

Proposal for a pre-conference course at IBC 2014, Firenze

## **Multistate models with multiple time scales**

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### **Background**

It is common practice to model transition rates in competing risk and more general multistate models using only one underlying timescale. However, from a subject matter point of view this will rarely be a sensible approach. For example it would be reasonable to model mortality rates among diabetes patients by both age and duration of diabetes. Of course the difference of the two, age at diagnosis, might be of interest too.

### **Contents**

The course will focus on representation and modelling of follow-up from studies where exact times of transition are known. The focus of the course will be modelling of rates with smooth functions of the relevant timescales.

To this end I will introduce the Lexis machinery from the Epi for R[2, 1]. This will encompass representation and plotting of summaries of the follow-up, as well as tools for creating the necessary data-splits for Poisson modelling. These models will be contrasted with the usual non-parametric (“Cox”-type) models.

The multistate model framework with these models will be compared with other approaches such as the sub-distribution hazard modelling.

Finally, it will be demonstrated how state occupancy probabilities from models with multiple time scales may be estimated by the simLexis tools.

### **Format**

The course will consist of 4 lectures of approximately 30 min. each, followed by short practical sessions where concepts illustrated can be tried out by the attendees on their own computers.

### **Attendance**

You should attend this course if you (plan to) work with competing risk or multistate models, and want a set set of immediately applicable practical tools for analysis and reporting of analyses.

You will not be provided with simple canned solutions, but the intention is that you after the computer-sessions have a running example that you understand all details of, and therefore can

either adapt to problems coming your way, or using for making sense of problems presented to you.

## References

- [1] Bendix Carstensen and Martyn Plummer. Using Lexis objects for multi-state models in R. *Journal of Statistical Software*, 38(6):1–18, 1 2011.
- [2] Martyn Plummer and Bendix Carstensen. Lexis: An R class for epidemiological studies with long-term follow-up. *Journal of Statistical Software*, 38(5):1–12, 1 2011.