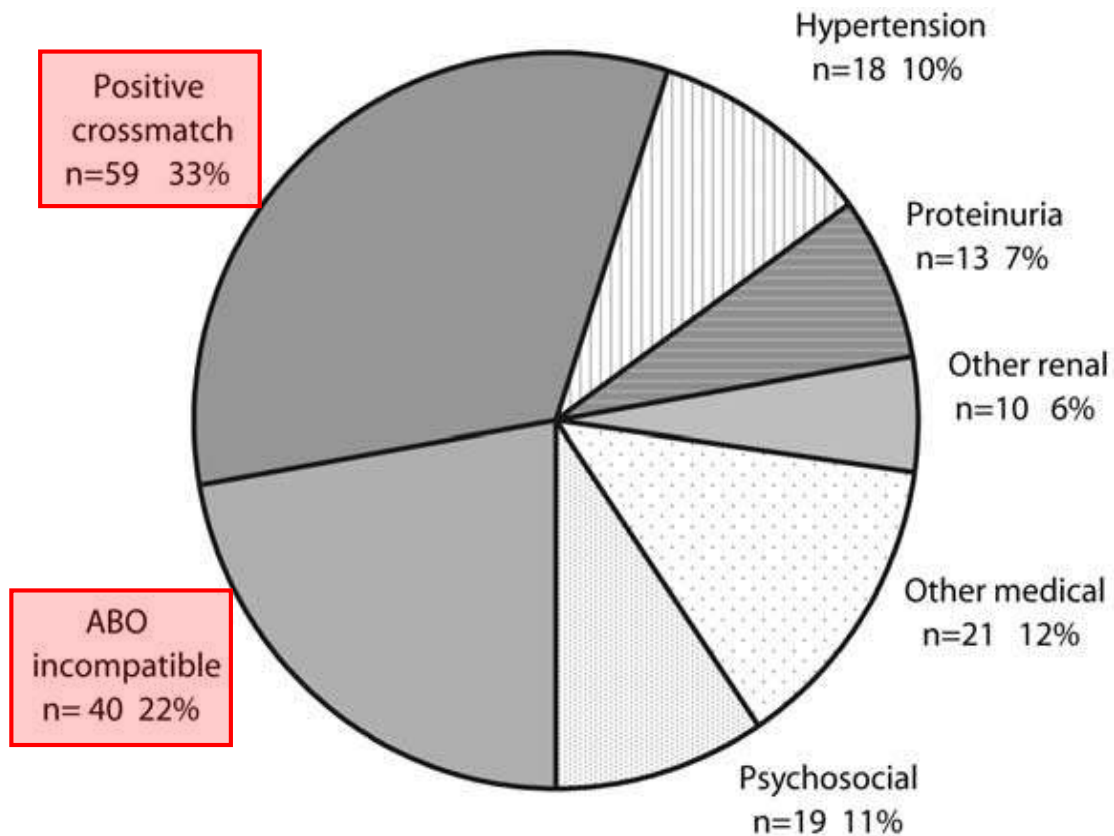


PAIRED KIDNEY EXCHANGE

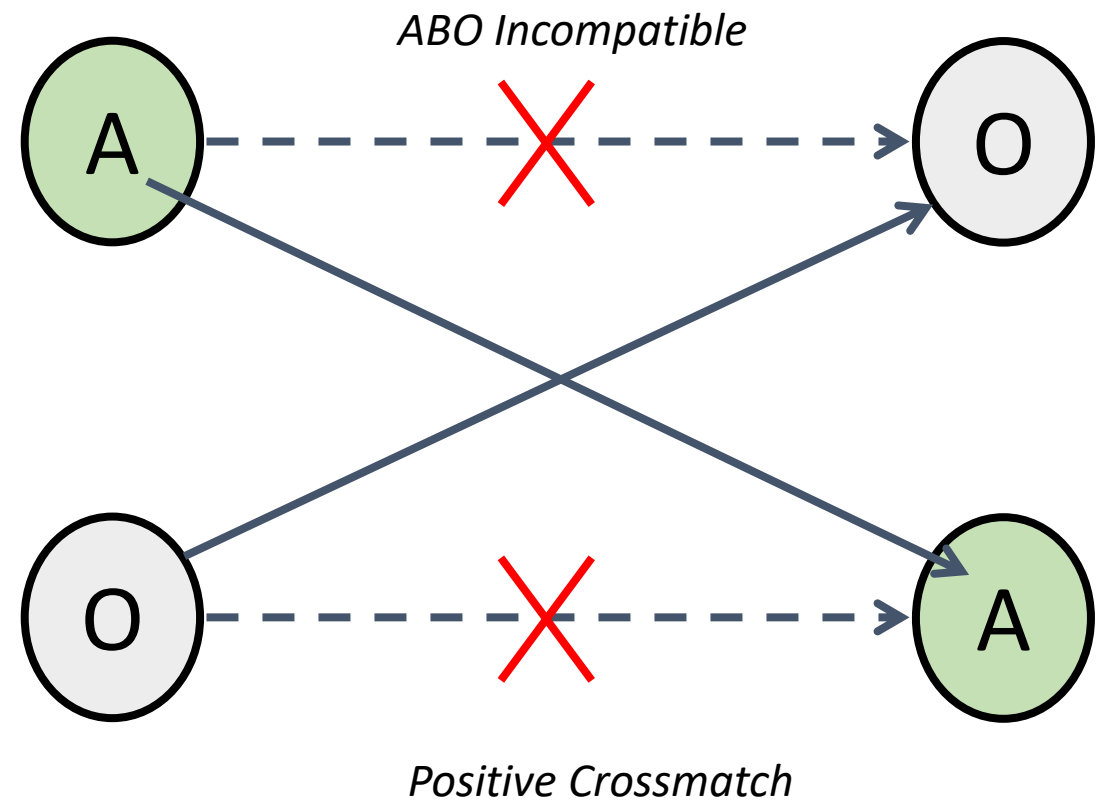
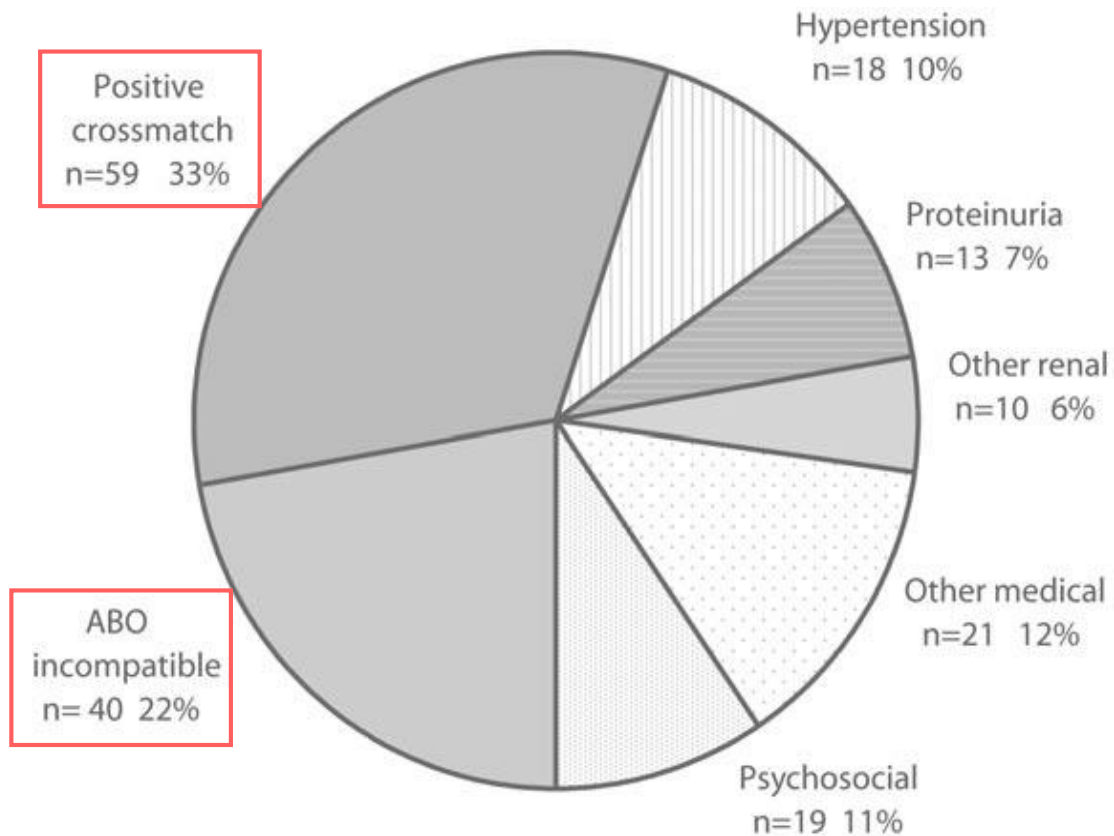
structure
setup
evolution

