COMPETING RISKS SURVIVAL ANALYSIS WITH RECURRENT EVENTS

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The competing risks arise when one type of event may affect the probability of occurrence of other events. Some authors have made important contributions on multistate models and have proposed models in this area of research. These are very useful tools to answer a variety of questions, which can not be answered through classical survival analysis and an variety of records are frequently encountered in areas as medicine, engineering, sociology, biology, social science, among others. Now, there are competing risks models that try to generalize the classical survival analysis of a non-recurrent single event to multiple recurrent events. The aim of this paper is to propose a model in competing risks for recurrent events. This paper presents and reviews the formulation of a competing risks model with recurrent events and compares basic nonparametric estimation method with these types of events. The data in the models in classical competing risks usually arises in studies in which the k events of a subject are considered as independent, mutually exclusive and not recurrent events, with ($k > 1$). This works also illustrated the methodology to apply the proposed model and two examples with simulated data are developed. The estimations of the methods presented here are calculated using the R package, counting processes are used and some routines of R language to estimates the functions of the model in competing risks with recurrent events are showed.

Key Words*:* Competing risks, counting process, survival analysis, recurrent events