A Latent-Variable Approach to Potential Outcomes for Emergency Department Admission Decisions

Abstract: In emergency departments (EDs), care providers weigh admissions against continued monitoring and treatment often without knowing their condition and health state. In this talk, we describe a framework to estimate the causal effect of admission decisions on patient outcomes from electronic healthcare records. We describe admission decisions as a decision-making process in which the patient’s health needs is a latent variable. We estimate latent health needs with limited knowledge of the decision process. To estimate causal effects, we use the potential outcomes framework and assume potential outcomes are stochastically independent from admission decisions within a latent health state. As a case study, we apply our approach to over 150,000 patient encounters with the ED from the University of Michigan Health System collected from August 2012 through July 2015.