

Abstract # 000 AI-Enabled Digital Support to Increase Placement of Hard-to-Place Deceased Donor Kidneys

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Purpose: Current practice for allocating high-risk deceased donor kidneys requires organ procurement organizations (OPOs) to engage in a prolonged manual process, accruing cold ischemic time and exacerbating kidney quality. An interactive digital simulation tool is developed to identify high-risk kidneys that are hard to place and justify starting the accelerated placement process sooner. The simulation tool will estimate the increased likelihood of placement and improve the current allocation model by providing a systematic basis for changing the current process and demonstrating how simulation can be leveraged to evaluate a policy change before implementation.

Methods: A digital simulation tool developed using AnyLogic software serves as a research tool to test kidney allocation policies and their effect on deceased donor kidney acceptance. The tool allows users to adjust or scale factors to observe the influence on final decision offerings and policies. AI models are integrated to inform the utilization probability and identify transplant centers likely to accept and transplant kidneys at risk for non-utilization.

Results: Initial results shown in Figure 1 includes the current architecture of kidney allocation from the OPO perspective, agents, kidney characteristics and Key Performance Parameters (KPP). This tool estimates the system-level performance of OPO efforts to increase kidney utilization. The effectiveness of the digital simulation tool is measured by KPPs of *kidney utilization* and *observed/expected kidney transplants*. Other calculated measures include allocation time, out-of-sequence allocation, and anticipated procurement to transplant time. The approach will be validated and verified using historical UNOS data with and without the AI model to observe the benefit for the OPOs utilizing the AI models and simulation.

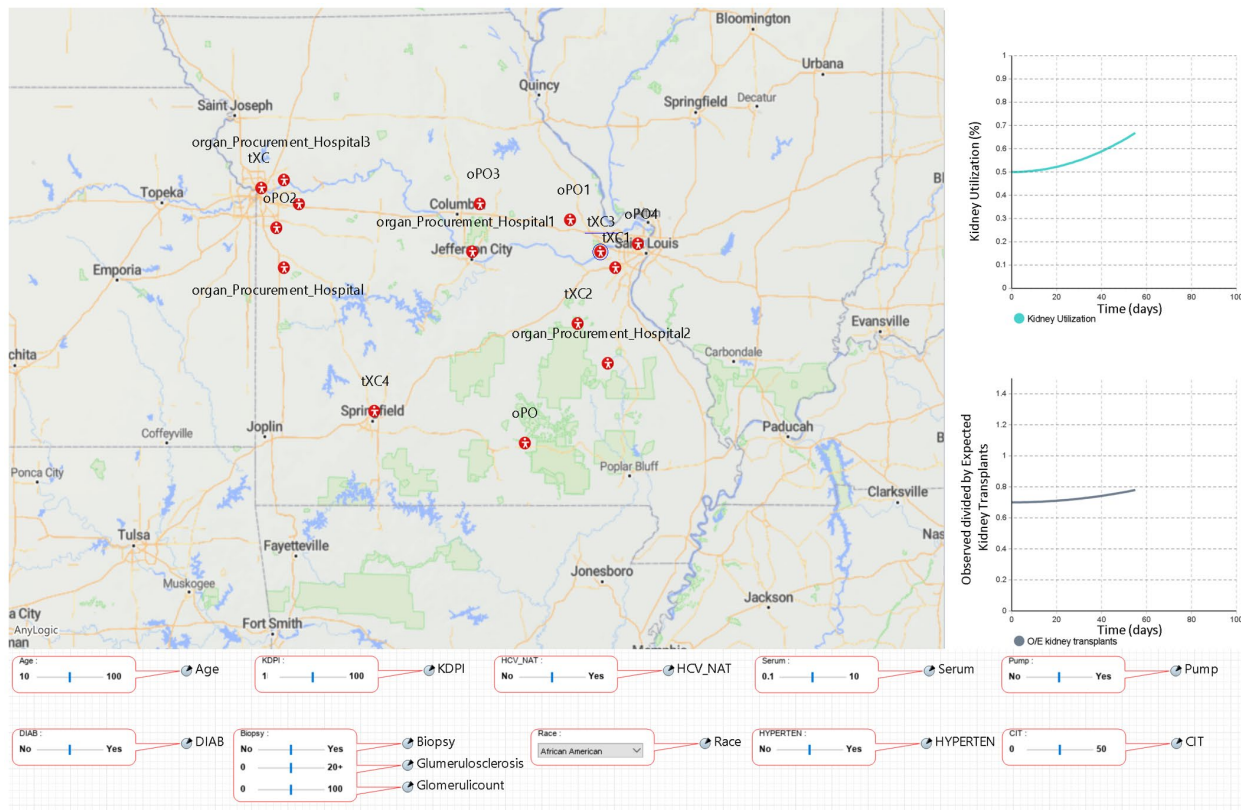


Figure 1 Initial simulation

Conclusion: The study analyzes the impact of amended kidney allocation practices and identifies best practices for high-risk kidney allocation. KPPs are used to measure the effectiveness of new kidney allocation policies for high-risk kidneys. The digital simulation tool predicts an increased deceased donor kidney utilization for early engagement in accelerated placement for out-of-sequence allocation, hence supporting high-risk kidney allocation policy changes. Future work will include incremental updates to the simulation and AI models for data-supported aggressive transplant centers willing to transplant high-risk kidneys.

Citation information:

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