Noumea
April 2019

Live Donors: Unable to proceed



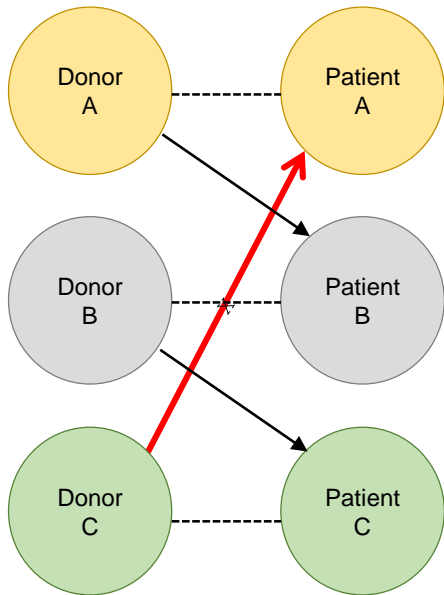
Paired kidney exchange



Closed loops v non-directed altruistic donor chains

Closed loop

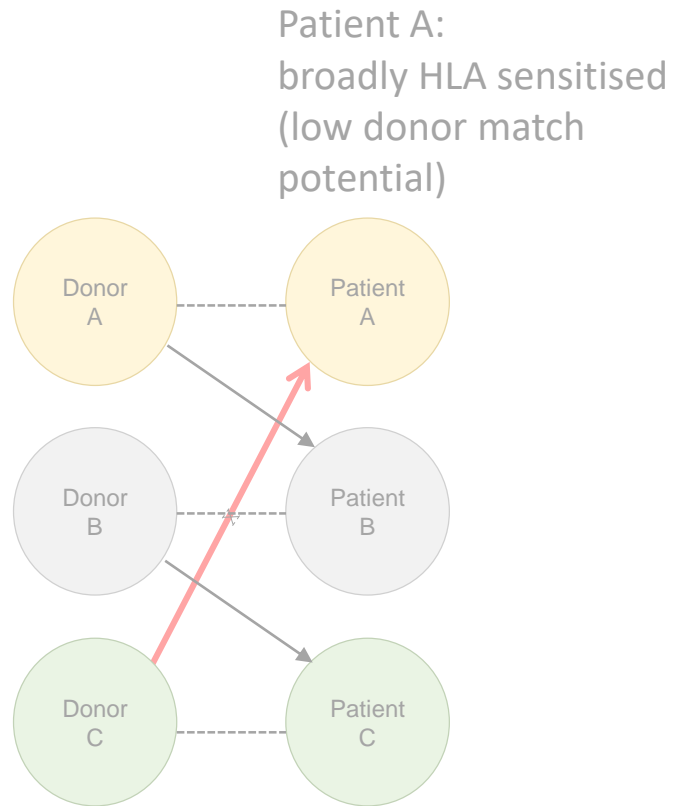
Patient A:
broadly HLA sensitised
(low donor match
potential)



Donor C:
common HLA antigens
(low recipient match potential)

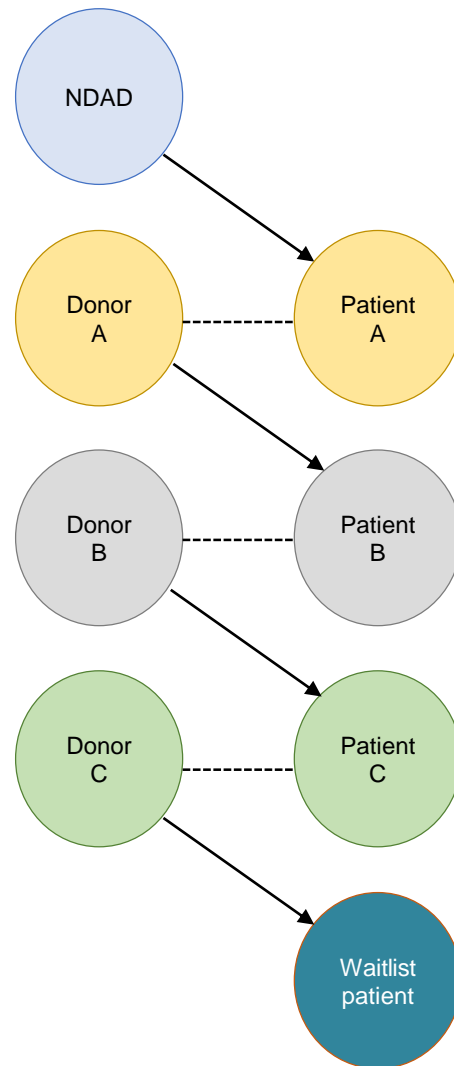
Closed loops v non-directed altruistic donor chains

Closed loop



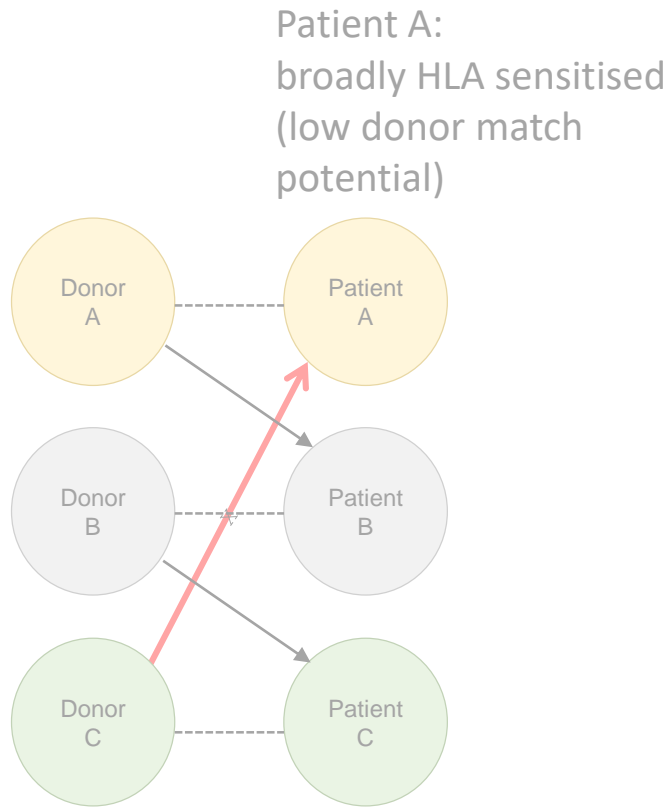
Donor C:
common HLA antigens
(low recipient match potential)

NDAD-chain



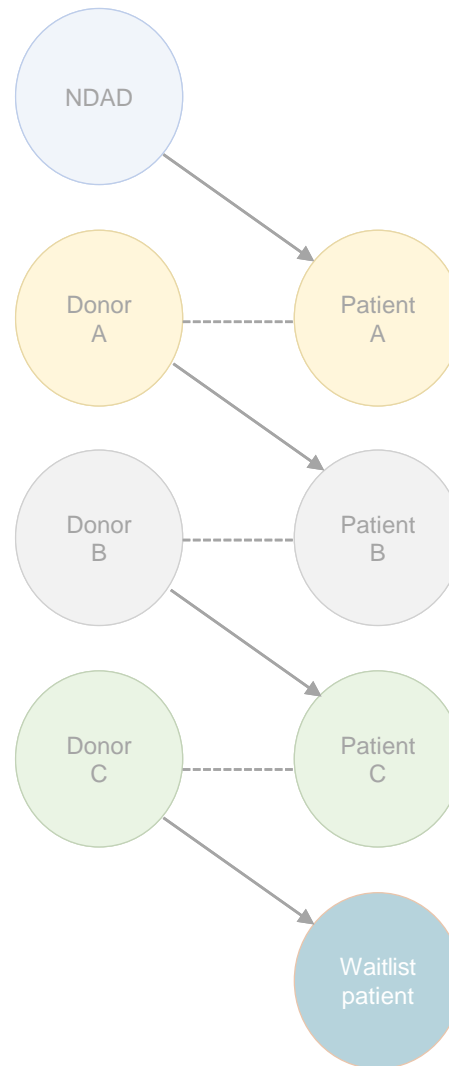
Closed loops v non-directed altruistic donor chains

