ESTIMATION OF THE MARGINAL CAUSAL EFFECTS OF INITIAL AND SALVAGE TREATMENTS FOR RECURRENT DISEASES

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In the treatment of recurrent diseases, the initial treatments administered following diagnosis can vary, as well as subsequent salvage regimens given after disease recurrence. The Cox proportional hazards model, including disease recurrence and salvage treatments as time-dependent covariates, cannot be used to estimate the marginal causal effects of the initial and salvage treatments on survival. The marginal structural model proposed by Robins and colleagues is extended to the recurrent disease situation to estimate these marginal causal effects. The model is still in the format of proportional hazards, and easy to implement using available software. Simulation studies are conducted to evaluate the proposed model. The model is used to analyze the effects of chemotherapy and radiation, when used as initial or salvage treatment, for patients with soft tissue sarcoma.