PO-082

Computational Simulations to Evaluate the Feasibility of Kidney Paired Donation in Highly HLA Sensitized Patients

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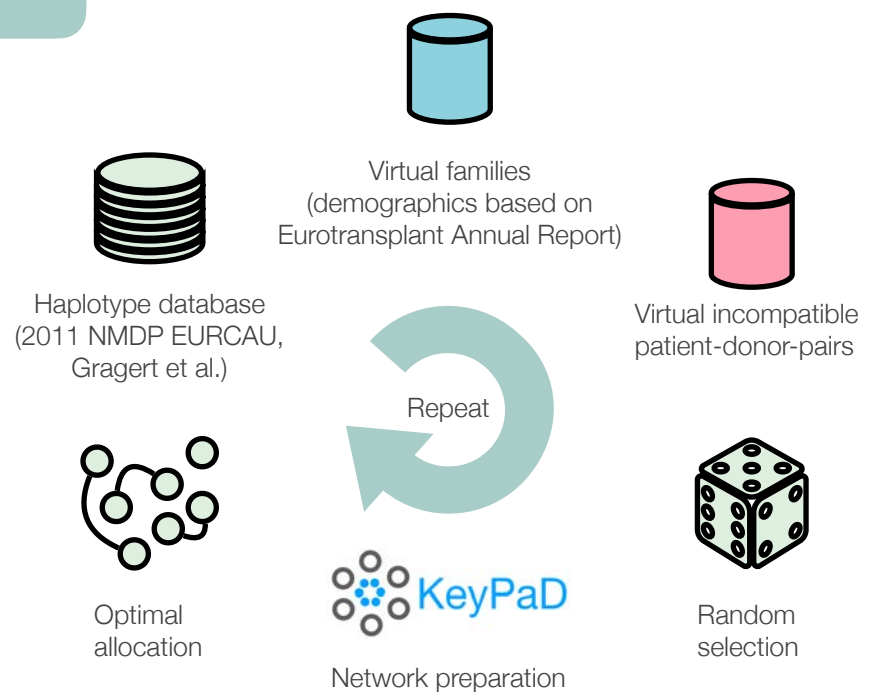
Background

About one-fifth of patients on the Eurotransplant (ET) kidney waiting list (WL) have current PRA levels above 5% due to previous sensitization events. This is particularly a problem, if the patient has a suitable yet HLA incompatible living donor candidate. In this study we used computer simulations to estimate transplantation pair numbers that can be expected by a local kidney paired donation (KPD) program considering different WL sizes.

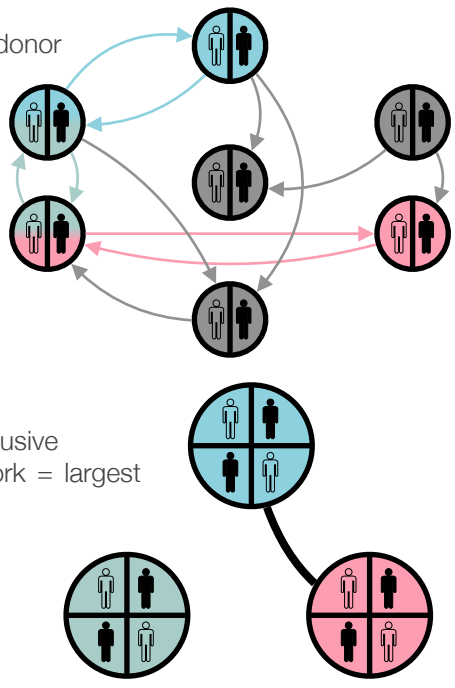
Methods



- Simulations repeated 50 times per waiting list size
- Allocation limited to paired donation (i.e. circle size = 2)
- Blood group identity required during allocation
- Kidney Paired Donation web-platform prototype (KeyPaD) allocated patients and donors

Graph algorithms for KPD

- Directed „compatibility graph“
  - node = patient with incompatible donor
  - vertex = compatibility score
- Incompatible pair not connected
- Finding all circles of length 2