Closed loop

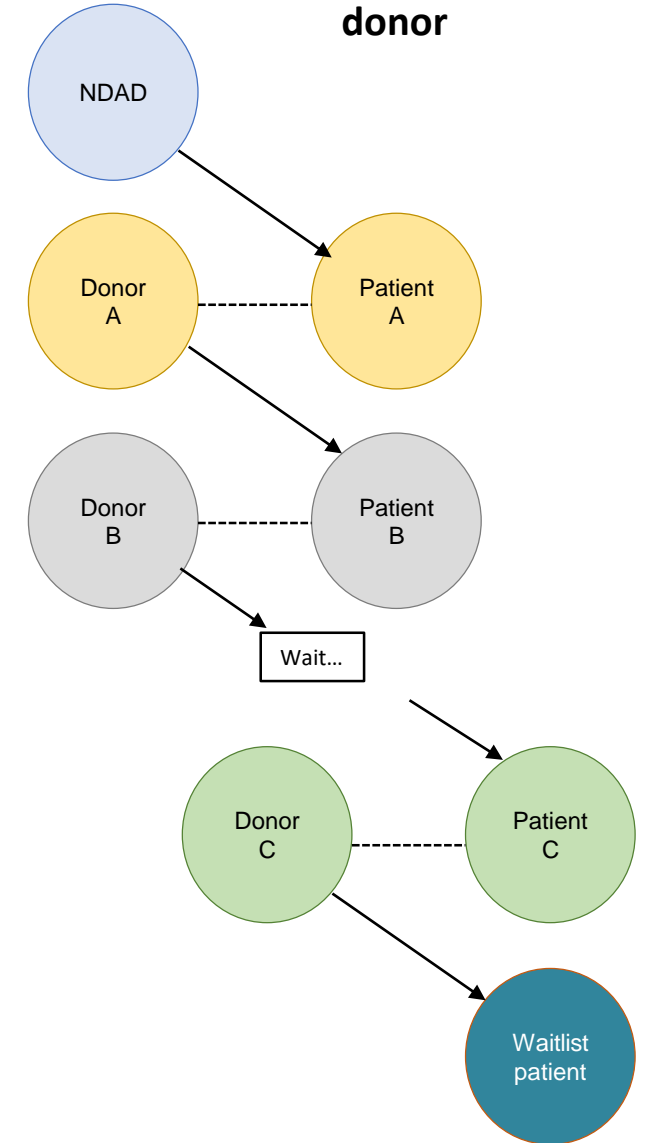


Donor C:
common HLA antigens
(low recipient match potential)

NDAD-chain



NDAD-chain with bridge donor



Australian paired Kidney eXchange (AKX)

- Begun 2010, Prof Paolo Ferrari, supported by the Organ and Tissue Authority
- National program with coordinating centre
- Oversight by national transplant advisory subcommittee
- Based on:
 - Clear, standardized, agreed donor eligibility criteria
 - Matching based on virtual crossmatch using high resolution (4 digit) typing at all loci
 - -A, -B, -Cw, -DRB1, -DPB1, -DQB1, -DQA1, -DRB3, -DRB4 and -DRB5
 - Cell crossmatch then performed
 - 4 'match runs' per year
 - Allocation rules
 - Donor operations are begun simultaneously
 - Kidneys are transported, not donors

Allocation in AKX

Donor matching “rules”

- **Donors** are excluded if:
 - Blood group not acceptable
 - HBcAb status not acceptable
 - Unacceptable antigens are listed
 - Due to donor specific HLA antibodies
 - To improve matching
- Chains and combinations then built out of all compatible donor-recipient pairs

Allocation in AKX

Matching “rules”

- **Donors** are excluded if:
 - Blood group not acceptable
 - HBcAb status not acceptable
 - Unacceptable antigens are listed
 - Due to donor specific HLA antibodies
 - To improve matching
- Chains and combinations then built out of all compatible donor-recipient pairs

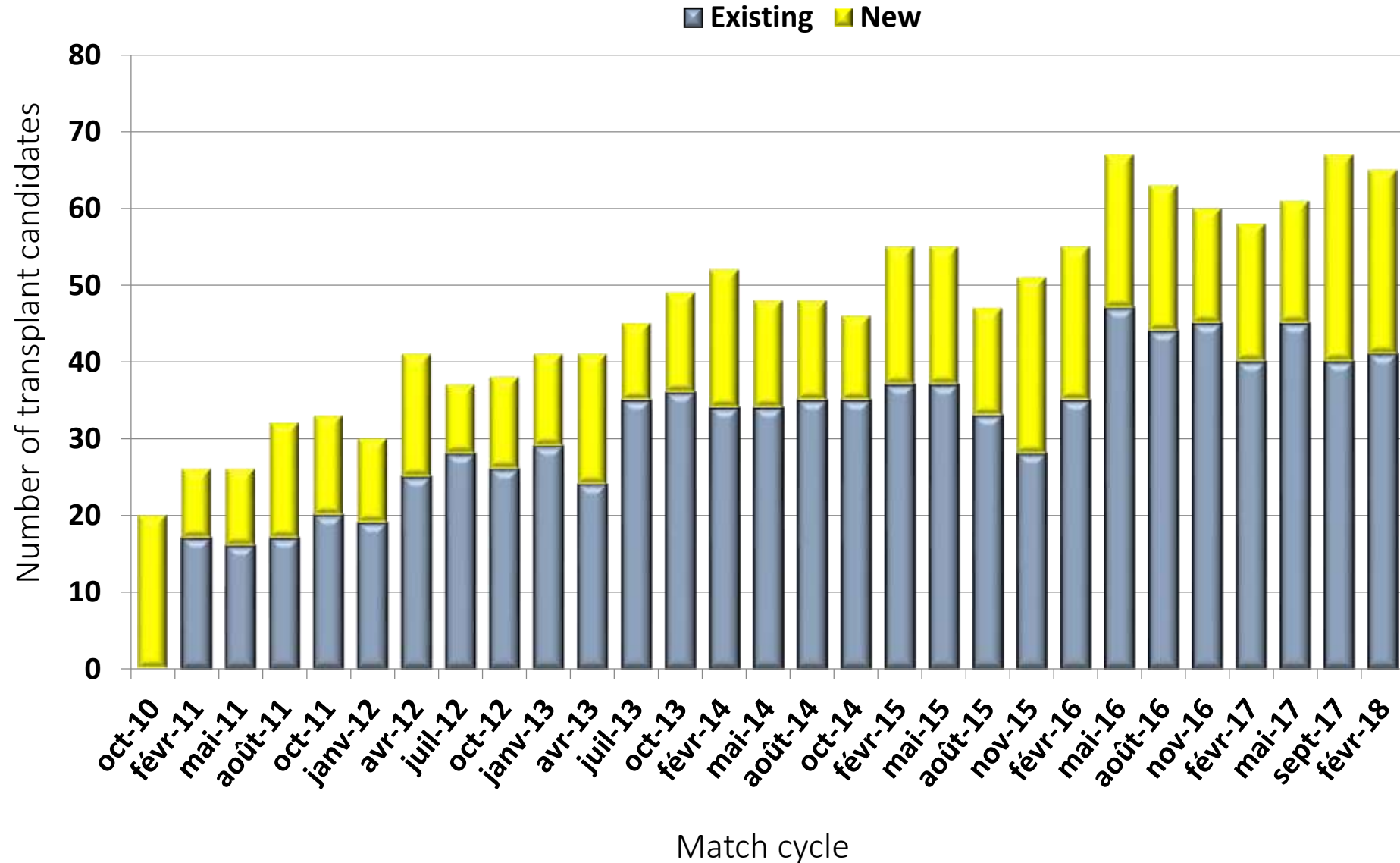
Ranking rules for chains

1. Highest number of matches
2. Lowest match probability
3. Highest number of matched DRB1
4. Highest number of identical blood groups
 - Favours O to O > O to A or B
5. Lowest chain length
6. Longest waiting time

