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Unspecified donation in kidney exchange: when to end the chain

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Abstract This paper studies participation of unspecified donors in kidney exchange through simultaneous domino paired donation (DPD) and non-simultaneous extended altruistic donor (NEAD) chains. It extends existing research by investigating the termination of chains, the possibility of transplantation across the blood type barrier, and the impact of incentives in multi-center exchanges. Furthermore, it looks into the effect of various configuration parameters such as the time interval between exchanges. Our analysis is based on a simulation study that uses data of all 438 patient-donor pairs and 109 unspecified donors who were screened at Dutch transplant centers between 2003 and 2011. Because multi-center coordination may raise incentive issues, special attention is paid to individually rational implementation. We find that chains are best terminated when no further segment is part of an optimal exchange within 3 months. Transplantation across the blood type barrier allows for longer continuation of chains, more transplants and more equity among patient groups. NEAD chains perform slightly better than DPD chains, provided that the renege rate is sufficiently low. Additional substantial gains are due to national individually rational coordination. Particularly highly sensitized and blood type O patients benefit. Appropriate timing of exchanges can further improve these results.
