

GRA position available**Starting Date:**

On or after September 1, 2021

Duration:

48 months

Funding Agency:

National Science Foundation

Description of The Whole Project:

A confluence of technological advances in the medical sciences, operations research, and other AI-based approaches such as machine learning has opened up a unique opportunity for dramatically improving the quality of life for organ transplant patients. In particular, the proposed research aims to exploit the option of a personalized “desensitization” antibody removal regimen in combination with data-driven decision algorithms and simulation-optimization models to improve kidney transplantation outcomes, including increasing the number of successful transplants, decreasing overall wait times, and lowering overall system operational costs, as well as individual patient out-of-pocket costs. In contrast with other major organs such as the heart, lung, and liver, the kidney setting is even more well suited to such data-driven approaches, because there is a far wider set of decision options, which means that improved simulation modeling and optimization-based data-driven algorithms have the potential to have a far greater impact. The proposed project will develop an integrated dynamic stochastic simulation-optimization model framework for data driven decision making to match donors and recipients in a kidney paired donation (KPD) system where desensitization is a viable option. The model will include a detailed dynamic and stochastic simulation incorporating the complex uncertainties and risk factors in the system, including the success rate of the desensitization and patient behavior in response to an offered matching/desensitization therapy. The output of the integrated simulation-optimization model will include the suggested paired matchings from the combinatorial and simulation optimization algorithms, the realized matchings based on simulated patient behavior, and statistical estimates of key performance metrics.

Main Responsibility:

1. Develop the proposed simulation model
2. Perform research in the development of efficient simulation optimization methods, such as optimal computing budget allocation

Required qualifications:

1. Comfortable with computer programming to develop the proposed simulation model
2. Good background in statistics/mathematics/engineering to do research in stochastic simulation and optimization

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