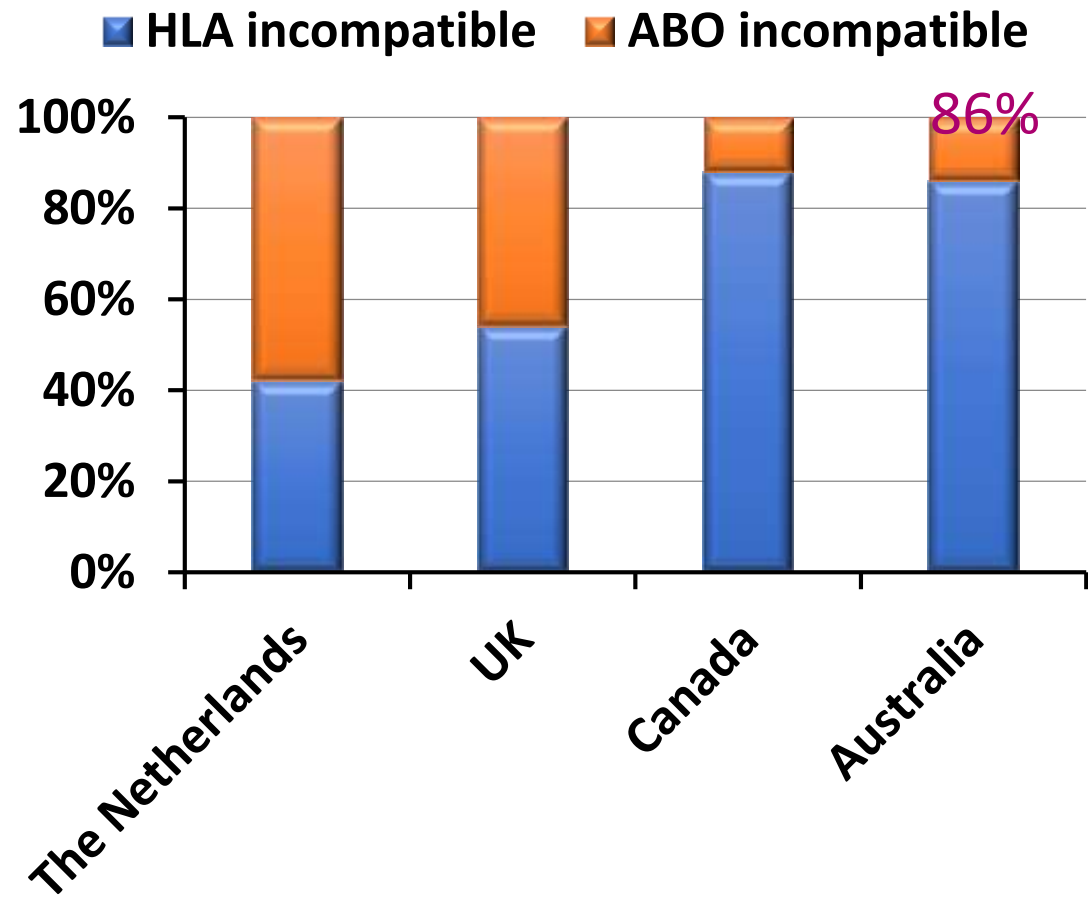
DATA

Number of patients in quarterly AKX matching cycles

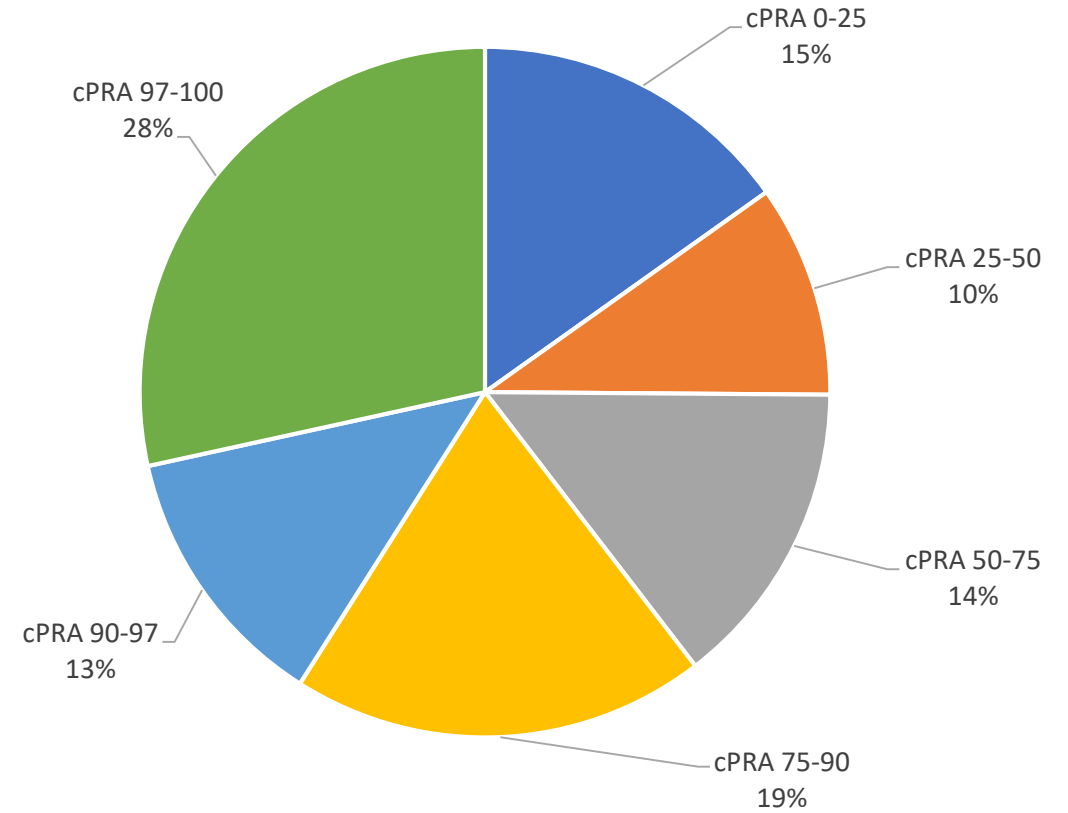
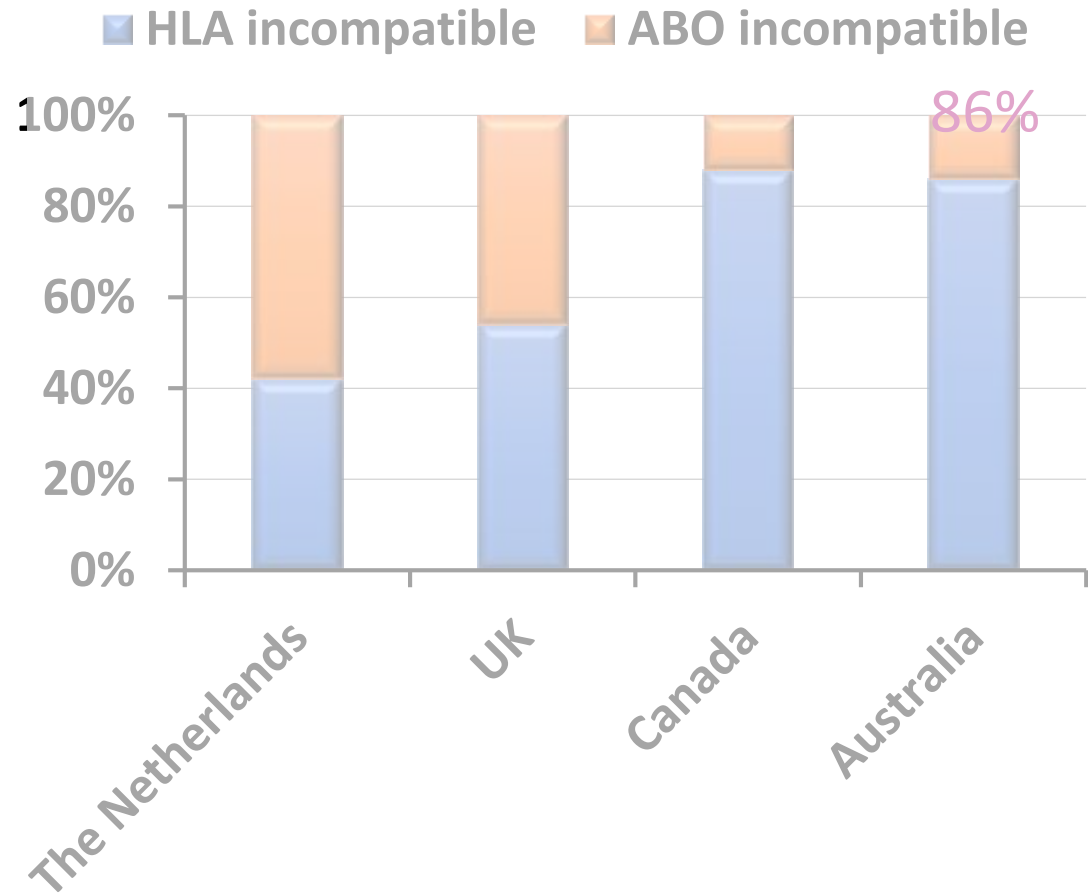
Cumulative number of individual candidates = 437



