

**Operations Research in Healthcare:  
Models and Insights to Improve Healthcare Interventions and Policies**

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**Abstract:** Evidence-based healthcare modeling research is increasingly in demand due to excessive costs and the desire to improve quality of care in the U.S. The goal is to identify optimal strategies to improve population health outcomes, while accounting for patients' heterogeneity in disease progression and transmission dynamics. This talk will feature research at the UW Healthcare Analytics Lab using advanced analytics to tackle two urgent problems facing America today—mental health and COVID-19.

The *first* research area focuses on designing predictive and optimization models to adaptively monitor and treat chronically depressed patients. Mitigating depression has become a national health priority as it affects 1 out of 10 adults in the U.S. Prognostic-based monitoring that stratifies patients' disease risk and adaptively allocates resources to high-risk patients can improve overall health outcomes. Our objective is to translate data into solutions regarding who should be monitored and treated at the appropriate time, and study how cost-effective these adaptive strategies could be. The *second* research area focuses on modeling the impact of COVID-19 vaccination and non-pharmaceutical interventions (NPIs) given new viral variants and waning immunity in King County between year 2020-2022. A detailed agent-based simulation model was calibrated to the greater Seattle area in 2020 by observing local epidemic trend.

**Bio:** *Shan Liu* is an associate professor of Industrial & Systems Engineering at the University of Washington. She received her Ph.D. in Management Science & Engineering from Stanford University, a S.M. in Technology and Policy from MIT, and a B.S. in Electrical Engineering from The University of Texas at Austin. Her research focuses on the design and evaluation of healthcare interventions to improve patients' health and enable cost-effective care delivery. She develops methods in sequential decision making, decision analytics, and systems modeling to optimize healthcare systems. She has received multiple grants from the National Science Foundation and National Institutes of Health.