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**A Data-Driven Distributionally Robust Optimization
Approach for Appointment Scheduling**

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We study the nurse staffing problem under random nurse demand and absenteeism. While the nurse demand uncertainty is exogenous (stemming from the random patient census), the nurse absenteeism uncertainty is endogenous, i.e., the number of nurses present partially depends on the nurse staffing level. For the quality of care, many hospitals have developed float pools of nurses by cross-training, so that a pool nurse can be assigned to the units short of nurses. In this talk, we propose a distributionally robust nurse staffing (DRNS) model that considers both exogenous and endogenous uncertainties. We derive a decomposition algorithm to solve this model. In addition, we identify several float pool structures that often arise in practice and allow us to reformulate the DRNS model as a monolithic mixed-integer linear program, which facilitates off-the-shelf commercial solvers. Furthermore, we optimize the float pool design to reduce the cross-training while achieving a specified target staffing costs. The numerical case studies, based on the data of a collaborating hospital, lead to recommendations for the float pool design from an operational perspective.

Ruiwei Jiang is an Assistant Professor of Industrial & Operations Engineering in the University of Michigan. He conducts research on the theory of stochastic and robust optimization, integer programming, and their applications on power systems and healthcare operations. Ruiwei's research has been recognized with the INFORMS George Nicholson student paper award, the Stochastic Programming Society student paper award, the INFORMS Junior Faculty Interest Group paper award (honorable mention).

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