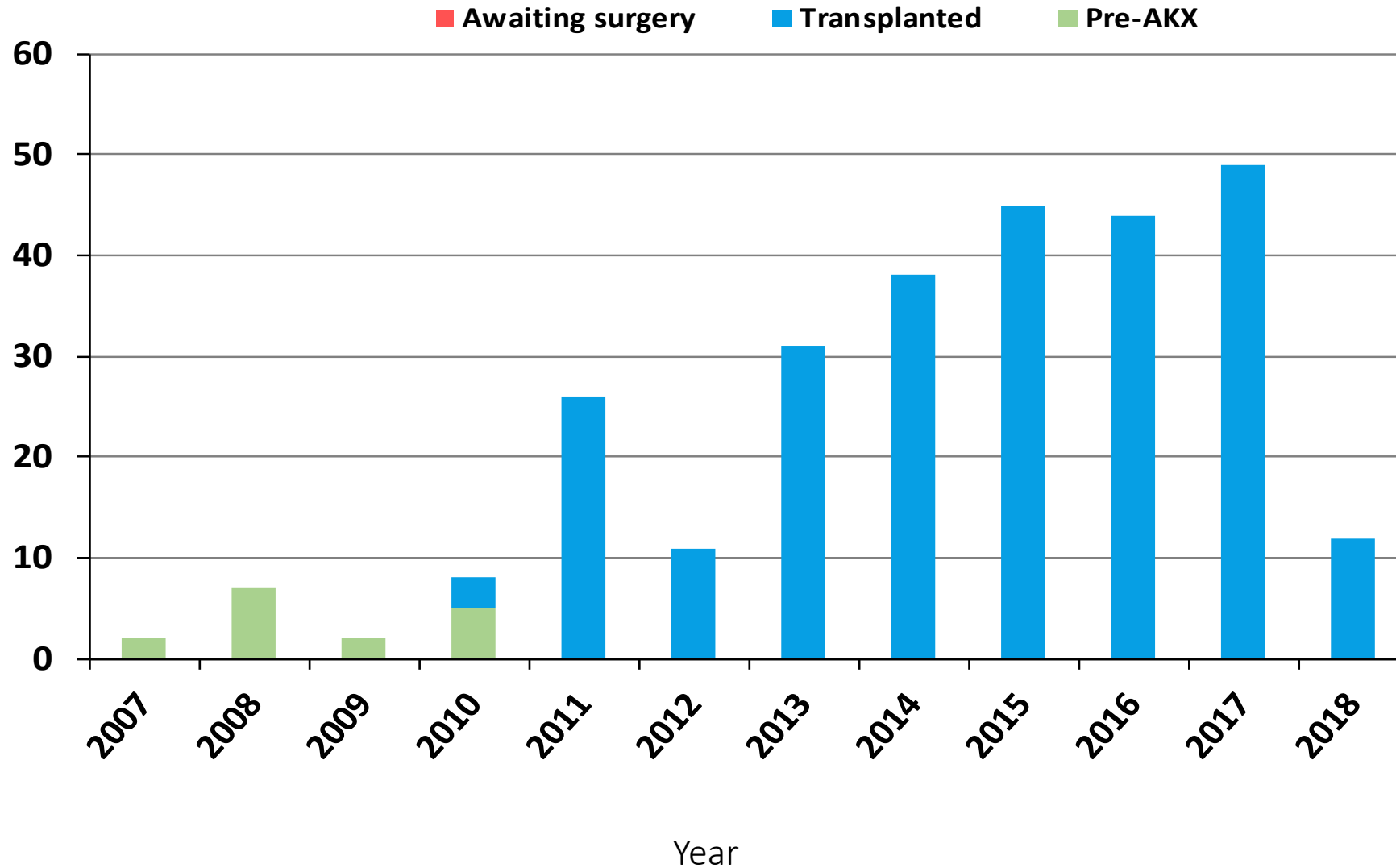
Reasons for referral to KPD



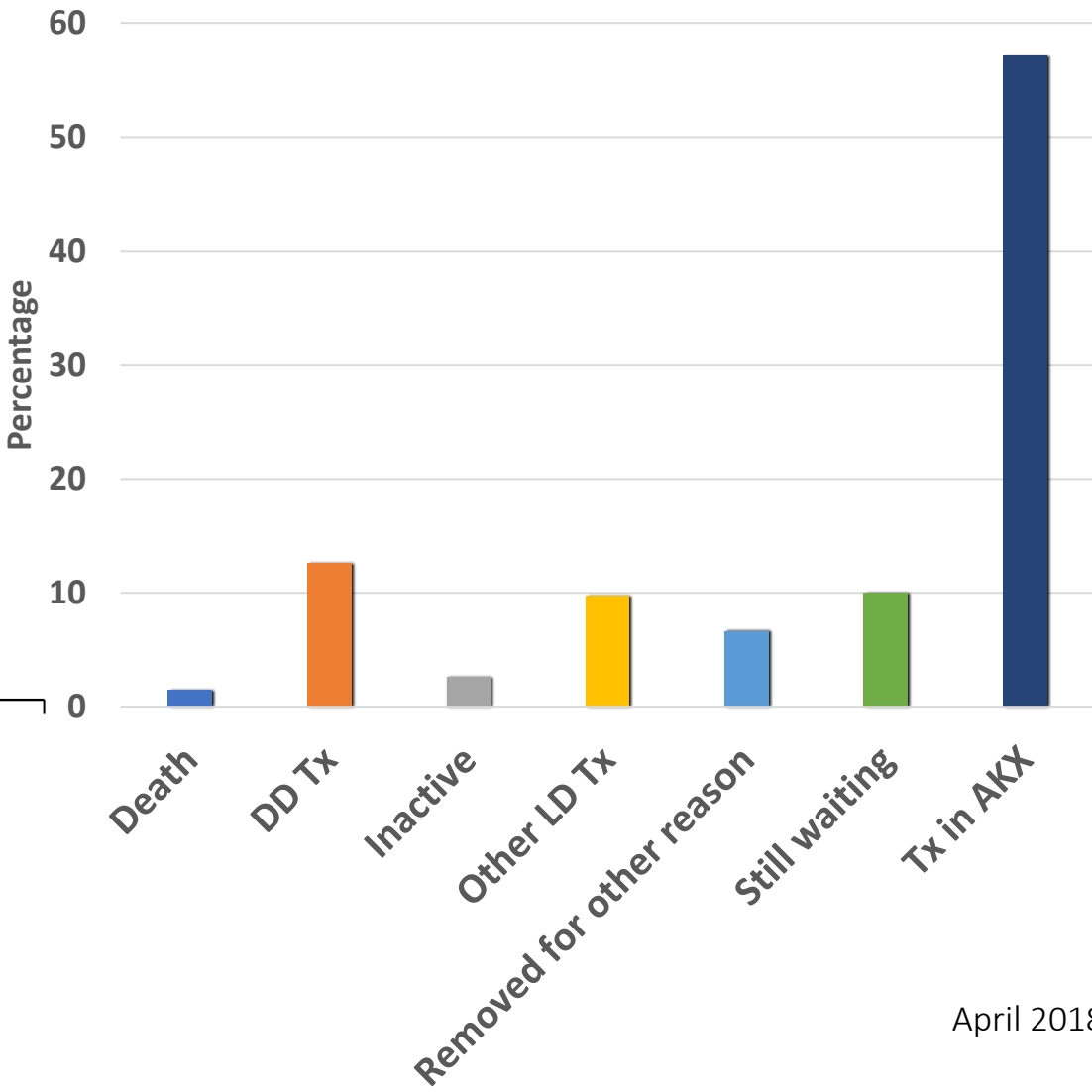
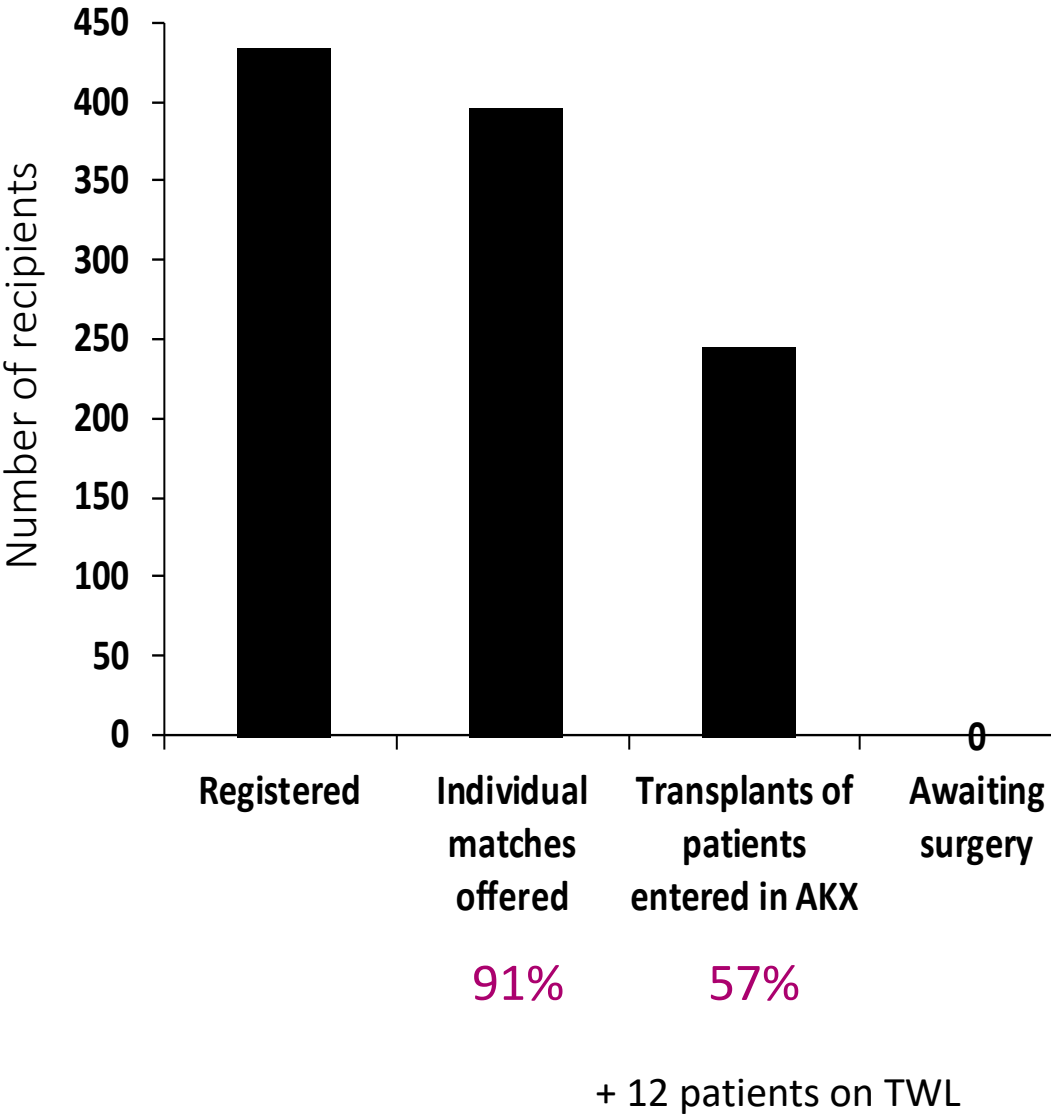
Reasons for referral to KPD



