Multi-state modelling for Heart Failure care path: a population-based study from Italy exploiting administrative data

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Nowadays, a great effort of the statistical community focuses on the analysis of administrative databases, that are routinely collected in a wide range of situations (from hospitalizations to pharmacy visits). Despite of the fact that these databases were originally proposed to reimburse health care services, they are increasingly being used for epidemiological research. This is not surprising, since they provide very rich information about patients’ clinical history (they are population based and combine information from multiple centers) and they are not expensive, compared to other data collections, like clinical randomized trials. Administrative databases have also some limitations, i.e., they can be inaccurate or not consistent (depending on the reliability of codes and linkage) and some key clinical information might be missing. Given these caveat, administrative databases can be really useful for assessing performances of providers in the management of chronic diseases, that require a long term follow up (i.e., Heart Failure condition, HF), as well as for planning and managing related resources.

In this work, we present a case study in which two semi-markovian multi-state models with transition specific covariates are applied to Heart Failure patients’ care paths, in order to investigate how patients’ and external covariates affect jointly the final outcome (survival) and the dynamics of the healthcare process (HF related events like hospitalizations and/or outpatients care activations). Data are provided within a joint project with the Cardiological Unit of Trieste, the capital of a Northern Region in Italy, namely Friuli Venezia Giulia. Exploiting the potential of the integration among the administrative data warehouse of the region and a tailored cardiological registry, several information about patients diagnosed with HF are retrieved, like personal information, event times, outpatient care (intermediate care unit and integrated home care) and laboratory tests.

Through this analysis we highlight the importance of modelling the whole clinical history of the patients in contrast to the classical clinical approach of focusing only on the first hospitalization. Finally, we state how the outpatient care activations are effective in the survival of the patients and how the role of administrative databases is fundamental for reaching these conclusions.