The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

Multilevel Joint Modeling of Hospitalization and Survival in Patients on Dialysis

By

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Abstract

More than 720,000 patients with end-stage renal disease in the U.S. require life- sustaining dialysis treatment that is predominantly administered at local dialysis facilities. In this population of typically older patients with a high morbidity burden, hospitalization is frequent at a rate of about twice per patient-year. Aside from frequent hospitalizations, which is a major source of death risk, overall mortality in dialysis patients is higher than other comparable populations, including Medicare patients with cancer. Thus, understanding patient- and facility-level risk factors that jointly contribute to longitudinal hospitalizations and mortality is of interest. Towards this objective, we propose a novel methodology to jointly model hospitalization, a binary longitudinal out- come, and survival, based on multilevel data from the United States Renal Data System (USRDS), with repeated observations over time nested in patients and patients nested in dialysis facilities. In our approach, the outcomes are modeled through a common set of multilevel random effects. In order to accommodate the USRDS data structure, we depart from the literature on joint modeling of longitudinal and survival data by including multilevel random effects and multilevel covariates, at both the patient and facility levels. An approximate Expectation-Maximization (EM) algorithm is developed for estimation where fully exponential Laplace approximations are utilized to address computational challenges. Standard error formulas for the estimated parameters are derived and evaluated to guide practical inference.

Date : 11 May, 2020 (Monday)
Time : 10:00-11:00
Venue: Online Talk via Zoom
* The Talk will be given in English.

* * *   ALL ARE WELCOME   * * *

For enrolment, please send your name and email (zoom's account) to chingching.lu@polyu.edu.hk on or before 8 May 2020, Friday.