Kidney transplants facilitated through AKX per year



AKX: numbers of participants and outcomes

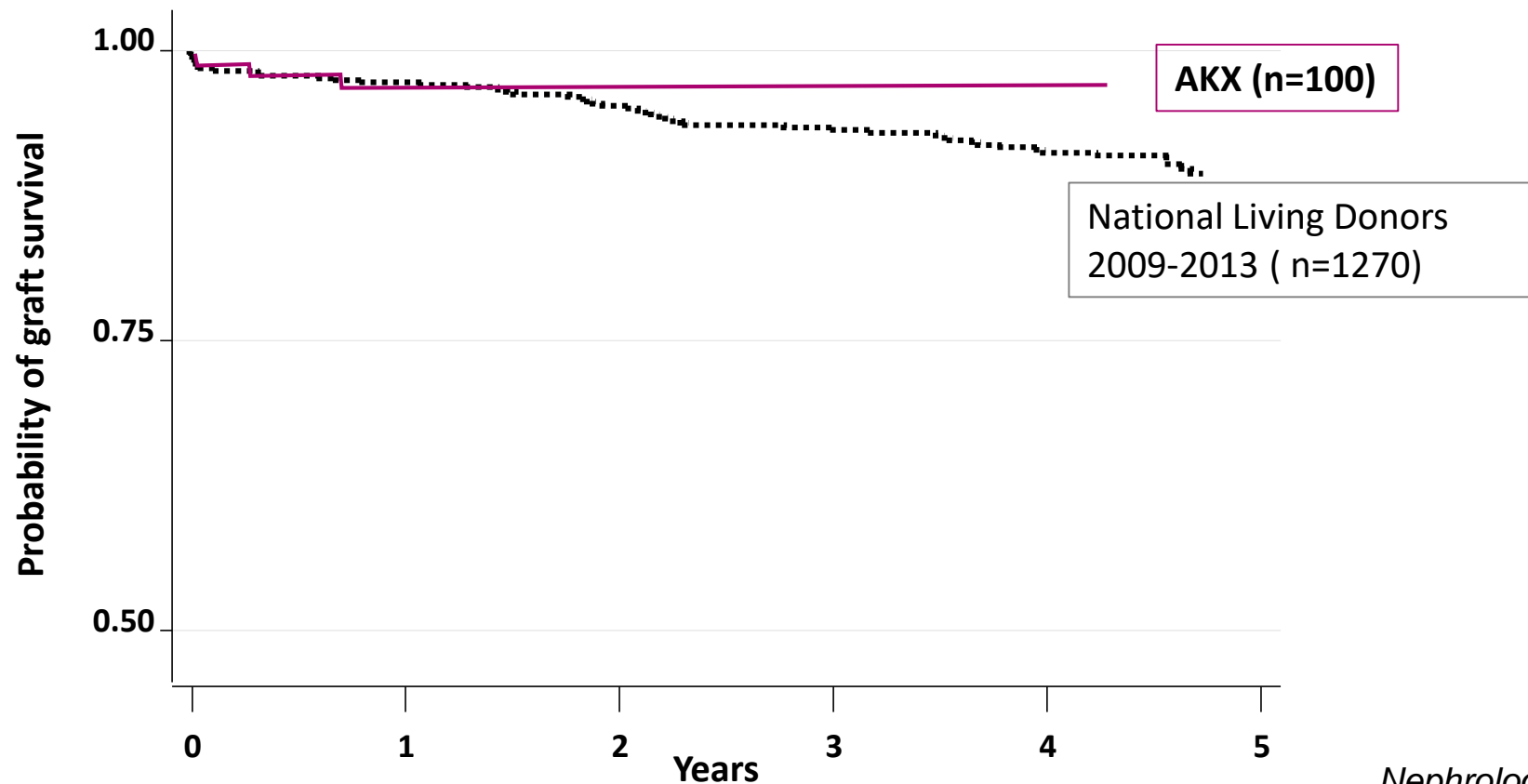


Outcomes: graft survival

Review Article

Four years of experience with the Australian kidney paired donation programme

LINDA CANTWELL,¹ CLAUDIA WOODROFFE,² RHONDA HOLDSWORTH¹ and PAOLO FERRARI^{2,3}



Evolution of AKX

1. Non-directed altruistic donors
2. ABO incompatible matching
2. Increase size of closed chains
 - Progressively from 2-3 to 6
3. Allow HepB core antibody positive donors to enter
 - Recipients pre-consent to receive kidneys from these donors
5. Inclusion of compatible pairs

