834    93.12983
4#survivor 87.64115   .9564088    91.64   0.000     85.76662    89.51567
4#nonsurvivor 91.05995   1.199193    75.93   0.000     88.70957    93.41032
5#survivor 87.65952   .9501902    92.25   0.000     85.79718    89.52185

10._at       : b_day_mala~a
p_obeso      (asbalanced)
p_rene       (asbalanced)

11._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

12._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

13._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

14._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

15._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

16._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

17._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

18._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

19._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

20._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

21._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)

22._at       : b_day_mala~a
p_age2       (asbalanced)
p_cardio     (asbalanced)
p_obeso      (asbalanced)
p_rene       (asbalanced)
User: Chiara Montaldo

5#survivor  91.30867, 1.18091, 77.36, 0.000  89.04613  92.67321
6#survivor  91.64599, 1.16824, 78.39, 0.000  89.23468  92.91578
7#survivor  91.80584, 1.161722, 79.07, 0.000  89.50155  93.11937
8#survivor  91.76353, 0.9605486, 79.31, 0.000  89.51986  93.60674
9#survivor  91.06854, 1.105473, 79.47, 0.000  89.78377  94.12995
10#survivor 87.72059, 0.9425454, 92.72, 0.000  85.83252  89.53947
11#survivor 87.68599, 0.9456694, 92.72, 0.000  85.8941  89.53947
12#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
13#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
14#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
15#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
16#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
17#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
18#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
19#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794
20#survivor 87.72059, 0.9425454, 93.07, 0.000  85.87323  89.56794

. marginsplot, ytitle(\"Cells volume (fl)\") xlab(0(1)21) ylab(70(10)110) yline(80, lcolor(red)) legend(off)

Variables that uniquely identify margins: b_day_malattia death_30

. margins ar.death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Contrasts of adjusted predictions

Number of obs = 1,805
Expression : exp(predict(xb))

1._at : b_day_malattia = 0
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
2._at : b_day_malattia = 1
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
3._at : b_day_malattia = 2
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
4._at : b_day_malattia = 3
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
5._at : b_day_malattia = 4
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
6._at : b_day_malattia = 5
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
7._at : b_day_malattia = 6
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
8._at : b_day_malattia = 7
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)
9._at : b_day_malattia = 8
day_30 = (asbalanced)
p_age2 = (asbalanced)
p_cardio = (asbalanced)
p_obeso = (asbalanced)
p_rene = (asbalanced)

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(nonsurvivor vs survivor) 12
1 17.70 0.0000
(nonsurvivor vs survivor) 13
1 17.13 0.0000
(nonsurvivor vs survivor) 14
1 16.21 0.0001
(nonsurvivor vs survivor) 15
1 14.97 0.0001
(nonsurvivor vs survivor) 16
1 13.45 0.0002
(nonsurvivor vs survivor) 17
1 11.72 0.0006
(nonsurvivor vs survivor) 18
1 9.83 0.0017
(nonsurvivor vs survivor) 19
1 7.89 0.0050
(nonsurvivor vs survivor) 20
1 5.98 0.0144
(nonsurvivor vs survivor) 21
1 4.22 0.0399
(nonsurvivor vs survivor) 22
1 2.71 0.1000
2016
5 56.45 0.0000

| Death 300 st | Coef. | Std. Err. | z     | P>|z|     | [95% Conf. Interval] |
|--------------|-------|-----------|-------|--------|---------------------|
| (nonsurvivor vs survivor) 1 | 2.373763 1.271823 -1.509439 4.810499 |
| (nonsurvivor vs survivor) 2 | 2.373729 1.214363 -2.519347 5.957822 |
| (nonsurvivor vs survivor) 3 | 3.092205 1.247161 -2.501233 5.382727 |
| (nonsurvivor vs survivor) 4 | 3.411696 1.139546 1.199966 5.375623 |
| (nonsurvivor vs survivor) 5 | 3.699153 1.105514 3.523885 5.869521 |
| (nonsurvivor vs survivor) 6 | 3.939836 1.066422 3.680587 6.069285 |
| (nonsurvivor vs survivor) 7 | 4.137853 1.074934 2.01302 4.246686 |
| (nonsurvivor vs survivor) 8 | 4.256677 1.081046 2.02071 3.892020 |
| (nonsurvivor vs survivor) 9 | 4.410861 1.065404 2.323909 5.895214 |
| (nonsurvivor vs survivor) 10 | 4.609277 1.056625 2.393411 6.575513 |
| (nonsurvivor vs survivor) 11 | 4.652907 1.080566 2.457722 6.612494 |
| (nonsurvivor vs survivor) 12 | 4.651270 1.072199 2.409899 6.612861 |
| (nonsurvivor vs survivor) 13 | 4.655074 1.077846 2.348186 6.573263 |
| (nonsurvivor vs survivor) 14 | 4.360577 1.085077 2.241455 4.949789 |
| (nonsurvivor vs survivor) 15 | 4.223403 1.094266 2.08761 3.781046 |
| (nonsurvivor vs survivor) 16 | 4.056712 1.106006 1.889911 5.220443 |
| (nonsurvivor vs survivor) 17 | 3.83085 1.121187 1.86954 6.538535 |
| (nonsurvivor vs survivor) 18 | 3.577484 1.141473 1.441741 5.815050 |
| (nonsurvivor vs survivor) 19 | 3.275159 1.146173 0.905012 5.682017 |
| (nonsurvivor vs survivor) 20 | 2.931191 1.194603 0.802664 5.205016 |
| (nonsurvivor vs survivor) 21 | 2.545711 1.238755 0.117856 5.527866 |
| (nonsurvivor vs survivor) 22 | 2.161123 1.280344 0.410976 4.644216 |

