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Optimization in a Kidney Paired Donation Program

Kidney transplant is the best available treatment for patients with end stage kidney disease. Often, however, patients have a willing living donor, but that donor is incompatible in blood type and/or histology. A kidney paired donation (KPD) program consists of transplant candidates and their incompatible living donors as well as non-directed or altruistic donors (ADs). Exchanges of donors among candidates and chains created by ADs overcome the incompatibilities. A problem of importance is how best to arrange exchanges and chains in order to achieve as many transplants as possible. We develop allocation schemes that account for uncertainties. These methods are compared through simulations with methods currently in use and illustrate substantial gains in transplants achieved.