Practical aspects: Model building using the Cox model

The following considerations have to be taken into account when building a model:

- Take always into account the non-statistical aspects,
- Think about possible transformations of the variables,
- Consider non-linear trends; add quadratic or cubic terms and see the reduction in the *deviance*.

Two important problems in the regression analysis are:

1. Validation of an specific hypothesis, for example, the comparison of two or more groups, adjusted by possible confounding variables.
2. Survival prediction for a given profile.

Verifying a specific hypothesis adjusted by possible confounding variables

1. The model should be established for the comparison of interest and has to be adjusted by other covariates.
2. Use a global test to specify the model.
3. Local tests to validate their significance.
4. Models for survival time and confounding variables are considered: if there is no relationship between variables and time, probably the variables will not be confounding.
5. Check the relationship between each confounding variables and survival in a model that already contains the significant covariates.
6. Finish when you do not find any statistically significant confounding covariates.

Prediction of the distribution of time to the event

1. Identify the set of explanatory variables of interest for the research question.
2. Start with tests for each explanatory variable. Choose the one with a stronger relationship with survival.
3. Fix the most significant variables in the model and proceed to find the next that has the strongest relationship with survival.
4. Wald test, likelihood ratio test and Akaike criteria can be used to make decisions.
5. Final model is obtained when neither test recommends to add other variables.