285. graph save "Graph" "Users/Chiara/Documents/fileDO 15 Maggio/Harg_MCV.gph", replace (file /Users/Chiara/Documents/fileDO 15 Maggio/Harg_MCV.gph saved)
286. 287. *margins death_30, at(b_day_malattia=(0(1)30)) expression(exp(predict(xb)))
288. *marginsplot, title("MVC kinetic day 0 to day 30 after onset") ytitle("Cell volume (fL") xlab(0(5)30) ylab(75(5)100))
289. *marginsplot, title("MCV kinetic day 0 to day 30 after onset") ytitle("Cell volume (fL") xlab(0(5)30) ylab(75(5)100))
290. 291. *** combine****
293. 294. graph save "Graph" "Users/Chiara/Documents/fileDO 15 Maggio/Harg_MCV.gph", replace (file /Users/Chiara/Documents/fileDO 15 Maggio/Harg_MCV.gph saved)
295. 296. 297. **********************************************/
298. *** anova B_vg-CV
299. **********************************************/
300. 301. *scatter rdwcv b_day_malattia if death_30==1, mcolor(red) legend(off) title("B_vg-CV variation over time") xtitle ("day since onset") ytitle("RDW-CV (%)") axis(1)
302. *scatter rdwcv b_day_malattia if death_30==0, mcolor(green) legend(off) title("RDW-CV% variation over time") xtitle ("day since onset") ytitle("RDW-CV (%)") axis(1)
303. *scatter rdwcv b_day_malattia if death_30==1, mcolor(red) legend(off) title("MCV kinetic day 0 to day 30 after onset") ytitle("Cell volume (fL") xlab(0(5)30) ylab(75(5)100))
304. *scatter rdwcv b_day_malattia if death_30==0, mcolor(green) legend(off) title("MCV kinetic day 0 to day 30 after onset") ytitle("Cell volume (fL") xlab(0(5)30) ylab(75(5)100))
305. 306. 307. 308. 309. mixed rdwcv ln c.b_day_malattia##i.death_30 || progr:b_day_malattia, cov(unstr)
310. Performing ML estimation:
311. Performing gradient-based optimization:
312. Iteration 0:  log likelihood = 3194.0531
313. Iteration 1:  log likelihood = 3194.0531
314. Iteration 2:  log likelihood = 3194.0531
315. Computing standard errors:
316. Mixed-effects ML regression
317. Number of obs = 1,805
318. Group variable: progr
319. Number of groups = 379
320. Obs per group:
321. min = 1
322. avg = 4.8
323. max = 22
324. Valid ch2(j) = 83.29
325. Log likelihood = 3194.0531
326. Prob > ch2 = 0.0000
### Mixed-effects Model

**Random-effects Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>progr: Unstructured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>var(b_day_malattia)</td>
<td>0.000016</td>
<td>1.99e-06</td>
<td>0.000013</td>
</tr>
<tr>
<td>var(_cons)</td>
<td>0.000058</td>
<td>0.00003</td>
<td>0.000048</td>
</tr>
<tr>
<td>cov(b_day_malattia,_cons)</td>
<td>-0.000087</td>
<td>0.00002</td>
<td>-0.000135</td>
</tr>
<tr>
<td>var(Residual)</td>
<td>0.000616</td>
<td>0.00025</td>
<td>0.000569</td>
</tr>
</tbody>
</table>

**LR test vs. linear model: chi2(3) = 3387.52**

Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

### Estimation

310. `est store linear`

311. Mixed `rdwcv_ln c.b_day_malattia##c.b_day_malattia##i.death_30 i.p.age2 i.p.cardio i.p.obeso i.p.rene || progr:b_day_malattia, cov(unstr)`

Performing EM optimization:

Performing gradient-based optimization:

Iteration 0: log likelihood = 3237.8802
Iteration 1: log likelihood = 3237.8807
Iteration 2: log likelihood = 3237.8807

Computing standard errors:

