

# MISQ Archivist

## A Prescriptive Analytics Method for Cost Reduction in Clinical Decision Making

*Xiao Fang, Yuanyuan Gao, and Paul Jen-Hwa Hu*

---

### Abstract

Containing skyrocketing health care costs is imperative. Toward that end, prescriptive analytics that analyze healthcare data to recommend optimal decisions is both relevant and crucial. We develop a novel prescriptive analytics method to improve the cost effectiveness in clinical decision making (CDM), a critical healthcare dimension that can greatly benefit from analytics. Effective prescriptive analytics for CDM has to address its probabilistic, cost-sensitive, and investment-related characteristics simultaneously. Unlike existing methods that often overlook the investment-related characteristic, the proposed method accounts for all of these characteristics. Specifically, our method considers two sets of costs associated with clinical decisions—before and after an investment—in combination with the probabilities of cost changes due to the investment. In contrast, prevalent methods only emphasize one set of costs, before an investment. Furthermore, the proposed method involves both clinical and investment decisions, whereas existing methods ignore investment decisions. Empirical evaluations with two real-world clinical data sets indicate that the proposed method consistently and significantly outperforms several salient methods from previous research, thereby demonstrating the value of addressing the investment-related characteristic in efforts to improve CDM.

**Keywords:** Data mining, cost-sensitive learning, prescriptive analytics, health care, clinical decision making