

Longitudinal data in biomedical studies often involve concomitant interventions in addition to the pre-specified repeatedly measured outcome and covariate variables. Since a concomitant intervention is often initiated when a patient exhibits an undesirable health trend, adequate statistical methods should properly incorporate the starting time of a concomitant intervention in order to reduce the potential bias of the estimated intervention effects. We propose in this paper a class of semiparametric random-effects conditional density models for evaluating the distributions and concomitant intervention effects with longitudinal observations. These models simultaneously incorporate concomitant intervention effects and intra-subject longitudinal dependence structures, and quantify the change of the distribution functions through the ratio of two conditional density functions. The conditional density ratio is assumed to have a parametric form, while the baseline density function is nonparametric. We develop a likelihood-based method for estimating the parameters and a goodness-of-fit test for testing the validity of the models. Finite sample properties of our estimation and testing procedures are illustrated through a simulation study and an application to a longitudinal clinical trial in depression and heart disease.