**Mixed-effects ML regression**

| Coef.   | Std. Err. | z   | P>|z|   | [95% Conf. Interval] |
|---------|-----------|-----|------|----------------------|
| b_day_malattia | -.0006197 | .000803 | -0.77 | 0.440      | -.0021933  | .000954   |
| c.b_day_malattia##c.b_day_malattia | .0000504 | .0000299 | 1.69 | 0.092      | -8.22e-06  | .000109   |
| death_30##nonsurvivor | .0548367 | .0108874 | 2.90 | 0.004      | .017818    | .091855   |
| death_30##c.b_day_malattia##nonsurvivor | -.0017401 | .0020595 | -0.84 | 0.398      | -.0057767  | .0022964  |
| 1.p.age2 | .0355318 | .0099427 | 3.57 | 0.000      | .0160444   | .0550192  |
| 1.p.cardio | .039348   | .010671  | 3.69 | 0.000      | .0184334   | .0602626  |
| 1.p.obeso | -.0000827 | .0004974 | -0.00 | 0.997      | -.0371548  | .0369894  |
| 1.p.rene | .0855343 | .0219689 | 3.89 | 0.000      | .0424761   | .1285925  |
| _cons   | 2.542967  | .007208  | 354.09 | 0.000      | 2.526019   | 2.559915  |

### Random-effects Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Estimate</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>progr: Unstructured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>var(b_day_malattia)</td>
<td>0.000016</td>
<td>2.00e-06</td>
<td>0.000013</td>
</tr>
<tr>
<td>var(_cons)</td>
<td>0.007909</td>
<td>.000709</td>
<td>0.006631</td>
</tr>
<tr>
<td>cov(b_day_malattia,_cons)</td>
<td>-0.000101</td>
<td>0.000158</td>
<td>-0.000436</td>
</tr>
<tr>
<td>var(Residual)</td>
<td>0.000602</td>
<td>0.000245</td>
<td>0.000556</td>
</tr>
</tbody>
</table>

**LR test vs. linear model: chi2(3) = 3166.07**

Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

### Marginal Analysis

312. `est store quadratic`

313. `lrtest linear quadratic`

**Likelihood-ratio test**

<table>
<thead>
<tr>
<th>LR chi2(6)</th>
<th>Prob &gt; chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.66</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

314. `margins death_30, at(b_day_malattia=(0(1)21)) expression(exp(predict(xb))) asbalanced`

**Adjusted predictions**

<table>
<thead>
<tr>
<th>Number of obs</th>
<th>1,805</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expression</td>
<td>exp(predict(xb))</td>
</tr>
</tbody>
</table>

1. _at b_day_malattia=0 death_30=0 p.age2=0

(ambalanced)

19/05/20, 17:13
2. at : b_day_mala-s = 1
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

3. at : b_day_mala-s = 2
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

4. at : b_day_mala-s = 3
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

5. at : b_day_mala-s = 4
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

6. at : b_day_mala-s = 5
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

7. at : b_day_mala-s = 6
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

8. at : b_day_mala-s = 7
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

9. at : b_day_mala-s = 8
  death_30
  p_age2
  p_cardio
  p_obeso
  p_rene

10. at : b_day_mala-s = 9
    death_30
    p_age2
    p_cardio
    p_obeso
    p_rene

11. at : b_day_mala-s = 10
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene

12. at : b_day_mala-s = 11
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene

13. at : b_day_mala-s = 12
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene

14. at : b_day_mala-s = 13
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene

15. at : b_day_mala-s = 14
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene

16. at : b_day_mala-s = 15
     death_30
     p_age2
     p_cardio
     p_obeso
     p_rene
17. at : b_day_mala -  16
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

18. at : b_day_mala -  17
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

19. at : b_day_mala -  18
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

20. at : b_day_mala -  19
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

21. at : b_day_mala -  20
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

22. at : b_day_mala -  21
   death_30  (asbalanced)
   p_age2   (asbalanced)
   p_cardio (asbalanced)
   p_obeso  (asbalanced)
   p_rese  (asbalanced)

Contrasts of adjusted predictions               Number of obs     =  1,805
.margins ar.death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced
.marginsplot, ytitle("RDW %") xlab(0(1)21) ylab(10(2)18) yline(14, lcolor(red)) legend(off)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>19/05/20, 17:13 Page 42 of 56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. at : b_day_mala = 1
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

3. at : b_day_mala = 2
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

4. at : b_day_mala = 3
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

5. at : b_day_mala = 4
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

6. at : b_day_mala = 5
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

7. at : b_day_mala = 6
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

8. at : b_day_mala = 7
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

9. at : b_day_mala = 8
  death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

10. at : b_day_mala = 9
    death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

11. at : b_day_mala = 10
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

12. at : b_day_mala = 11
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

13. at : b_day_mala = 12
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

14. at : b_day_mala = 13
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

15. at : b_day_mala = 14
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)

16. at : b_day_mala = 15
     death_30 (asbalanced)
p_age2 (asbalanced)
p_cardio (asbalanced)
p_obeso (asbalanced)
p_rene (asbalanced)
17.

18.

19.

20.

21.

