

ACTIVE POSTMARKETING DRUG SURVEILLANCE FOR MULTIPLE ADVERSE EVENTS

Joel Goh, Stanford Business School, USA, joelgoh@stanford.edu

Stefanos Zenios, Stanford Business School, USA, stefzen@stanford.edu

Active postmarketing drug surveillance is important for consumer safety. However, existing methods have limitations that prevent their direct use for active drug surveillance. One of the important consideration that has been absent thus far is the modeling of multiple adverse events and their interactions. In this paper, we propose a method to monitor the effect of a single drug on multiple adverse events, which explicitly captures interdependence between events. Our method uses a sequential hypothesis testing paradigm, and employs an intuitive test-statistic. Stopping boundaries for the test-statistic are designed by asymptotic analysis and by reducing the design problem to a convex optimization problem. We apply our method to a dynamic version of Cox's proportional hazards model, and show both analytically and numerically how our method can be used as a test for the hazard ratio of the drug. Our numerical studies further verify that our method delivers Type I/II errors that are below pre-specified levels and is robust to distributional assumptions and parameter values.