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Regression analysis for multistate models based on a pseudo-value approach, with applications to bone marrow transplantation studies.

Typically, regression analysis for multistate models has been based on regression models for the transition intensities. These models lead to highly non linear and very complex models for the effects of covariates on state occupation probabilities. We discuss a technique that models the state occupation or transition probabilities in a multistate model directly. The method is based on the pseudo-values from a jackknife statistic constructed from non-parametric estimators for the probability in question. These pseudo-values are used as outcome variables in a generalized estimating equation to obtain estimates of model parameters. We examine this approach and its properties for two special multistate model probabilities, the cumulative incidence function in competing risks and the current leukemia free survival used in bone marrow transplants. The latter is the probability a patient is alive and in either a first or second post transplant remission. The techniques are illustrated on a data set of leukemia patients given a marrow transplant.