22.

| death_30_at | df | df | P>|chi2 |
|-------------|----|----|----------|
| nonsurvivor vs survivor | 1 | 8.24 | 0.0041 |
| nonsurvivor vs survivor | 2 | 8.75 | 0.0031 |
| nonsurvivor vs survivor | 3 | 9.33 | 0.0022 |
| nonsurvivor vs survivor | 4 | 10.00 | 0.0016 |
| nonsurvivor vs survivor | 5 | 10.74 | 0.0010 |
| nonsurvivor vs survivor | 6 | 11.64 | 0.0006 |
| nonsurvivor vs survivor | 7 | 12.66 | 0.0004 |
| nonsurvivor vs survivor | 8 | 13.85 | 0.0002 |
| nonsurvivor vs survivor | 9 | 15.26 | 0.0001 |
| nonsurvivor vs survivor | 10 | 16.92 | 0.0000 |
| nonsurvivor vs survivor | 11 | 18.85 | 0.0000 |
| nonsurvivor vs survivor | 12 | 21.09 | 0.0000 |
| nonsurvivor vs survivor | 13 | 23.64 | 0.0000 |
| nonsurvivor vs survivor | 14 | 26.50 | 0.0000 |
| nonsurvivor vs survivor | 15 | 29.64 | 0.0000 |
| nonsurvivor vs survivor | 16 | 33.01 | 0.0000 |
| nonsurvivor vs survivor | 17 | 36.51 | 0.0000 |
| nonsurvivor vs survivor | 18 | 40.02 | 0.0000 |
| nonsurvivor vs survivor | 19 | 43.40 | 0.0000 |
| nonsurvivor vs survivor | 20 | 46.50 | 0.0000 |
| nonsurvivor vs survivor | 21 | 49.17 | 0.0000 |
| nonsurvivor vs survivor | 22 | 51.30 | 0.0000 |
| Joint | 5 | 165.28 | 0.0000 |

Delta-method

<table>
<thead>
<tr>
<th>death_30_at</th>
<th>Contrast</th>
<th>Std. Err.</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>nonsurvivor vs survivor</td>
<td>1</td>
<td>0.7766853</td>
<td>0.2706044</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>2</td>
<td>0.7557797</td>
<td>0.2554936</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>3</td>
<td>0.7446448</td>
<td>0.2437229</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>4</td>
<td>0.7332194</td>
<td>0.2415978</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>5</td>
<td>0.7155759</td>
<td>0.2391677</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>6</td>
<td>0.7048185</td>
<td>0.2363613</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>7</td>
<td>0.6941855</td>
<td>0.2337058</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>8</td>
<td>0.6836223</td>
<td>0.2310524</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>9</td>
<td>0.6731390</td>
<td>0.2284082</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>10</td>
<td>0.6626559</td>
<td>0.2257660</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>11</td>
<td>0.6521728</td>
<td>0.2231239</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>12</td>
<td>0.6416906</td>
<td>0.2204831</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>13</td>
<td>0.6312085</td>
<td>0.2178432</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>14</td>
<td>0.6207264</td>
<td>0.2152034</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>15</td>
<td>0.6102442</td>
<td>0.2125635</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>16</td>
<td>0.5997621</td>
<td>0.2099236</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>17</td>
<td>0.5892799</td>
<td>0.2072837</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>18</td>
<td>0.5787978</td>
<td>0.2046438</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>19</td>
<td>0.5683156</td>
<td>0.2020039</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>20</td>
<td>0.5578334</td>
<td>0.1993641</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>21</td>
<td>0.5473512</td>
<td>0.1967243</td>
</tr>
<tr>
<td>nonsurvivor vs survivor</td>
<td>22</td>
<td>0.5368689</td>
<td>0.1940845</td>
</tr>
</tbody>
</table>

