An Application of the Cox-Aalen model

Ofner P, Berghold A
Institut für Medizinische Informatik, Statistik und Dokumentation, Medizinische Universität Graz, Österreich
petra.ofner@meduni-graz.at

Abstract The most popular model used for survival analysis is the proportional hazards regression model proposed by Cox. Nevertheless the fundamental assumption of the Cox model is the proportionality of the hazards. For many applications this assumption is doubtful and has to be checked carefully using the score process and graphical methods. There are various approaches to account for non-proportionality including the Cox-Aalen model. This model extends the Cox regression model as well as the additive Aalen model in an additive-multiplicative way. The results of the Cox-Aalen model and the Cox proportional hazards model with time dependent covariates are compared in a clinical application.
We applied it to model the impact of graft arteriosclerosis on survival after heart transplantation. From 1984 to 2002 more than 900 patients have received a cardiac transplantation at Cardio Thoracic Surgery in Vienna. Other factors such as recipient age at surgery, donor age, CMV infection, perioperative infection, any other infection, rejection, gender, diabetes mellitus and induction therapy have to be considered as well. It is important to have an extended follow-up because graft arteriosclerosis will develop over a long period of time.