

Bayesian semiparametric G-computation for causal inference in a cohort study with non-ignorable dropout and death.

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Abstract

Causal inference with observational longitudinal data and time-varying exposures is often complicated by time-dependent confounding and attrition. G-computation is one method used for estimating a causal effect when time-varying confounding is present. The parametric modeling approach typically used in practice relies on strong modeling assumptions for valid inference, and moreover depends on an assumption of missing at random, which is not appropriate when the missingness is non-ignorable or due to death. In this work we develop a flexible Bayesian semiparametric G-computation approach for assessing the causal effect on the subpopulation that would survive irrespective of exposure, in a setting with non-ignorable dropout. The approach is to specify models for the observed data using Bayesian additive regression trees, and then use assumptions with embedded sensitivity parameters to identify and estimate the causal effect. The proposed approach is motivated by a longitudinal cohort study on cognition, health, and aging, and we apply our approach to study the effect of becoming a widow on memory.