319. graph save "Graph" //Users/Chiara/Documents/fileDO 15 Maggio/Marg_RDW.gph", replace
(file /Users/Chiara/Documents/fileDO 15 Maggio/Marg_RDW.gph saved)
***combine***

```
* combine */Users/Chiara/Documents/fileDO 15 Maggio/Marg_RDW.gph */Users/Chiara/Documents/fileDO 15 Maggio/RDW_R
> DN.gph", ywidth(8) ysize(4)
```

```
graph save "Graph" */Users/Chiara/Documents/fileDO 15 Maggio/Graph_RDW.gph", replace
```

```
user: /Users/Chiara/Documents/fileDO 15 Maggio/coorte_long_emocromo_anemia_1.dta", clear
```

```
*scatter no model
```

```
use */Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
```

```
*scatter rbc b_day_malattia  if death_30==1, mcolor(red) legend(off) title("RBC variation over time") xtitle("day > since onset") ytitle("RBC per mmc X 1000000") [scatter rbc b_day_malattia  if death_30==0, mcolor(green) legend(off) ms(oh)
```

```
*keep if rdwcv!=.
```

```
*********Graph box**************************************
```

```
replace rbc=rbc*1000000
```

```
graph box rbc, over(death_30, label(nolabel)) over(b_day_malattia) asyvars box(1, fcolor(navy)) nooutsides ytitle
> "(Cells per mmc x 1000000) yline(3000000, lcolor(red)) legend(off)
```

```
graph save "Graph" */Users/Chiara/Documents/fileDO 15 Maggio/BOX_RBC.gph", replace
```

```
**** modelling
```

```
use */Users/Chiara/Documents/fileDO 15 Maggio/fileDO\coorte_long_emocromo_anemia_1.dta", clear
```

```
mixed rbc Ln c.b_day_malattia##i.death_30 || progr:b_day_malattia, cov(unstr)
```

```
Performing EM optimization:
```

```
Performing gradient-based optimization:
```

```
Iteration 0:   log likelihood = 1661.5037
```

```
Iteration 1:   log likelihood = 1661.5103
```

```
Iteration 2:   log likelihood = 1661.5103
```

```
Computing standard errors:
```

```
Mixed-effects ML regression                     Number of obs     = 1,805
Group variable: progr                          Number of groups = 379
Obs per group: min   = 1
               avg   = 4.8
               max   = 22
Wald chi2(3)  = 129.70
Log likelihood = 1661.5103
```

```
rbc Ln         Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
```

```
b_day_malattia -.0059862   .0007063    -8.48   0.000    -.0073706   -.0046018
death_30 nonsurvivor    -.1346529   .0307841    -4.37   0.000    -.1949886   -.0743173
death_30 c.b_day_malattia nonsurvivor    -.0034302   .0021124    -1.62   0.104    -.0075704    .0007099
_cons            15.38927   .0110902  1387.65   0.000     15.36753      15.411
```

```
Random-effects Parameters  |   Estimate   |   Std. Err.   |      [95% Conf. Interval]
```

```
progr: Unstructured  
var(b_day_malattia)    .0000655   9.52e-06      .0000493    .0000871
var(_cons)             .0259037   .0026059      .0212682    .0315496
cov(b_day_malattia,_cons) -.0005826   .0001341     -.0008455   -.0003197
```

```
var(Residual)          .0044198   .0001783      .0040837    .0047836
```

```
LR test vs. linear model: chi2(3)  = 2292.52
```

```
Prob > chi2 = 0.0000
```

```
Note: LR test is conservative
and provided only for reference.
```

```
est store linear
```

```
mixed rbc Ln c.b_day_malattia#i.c_day_malattia#i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstr)
```

```
Performing EM optimization:
```

```
Performing gradient-based optimization:
```

```
Iteration 0:   log likelihood = 1694.3095
```

```
Iteration 1:   log likelihood = 1694.3168
```

```
Iteration 2:   log likelihood = 1694.3168
```

```
Computing standard errors:
```

```
Mixed-effects ML regression                     Number of obs     = 1,805
Group variable: progr                          Number of groups = 379
Obs per group: min   = 1
               avg   = 4.8
               max   = 22
Wald chi2(9)  = 207.96
Log likelihood = 1694.3168
```

```
Prob > chi2 = 0.0000
```

```
Note: LR test is conserving
and provided only for reference.
```

```
set store linear
```

```
mixed rbc Ln c.b_day_malattia#i.c_day_malattia#i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstr)
```

```
Performing EM optimization:
```

```
Performing gradient-based optimization:
```
| rbc_ln | Coef. (Std. Err.) | z    | P>|z|     | [95% Conf. Interval] |
|--------|------------------|------|---------|---------------------|
| b_day_malattia | -0.0073368 (0.002025) | -3.62 | 0.000   | (-0.0113056, -0.0033679) |
| c.b_day_malattia#c.b_day_malattia | 0.0000585 (0.0000771) | 0.76  | 0.448   | (-0.0000926, 0.0002096) |
| death_30 nonsurvivor | -0.0426850 (0.0380358) | -1.12 | 0.262   | (-0.1172345, 0.0318629) |
| death_30#c.b_day_malattia nonsurvivor | -0.0130316 (0.0051749) | -2.52 | 0.012   | (-0.0231742, -0.002889) |
| death_30#c.b_day_malattia#c.b_day_malattia nonsurvivor | 0.0004259 (0.0002116) | 2.01  | 0.044   | (0.0000111, 0.0008407) |
| 1.p_age2 | -0.0644802 (0.0157717) | -4.09 | 0.000   | (-0.095392, -0.0335683) |
| 1.p_cardio | 0.0093844 (0.0169037) | 0.56  | 0.579   | (-0.0237463, 0.0425151) |
| 1.p_obeso | 0.0368329 (0.0299484) | 1.23  | 0.219   | (-0.0218649, 0.0955307) |
| 1.p_rene | -0.2186919 (0.0348034) | -6.28 | 0.000   | (-0.2869053, -0.1504786) |
| _cons | 15.43243 (0.0170308) | 906.15 | 0.000   | (15.39905, 15.46581) |

### Random-effects Parameters

<table>
<thead>
<tr>
<th></th>
<th>Estimate (Std. Err.)</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>propr: Unstructured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>var(b_day_malattia)</td>
<td>0.0000644 (0.000010)</td>
<td>(0.0000523, 0.000092)</td>
</tr>
<tr>
<td>var(_cons)</td>
<td>0.0245928 (0.0025468)</td>
<td>(0.0200752, 0.030127)</td>
</tr>
<tr>
<td>cov(b_day_malattia,_cons)</td>
<td>-0.0006992 (0.0001403)</td>
<td>(-0.0009741, -0.0004242)</td>
</tr>
<tr>
<td>var(Residual)</td>
<td>0.0043675 (0.0001767)</td>
<td>(0.0040346, 0.004728)</td>
</tr>
</tbody>
</table>

LR test vs. linear model: ch2(3) = 2164.87  Prob > chi2 = 0.0000

Note: LR test is conservative and provided only for reference.

