Sensitivity analysis of longitudinal data with non-random dropouts using semi-parametric models

David Todem[1], KyngMann Kim[2], Jason Fine[3]

[1]*Division of Biostatistics, Department of Epidemiology, Michigan State University B601 West Fee Hall, East Lansing, MI 48823, U.S.A.*
[2]*Department of Biostatistics & Medical Informatics, University of Wisconsin-Madison 600 Highland Ave., Madison, WI 53792, U.S.A.*
[3]*Department of Statistics, University of Wisconsin-Madison, 1300 University Ave., Madison, WI 53792, U.S.A.*

Email: *todem@epi.msu.edu*

We propose a family of semi-parametric non-response models to adjust for informative dropouts in the analysis of longitudinal outcomes with fully observed predictors. The approach conceptually focuses on generalized linear mixed effects models with an unspecified random effects distribution. A novel formulation of a shared latent class model is presented and shown to provide parameters that have a meaningful interpretation. We show how to use the non-identifiability of some model characteristics to delineate the range of inferences consistent with observed data. Functional estimators are then developed and used as the basis for new global tests of covariate effects and contrasts over the whole support of the sensitivity parameter. Simulations demonstrate a large reduction of bias for the nonparametric model relative to the parametric model at times where the dropout rate is high or the dropout model is misspecified. The methodology's practical utility is illustrated in a data analysis.