# ESTIMATION AND INFERENCE FOR DYNAMIC INTENSITY MODELS FOR RECURRENT EVENT DATA WITH APPLICATIONS TO A MALARIA TRIAL

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Preprint no. 2024-06

**Abstract**

Recurrent events are commonly encountered in medical and epidemiological studies. It is often of interest what and how risk factors influence the occurrence of events. While much research on recurrent events has addressed both time-independent and time-dependent effects, there is a possibility that these effects also vary with certain covariates.

In this dissertation, we develop novel estimation and inference procedures for two intensity models for recurrent event data – a class of semiparametric models and a nonparametric frailty model. Both models allow for the simultaneous measurement of time-varying and covariate-varying effects, with covariates potentially depend on event history. The proposed semiparametric models offer much flexibility through the choice of different link functions and parametric functions. Two hypothesis tests have been developed to assess the parametric functions of the covariate-varying effects. For the proposed nonparametric intensity model with gamma frailty, estimation procedure involves using an Expectation-Maximization (EM) algorithm and local linear estimation techniques. Variance estimators are obtained through a weighted bootstrap procedure. Both of the proposed models have been applied to a malaria vaccine efficacy trial (MAL-094) to assess the efficacy of the RTS,S/AS01 vaccine.

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