345. est store quadratic
346. lrtest linear quadratic

Likelihood-ratio test                                 LR chi2(6) = 65.61 (Assumption: linear nested in quadratic)  Prob > chi2 = 0.0000

347. ***margins****
348. quiet: mixed rbc_ln  c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || prog > r:b_day_malattia, cov(unstr)
349. margins death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Adjusted predictions Number of obs = 1,805
Expression : exp(predict(xb))

1.  _at : b_day_mala~a = 0
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
2.  _at : b_day_mala~a = 1
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
3.  _at : b_day_mala~a = 2
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
4.  _at : b_day_mala~a = 3
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
5.  _at : b_day_mala~a = 4
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
6.  _at : b_day_mala~a = 5
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
7.  _at : b_day_mala~a = 6
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
p_rene (ambalanced)
8.  _at : b_day_mala~a = 7
day_30 (ambalanced)
p_age2 (ambalanced)
p_cardio (ambalanced)
p_obeso (ambalanced)
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| Delta-method | Margin | Std. Err. | z     | P>|z|     | [95% Conf. Interval] |
|--------------|--------|-----------|------|--------|---------------------|
|              |        |           |      |        |                     |
| _at#death_30 |        |           |      |        |                     |
| 1#survivor   | 4474709| 117652.2  | 38.03| 0.000  | 4244115-4705303     |
| 1#nonsurvivor| 4287722| 158954.8  | 26.97| 0.000  | 3976176-4599267     |
Variables that uniquely identify margins: b_day_malattia death_30

Contrasts of adjusted predictions

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350 - marginsplot, ytitle("Cells per mmc") xlab(0(1)21) ylab(2000000(1000000)6000000) yline(3000000, lcolor(red)) legend = (df)
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<th>Prob&gt;chi2</th>
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<td>4.54</td>
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</table>

<table>
<thead>
<tr>
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<th>nonsurvivor vs survivor</th>
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<th>chi2</th>
<th>Prob&gt;chi2</th>
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</thead>
<tbody>
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<td>1.28</td>
<td>0.2572</td>
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<td>2.61</td>
<td>0.1065</td>
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<td>3</td>
<td>4.54</td>
<td>0.0330</td>
</tr>
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</table>
(nonsurvivor vs survivor) 4  1  7.11  0.0077
(nonsurvivor vs survivor) 5  1  10.18  0.0014
(nonsurvivor vs survivor) 7  1  13.54  0.0002
(nonsurvivor vs survivor) 8  1  16.90  0.0000
(nonsurvivor vs survivor) 9  1  20.07  0.0000
(nonsurvivor vs survivor) 10  1  22.71  0.0000
(nonsurvivor vs survivor) 11  1  24.54  0.0000
(nonsurvivor vs survivor) 12  1  27.45  0.0000
(nonsurvivor vs survivor) 13  1  28.24  0.0000
(nonsurvivor vs survivor) 14  1  28.29  0.0000
(nonsurvivor vs survivor) 15  1  27.78  0.0000
(nonsurvivor vs survivor) 16  1  26.71  0.0000
(nonsurvivor vs survivor) 17  1  25.07  0.0000
(nonsurvivor vs survivor) 18  1  22.90  0.0000
(nonsurvivor vs survivor) 19  1  20.32  0.0000
(nonsurvivor vs survivor) 20  1  17.48  0.0000
(nonsurvivor vs survivor) 21  1  14.56  0.0001
(nonsurvivor vs survivor) 22  1  11.74  0.0006

Joint 5  36.28  0.0000

<table>
<thead>
<tr>
<th>death_30 vs progr</th>
<th>Delta-method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast</td>
<td>Std. Err.</td>
</tr>
<tr>
<td>Delta-method</td>
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352 | graph save "Graph" /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph", replace (file /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph saved)

353 | *** combine*****
354 | 59 cr combine /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph", replace (file /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph saved)

360 | graph save "Graph" /Users/Chiara/Documents/fileDO 15 Haggio/Graph_RBC.qph", replace (file /Users/Chiara/Documents/fileDO 15 Haggio/Graph_RBC.qph saved)

361

362

363

364

365

366

367 | use /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph", replace

368 | scatter hgb b_day_malattia if death_30==1, mcolor(red) legend(off) title("HGB variation over time") title("day > since onset") ytitle("HGB (g/dl)"") xlab(5(5)30) ylab(0(100)150) > 1000000, locolor(red) legend(off)

369 | keep if hgb>

370

371

372 | graph box hgb, over(b_day_malattia) xwidthbox(), mcolor(navy) nooutsides ytitle > "HGB (g/dl)"") ytitle("HGB variation over time") title("day > since onset") ytitle("HGB (g/dl)"") xlab(5(5)30) ylab(0(100)150) > Legend环绕

373 | graph save "Graph" /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BX_B.qph", replace (file /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BX_B.qph saved)

374

375 | *** modelling

376 | use /Users/Chiara/Documents/fileDO 15 Haggio/Marg_BRC.qph", replace

377 | mixed hgb ln c.b_day_malattia#i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, cov(unstruct)*