Evolution of AKX

1. Non-directed altruistic donors

2. ABO incompatible matching

2. Increase size of closed chains

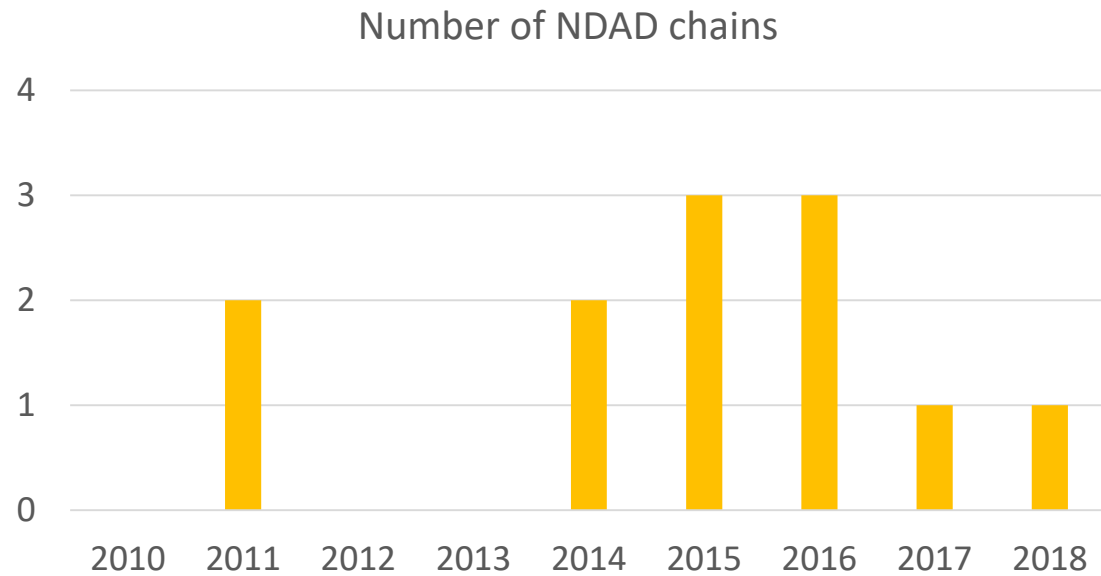
- Progressively from 2-3 to 6

3. Allow HepB core antibody positive donors to enter

- Recipients pre-consent to receive kidneys from these donors

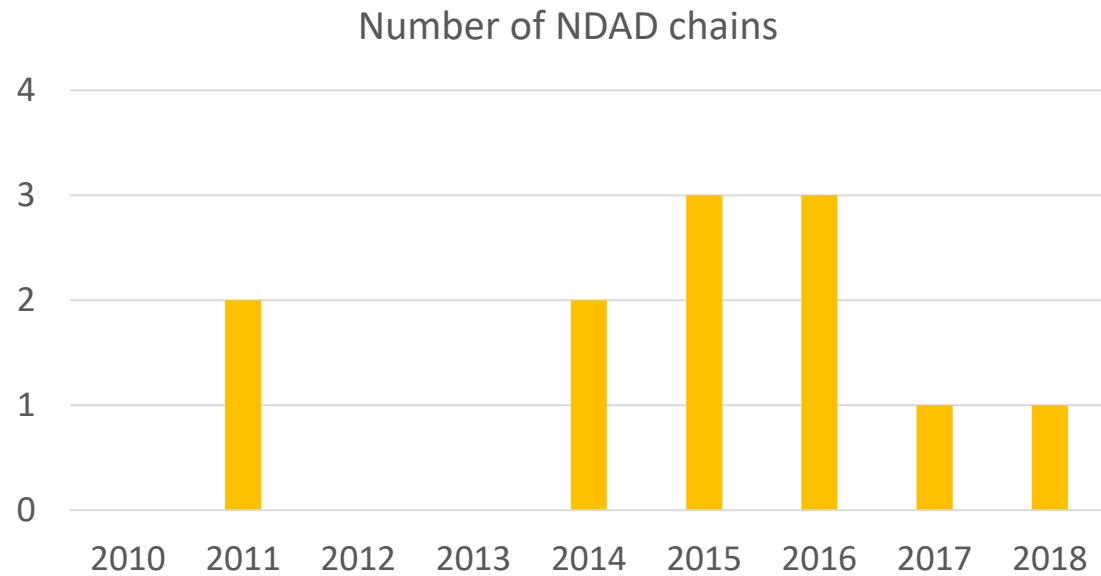
5. Inclusion of compatible pairs

Non Directed Altruistic Donors

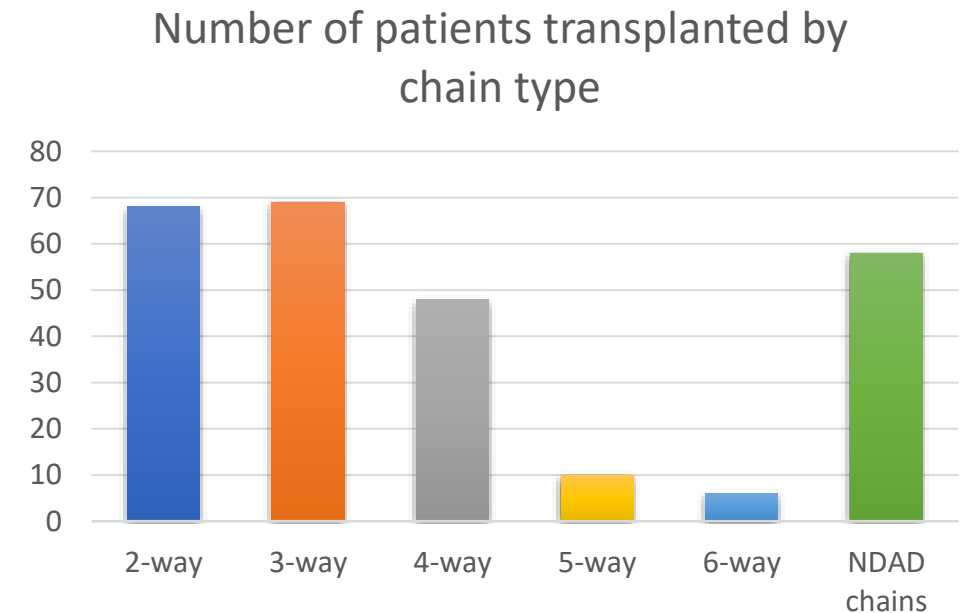
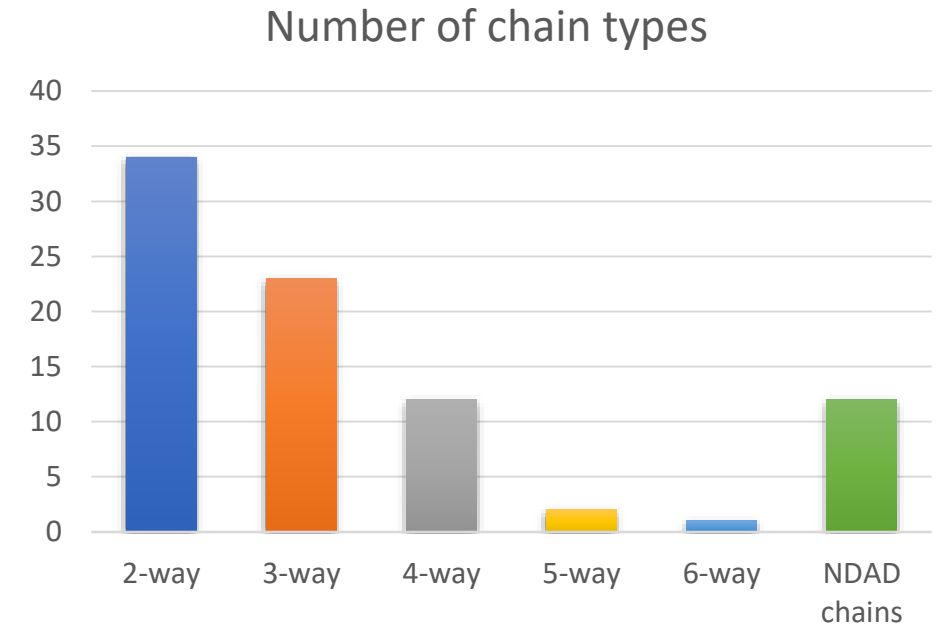


- 14% of chains have been initiated by a NDAD (12 of 84)
- 22% of patients have been transplanted in a NDAD chain

Non Directed Altruistic Donors



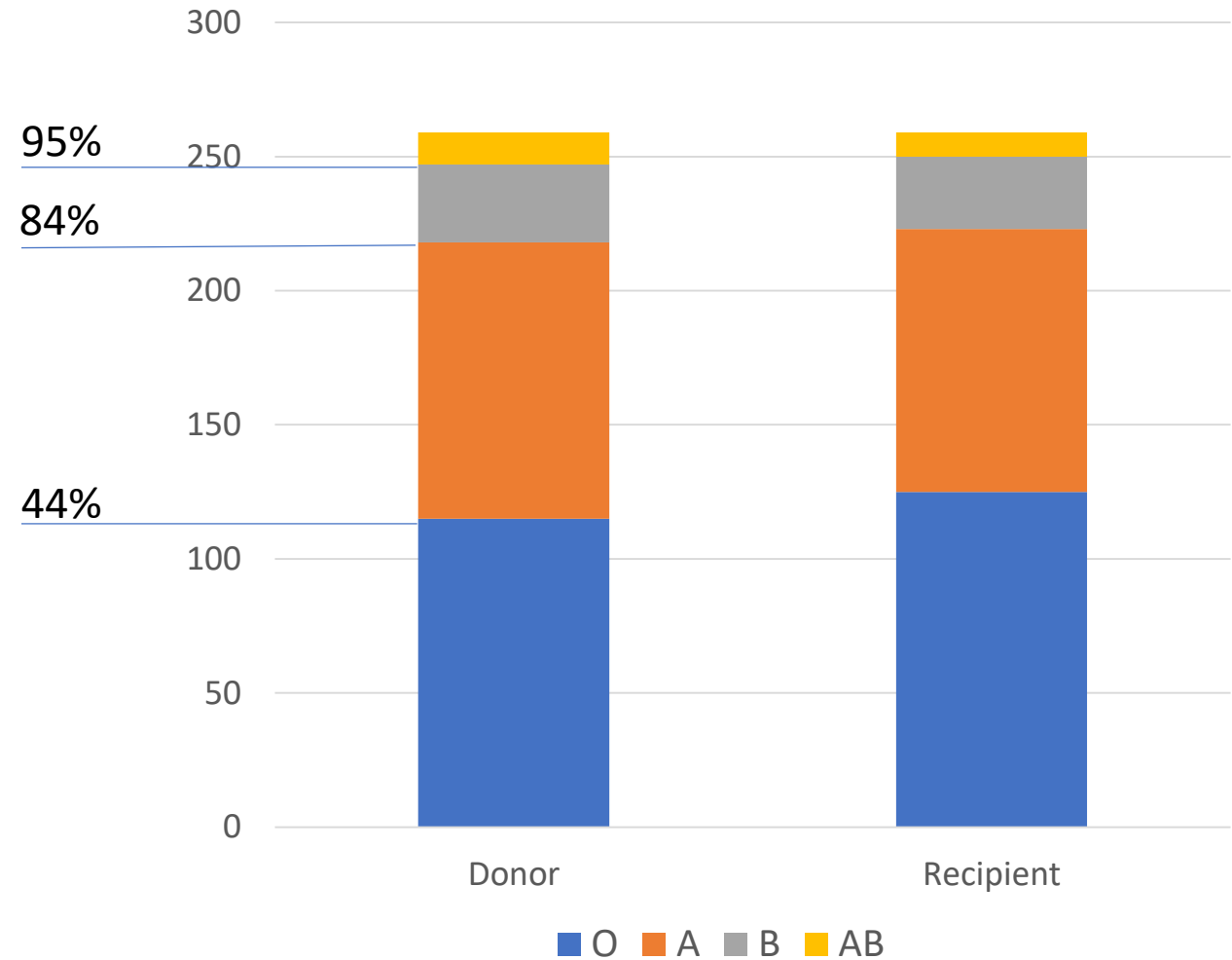
- 14% of chains have been initiated by a NDAD (12 of 84)
- 22% of patients have been transplanted in a NDAD chain