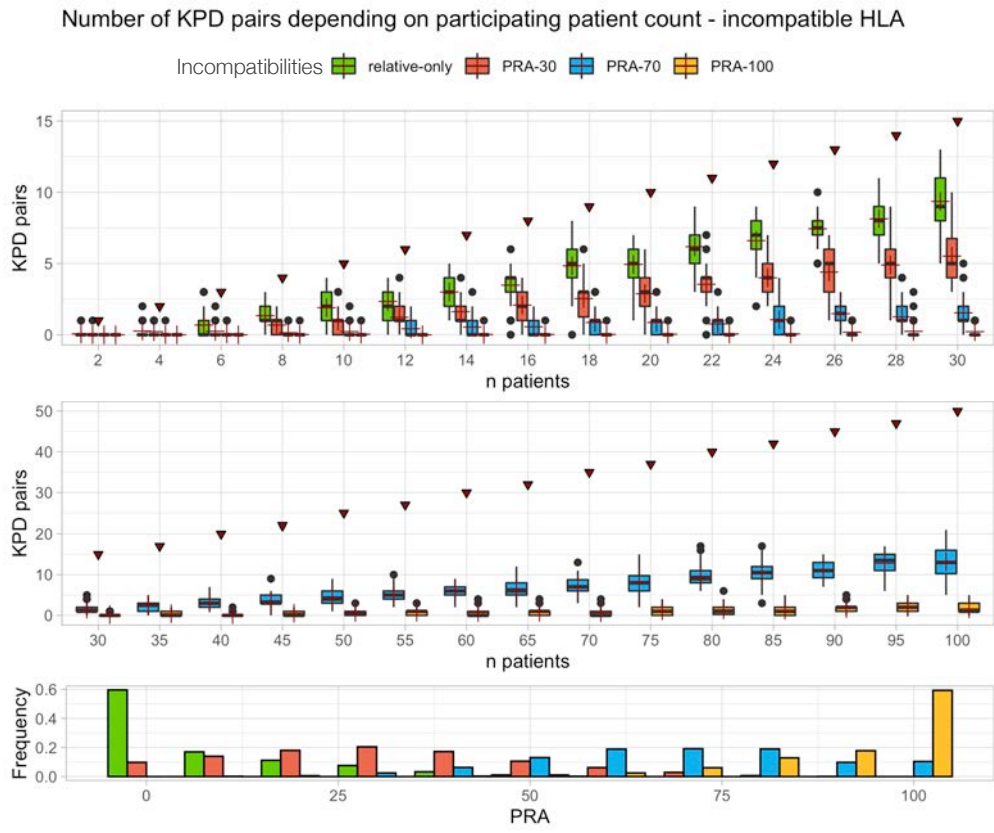


- Undirected „solution graph“
  - node = KPD circle
  - vertex = if nodes are mutually exclusive
- Finding largest fully connected network = largest KPD network

Conclusion

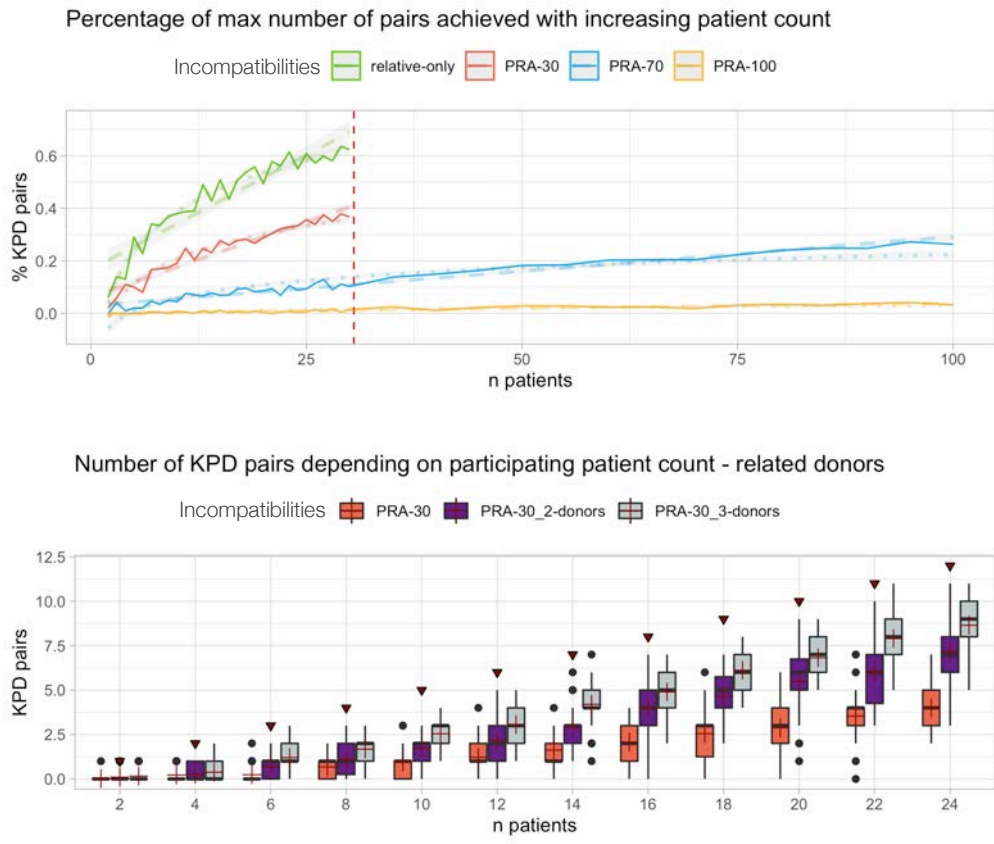
- Simulations efficient to estimate KPD allocation program performance
- HLA pre-sensitization is the major limiting factor for KPD
- Sublinear increase of network size with increasing patient pool suggest „sweet spot“ in waiting list sizes
- Multiple donor options per patient and acceptance of blood group compatible donors greatly improve network sizes

HLA pre-sensitization limits number of KPD options



*related donor always incompatible, plus indicates mean, triangle indicates theoretic maximum of KPD pairs

Multiple donors preferable over network size



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