Performing EM optimization:
Performing gradient-based optimization:
Iteration 0:  log likelihood = 1759.0077
Iteration 1:  log likelihood = 1759.0077
Iteration 2:  log likelihood = 1759.0077

Computing standard errors:
Mixed-effects NL regression
Number of obs =  1,805
Group variable: progr
Number of groups =  379

Obs per group:
min = 1  
arg = 4.8  
max = 22  

Valid chi2(7) = 207.52  
Prob > chi2 = 0.0000  

hgb_ln  |  Conf. Std. Err.  z  P>|z|  [95% Conf. Interval]  
--------|-----------------|---------|----------|-----------------|-----------------|  
b_day_malattia  | -0.0061723  | 0.0006761 | -9.13 | 0.000 | -0.0074975 -0.0048471  
day_30&b_day_malattia  | -0.002463  | 0.0020197 | -1.21 | 0.226 | -0.0064992 -0.0005559  
day_30#c.b_day_malattia  | 0.0001142  | 0.0000741 | 1.54  | 0.123 | -0.000031 0.0002593  
1.p_age2  | -0.0602628  | 0.0152214 | -3.96 | 0.000 | -0.0900962 -0.0304294  
1.p_obeso  | 0.0075202  | 0.0289389 | 0.26  | 0.795 | -0.0491989 0.0642397  
1.p_rene  | -0.1946001  | 0.0335085 | -5.83 | 0.000 | -0.2602756 -0.1289246  
_cons  | 2.690466  | 0.0129946 | 207.04 | 0.000 | 2.664997 2.715935  

Random-effects Parameters  |  Estimate  | Std. Err.  [95% Conf. Interval]  
progr: Variance  | 8.56e-06  | 0.0000457 | 8.38e-06 8.76e-06  
var(b_day_malattia)  | 0.0000603  | 8.54e-06 | 0.0000457 0.0000796  
var(_cons)  | 0.021043  | 0.0021668 | 0.0171972 0.0257487  
cov(b_day_malattia,_cons)  | -0.0005393 | 0.0001172 | -0.0007689 -0.0003097  
var(Residual)  | 0.0040964  | 0.0001641 | 0.003787 0.0044311  

LR test vs. linear model:  chi2(3) = 2144.80  
Prob > chi2 = 0.0000  

Note: LR test is conservative and provided only for reference.

378 . est store linear  
379 . mixed hgb_ln  c.b_day_malattia##c.b_day_malattia##i.death_30 i.p_age2 i.p_obeso i.p_rene i.p_cardio || progr:b_day_malattia, cov(unstr)  
Performing EM optimization:  
Performing gradient-based optimization:  
Iteration 0:   log likelihood = 1760.7311  
Iteration 1:   log likelihood = 1760.7359  
Iteration 2:   log likelihood = 1760.7359  
Computing standard errors:  
Log likelihood = 1760.7359  

hgb_ln  |  Conf. Std. Err.  z  P>|z|  [95% Conf. Interval]  
b_day_malattia  | -0.0089773  | 0.0019427 | -4.62 | 0.000 | -0.0127849 -0.0051697  
day_30&b_day_malattia  | -0.496847  | 0.061198 | -8.19 | 0.000 | -0.622042 -0.371652  
day_30#c.b_day_malattia  | 0.000937  | 0.0002034 | 4.62 | 0.000 | -0.0003059 0.0011764  
1.p_age2  | -0.0607034  | 0.0152433 | -4.00 | 0.000 | -0.1876106 -0.0337962  
1.p_obeso  | 0.0075202  | 0.0289389 | 0.26  | 0.795 | -0.0491989 0.0642397  
1.p_rene  | -0.1946001  | 0.0335085 | -5.83 | 0.000 | -0.2602756 -0.1289246  
1.p_cardio  | 0.0181757  | 0.0163432 | 1.11  | 0.268 | -0.0302088 0.0665512  
_cons  | 2.705509  | 0.0162643 | 166.35 | 0.000 | 2.673632 2.737387  

Random-effects Parameters  |  Estimate  | Std. Err.  [95% Conf. Interval]  
progr: Variance  | 8.56e-06  | 0.0000457 | 8.38e-06 8.76e-06  
var(b_day_malattia)  | 0.0000603  | 8.54e-06 | 0.0000457 0.0000796  
var(_cons)  | 0.021043  | 0.0021668 | 0.0171972 0.0257487  
cov(b_day_malattia,_cons)  | -0.0005393 | 0.0001172 | -0.0007689 -0.0003097  
var(Residual)  | 0.0040964  | 0.0001641 | 0.003787 0.0044311  

LR test vs. linear model:  chi2(3) = 2144.62  
Prob > chi2 = 0.0000  

Note: LR test is conservative and provided only for reference.

