Not all kidneys are the same

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Outline

• How the current allocation system works
• Quality matching in the current system
• KDRI and EPTS
• Trends in donor demographics
• Discard rates
• Good kidneys to good recipients?
• Marginal kidneys to marginal recipients?
• What are other countries doing?
Current Australian model

• Major listing criteria:
  – ESKD on dialysis
  – 80% likelihood of surviving for at least 5 years after transplantation

• Major allocation criteria:
  – Blood group Equity
  – Waiting time Equity
  – HLA match Utility
  – Highly sensitised Equity
  – Childhood Utility
Death-censored graft survival

Australian DD grafts 1995-2009

Years
0-24
25-34
35-44
45-54
55-64
65+

Donor age

Donor age

0-24
25-34
35-44
45-54
55-64
65+

Years
0 5 10 15

Death-censored graft survival
Age difference (donor minus recipient age)
Australian DD grafts 1995-2009

Young donors
Old patients

Old donors
Young patients
KDRI

• Kidney donor risk index
• Developed by SRTR
• Components
  – Donor age
  – Hypertension
  – Diabetes
  – Terminal creatinine
  – Cause of death
  – Height
  – Weight
  – DCD status
  – Hepatitis C status
• Reported in US at time of offer, and used for allocation
Death-censored graft survival by KDRI quintile

$c=0.69$

Clayton PA et al. TSANZ ASM 2015 (submitted)
EPTS

• Estimated post-transplant survival score
• Components
  – Age
  – Diabetic status
  – Prior solid organ transplant
  – Years on dialysis
Patient survival by EPTS quintile

$\text{c}=0.69$

Kidney risk vs recipient risk
Australian DD kidney-only grafts 2008-2012
Kidney risk vs recipient risk

Australian DD kidney-only grafts 2008-2012
Kidney risk vs recipient risk

Australian DD kidney-only grafts 2008-2012
Donor demographics

• Broad push to increase organ donor rates
• Increasing number of older donors with more co-morbidities ("marginal" kidneys)
Deceased Kidney Donor Type
Australia 2004-2013

DCD, donor after cardiac death
DBD ECD, expanded criteria donor after brain death
DCD SCD, standard criteria donor after brain death

DCD
DBD ECD
DBD SCD
Donor age over time

Australian deceased kidney donors 2000-2013
Referred and actual solid organ NSW donors
2010-2014

Referred

Donated

Referral and donation rates for solid organ organ donors in NSW from 2010 to 2014, courtesy of Daniel Hirsch. Data from NSW OTDS.
Discard rate of retrieved kidneys
Australia 2005-2014

0 2 4 6 8
% kidneys retrieved but not transplanted
Where we are so far

• Current allocation system doesn’t aim to match quality of kidneys with recipients
• KDRI and EPTS are statistically valid scores to quantify risk
  – Could be used for allocation purposes
• Increasing number of marginal kidneys
• Recent increase in discard rate
• Should we aim to match quality of kidneys and recipients?
Good kidneys to good recipients?

• Pros
  – Increased utility – get the most out of scarce resource
  – Better kidneys go to patients most likely to need re-grafting in the future

• Cons
  – Inequitable – patients jumping the “queue”; ageism
  – May reduce incentive to find a living donor
  – How to define “better” kidneys and recipients?
Trends in Donation of Kidneys from Living and Deceased Donors to Pediatric Candidates.

Living donor transplantation rate
Australia 2002-2010

- Current allocation system
- Utility-based allocation system

Observed vs. Simulated
Marginal kidneys to marginal recipients?

- **Pros**
  - Reduces likelihood of discards
  - Reduces waiting time for older patients
  - Avoids allocating “bad” kidneys to people who shouldn’t take them

- **Cons**
  - Healthy patients offered a marginal kidney can (and often do) decline the offer anyway
  - Reduces organ pool available to healthier (younger) recipients – effects on utility may be negative
  - Potentially inefficient allocation since fewer potential recipients for marginal kidneys (more shipping)
  - How to define “marginal” kidneys and recipients?
Other models

• US
  – Longstanding ECD system
    • Designed to reduce discards
    • Discard rate much higher than Aust/NZ
  – New system
    • Allocates top 20% of kidneys to top 20% of recipients
    • Designed to increase utility

• Europe
  – Eurotransplant Seniors Program
  – 65+ kidneys to 65+ recipients, ABO compatible, HLA mismatches ignored, local allocation

• UK
  – Allocation score includes a term for age difference
Conclusions

• Current allocation system does not match kidney and recipient quality
• This could be done using KDRI/EPTS
• Need clear understanding of:
  – Goals of system
  – Ethical aspects
  – Potential unintended consequences