



JOHNS HOPKINS
BLOOMBERG
SCHOOL of PUBLIC HEALTH

Department of Biostatistics

BIostatISTICS SEMINAR,

Hospital Profiling for Quality of End-of -life Care via Semi-competing Risks Analysis

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Although not without controversy, readmission is entrenched as a hospital quality metric. In addition to being a key outcome in the clinical and health policy literature, the Centers for Medicare and Medicaid Services (CMS) uses 30-day readmission rates as a basis for determining hospital reimbursement rates. To-date, statistical analyses for hospital profiling based on readmission hinge on fitting a logistic-Normal generalized linear mixed model (Normand et al, JASA, 1997). In doing so, however, death as a competing risk is ignored. For clinical conditions with a strong force of mortality, such as a diagnosis of pancreatic cancer, ignoring death can have profound effects. Furthermore, in such settings, scientific interest may lie in understanding variation in readmission and mortality simultaneously. Recently, Lee et al (JASA, 2016) proposed a novel Bayesian framework for the analysis of cluster-correlated semi-competing risks data within which readmission and mortality can be investigated simultaneously. The focus of that work was on estimation/inference for fixed (covariate) effects, components of variation and hospital-specific random effects. Here we build on that framework to propose and develop novel multivariate hospital-level performance measures that jointly accommodate readmission and mortality. We also consider a series of hospital profiling-related goals, including the identification of extreme performers and the bivariate classification of hospitals according to whether they have higher-than-expected or lower-than-expected readmission and mortality rates. To the best of our knowledge the latter is novel as a profiling goal. Towards achieving these goals this we develop a Bayesian decision-theoretic approach that characterizes hospitals on the basis of minimizing the posterior expected loss for an appropriate loss function. In some settings, particularly if the number of hospitals is large, the computational burden may be prohibitive. To resolve this, we propose a series of analysis strategies that will be useful in practice. Throughout the methods are motivated by and illustrated with data from CMS on 217,616 patients aged 65 years and older who were diagnosed with pancreatic cancer between 2000 and 2012 at one of 2,657 hospitals in the US.

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