380 . est store quadratic  
381 . lrtest linear quadratic  
Likelihood-ratio test  
chi2(3) = 3.46  
Prob > chi2 = 0.1776  

Note: LR test is conservative and provided only for reference.
User: Chiara Montaldo

```
382  margins***************
384  > quiet: mixed bhp bs c.b_day_malattia##i.death_30 i.p_age2 i.p_cardio i.p_obeso i.p_rene || progr:b_day_malattia, c
385  > or(user)
386  > margins death_30, at(b_day_malattia=(0(1)21))  expression(exp(predict(xb))) asbalanced

Adjusted predictions  Number of obs  = 1,805
Expression   :
   : exp(predict(xb))

1._at   : b_day_mala~a = 0
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
2._at   : b_day_mala~a = 1
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
3._at   : b_day_mala~a = 2
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
4._at   : b_day_mala~a = 3
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
5._at   : b_day_mala~a = 4
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
6._at   : b_day_mala~a = 5
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
7._at   : b_day_mala~a = 6
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
8._at   : b_day_mala~a = 7
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
9._at   : b_day_mala~a = 8
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
10._at  : b_day_mala~a = 9
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
11._at  : b_day_mala~a = 10
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
12._at  : b_day_mala~a = 11
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
13._at  : b_day_mala~a = 12
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
14._at  : b_day_mala~a = 13
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
15._at  : b_day_mala~a = 14
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
16._at  : b_day_mala~a = 15
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
17._at  : b_day_mala~a = 16
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
18._at  : b_day_mala~a = 17
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
19._at  : b_day_mala~a = 18
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
20._at  : b_day_mala~a = 19
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
21._at  : b_day_mala~a = 20
   death_30  (asbalanced)
   p_age2  (asbalanced)
   p_cardio  (asbalanced)
   p_obeso  (asbalanced)
   p_rene  (asbalanced)
```


Δt | day | n | nonsurvivor | survivor 
---|-----|---|------------|--------
15 | day | 14 | (asbalanced) 
16 | day | 15 | (asbalanced) 
17 | day | 16 | (asbalanced) 
18 | day | 17 | (asbalanced) 
19 | day | 18 | (asbalanced) 
20 | day | 19 | (asbalanced) 
21 | day | 20 | (asbalanced) 
22 | day | 21 | (asbalanced) 

| Delta-method | Margin | Std. Err. | z | P>|z| | [95% Conf. Interval] |
|--------------|--------|-----------|---|------|----------------------|
| Δt|day|nonsurvivor|survivor|

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<th>day</th>
<th>n</th>
<th>nonsurvivor</th>
<th>survivor</th>
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| 15 | day | 14 | (asbalanced) 
| 16 | day | 15 | (asbalanced) 
| 17 | day | 16 | (asbalanced) 
| 18 | day | 17 | (asbalanced) 
| 19 | day | 18 | (asbalanced) 
| 20 | day | 19 | (asbalanced) 
| 21 | day | 20 | (asbalanced) 
| 22 | day | 21 | (asbalanced) 

### Notes

- The data appears to be from a statistical analysis or a research study, focusing on survival rates or other health-related metrics.
- The table shows comparisons across different time points (Δt), with columns for nonsurvivor and survivor counts.
- Specific metrics such as death rate, and age-related data are indicated.
- The data includes additional columns for margin and standard error, suggesting a focus on statistical analysis.

### References

- For detailed analysis and interpretation, consult the source document or the relevant research literature.
- Further exploration into the data can be achieved through statistical software or detailed analysis tools.

---

**User:** Chiara Montaldo

**Date:** 19/05/20, 17:13

**Page:** 53 of 56
Variables that uniquely identify margins: b_day_malattia death_30

Contrasts of adjusted predictions

Expression : \( \exp(\text{predict}(xb)) \)

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dead_30 (asbalanced)
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16.  at        : b_day_mala-a
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Delta-method

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(nonsurvivor vs survivor) 18  -1.205991  .3174533     -1.828188   -.5837943
(nonsurvivor vs survivor) 19  -1.232092   .3271942     -1.873381   -.5908036
(nonsurvivor vs survivor) 20  -1.257719   .3375714     -1.919346   -.5960909
(nonsurvivor vs survivor) 21  -1.282876   .3484714     -1.965867   -.6000843
(nonsurvivor vs survivor) 22  -1.307570   .3597942     -2.012753   -.6023865

388 . graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_Hb.gph", replace
(file /Users/Chiara/Documents/fileDO 15 Maggio/Marg_Hb.gph saved)

389 . *margins death_30, at(b_day_malattia=(0(1)30))  expression(exp(predict(xb)))

390 . *marginsplot, title("HGb kinetic day 0 to day 30 after onset") ytitle("HGb (g/dL; log-scale)"") xlab(0(5)30) ylab(4
   > (2)16)

391 . *margins ar.death_30, at(b_day_malattia=(0(1)30))  expression(exp(predict(xb)))

392 . **combine*****

393 . gr combine "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_Hb.gph" "/Users/Chiara/Documents/fileDO 15 Maggio/Marg_Hb
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394 . graph save "Graph" "/Users/Chiara/Documents/fileDO 15 Maggio/Graph_Hb.gph", replace
(file /Users/Chiara/Documents/fileDO 15 Maggio/Graph_Hb.gph saved)

395 . end of do-file

396 . log close

397 . name: <unnamed>


log type: smcl

closed on: 19 May 2020, 17:05:04