Practical session 4: Competing risks as a multi-state model

EHA Septtember 01 - 25, 2015

1. Consider a competing risk model with state "alive" and two absorbing states. See e.g. Figure 2 in Andersen and Keiding. Simulate $N = 1000$ control individuals with constant cause specific hazards $\alpha_1 = 0.2$ and $\alpha_2 = 0.4$, and 1000 treated individuals with cause specific hazards $1.5\alpha_1$ and $1.5\alpha_2$. Censor all observations at time $T = 3$ (end of follow-up).

   Record the simulated data in a data matrix, in which each individual's data constitute one row with entries 0 (entry time; in this example always 0), T_exit (exit time), and D (event mark with values 0, 1, or 2 for censoring and the two transitions, respectively).

   N.B. The true model employs an assumption of constant baseline hazards in the two strata (control and treated individuals), and a shared multiplicative effect of treatment.

   (a) Prepare your data for a competing risk analysis where you assume that both transitions have their own hazards and the effect of treatment is different on different transitions. Fit an exponential survival regression model to the simulated data.

   (b) Prepare the same data for a competing risk analysis where you now assume that both transitions have their own baseline hazards, but the (multiplicative) effect of treatment is the same on both transitions. Analyse the data. You can try both the weibreg and coxph functions.

   (c) Prepare the same data for a competing risk analysis where you assume proportional baseline hazards and different effects of treatment on both transitions. Analyse the data.

   At each analysis, compare your results to the values of the model parameters that you used to simulate the data. Because the size of the

data is considerable, the point estimates should be reasonably close to these "true" values.