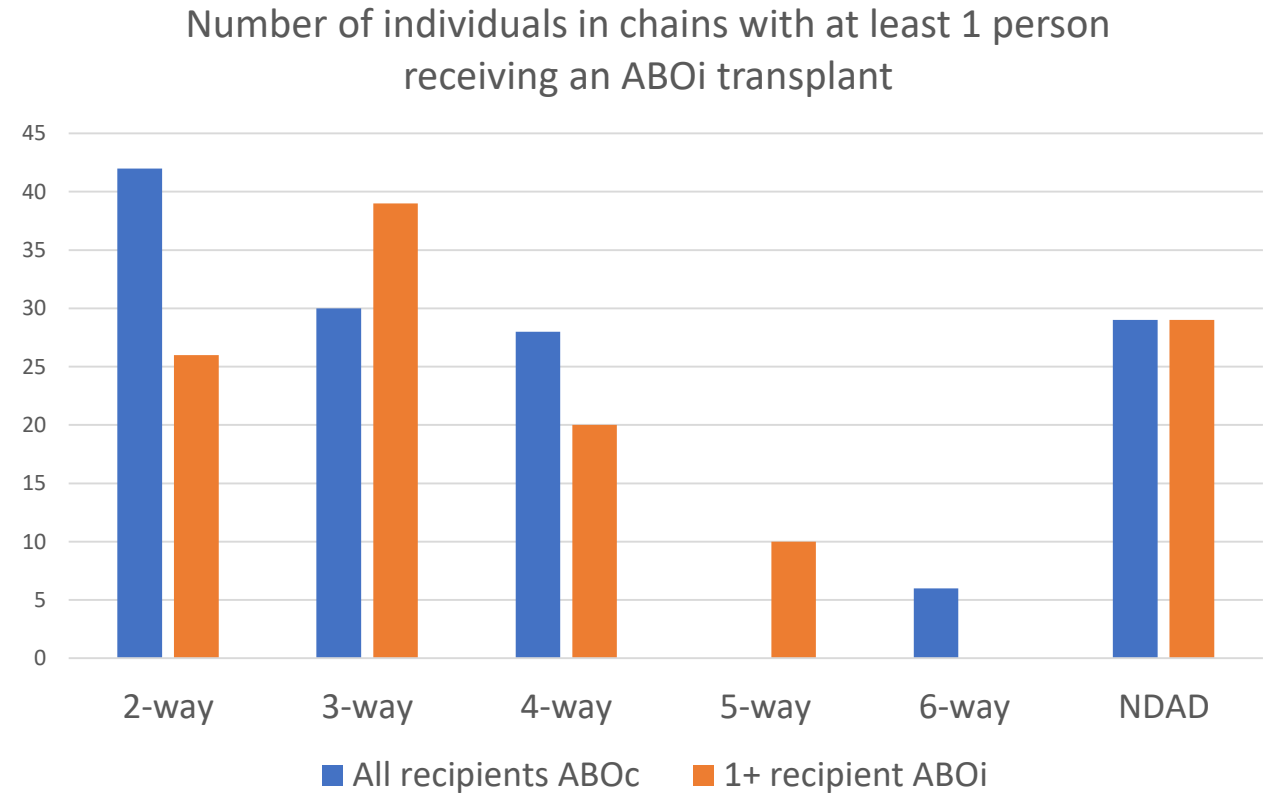
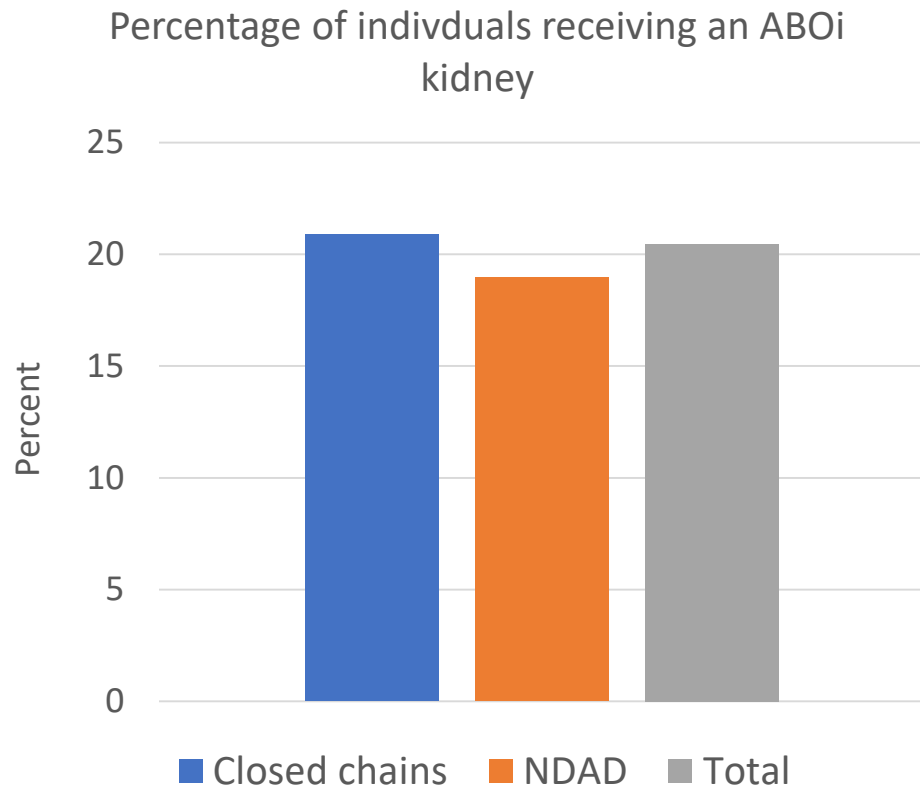
Blood groups in AKX

O recipient accepting:

- O 44% of pool
- O and A 84% of pool
- O and B 59% of pool
- Any 100% of pool



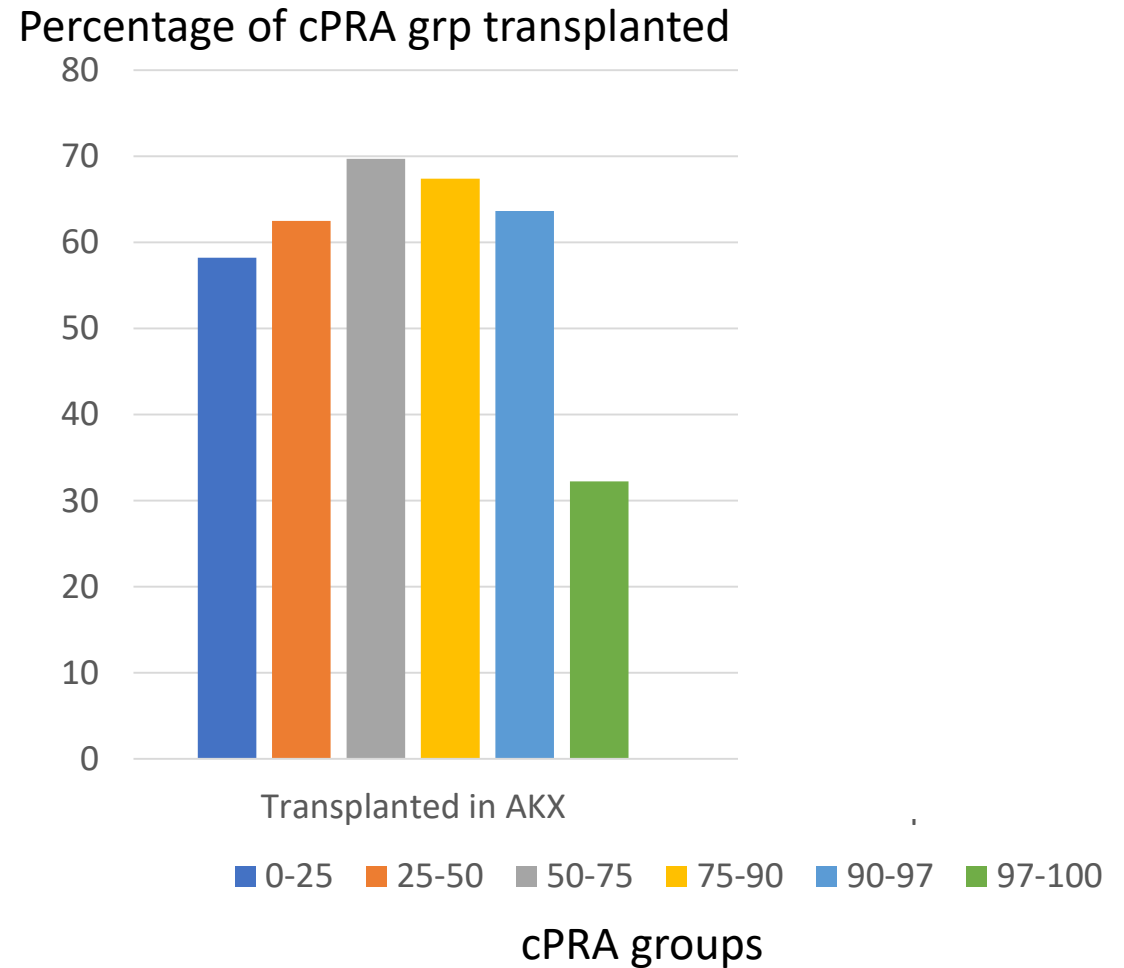
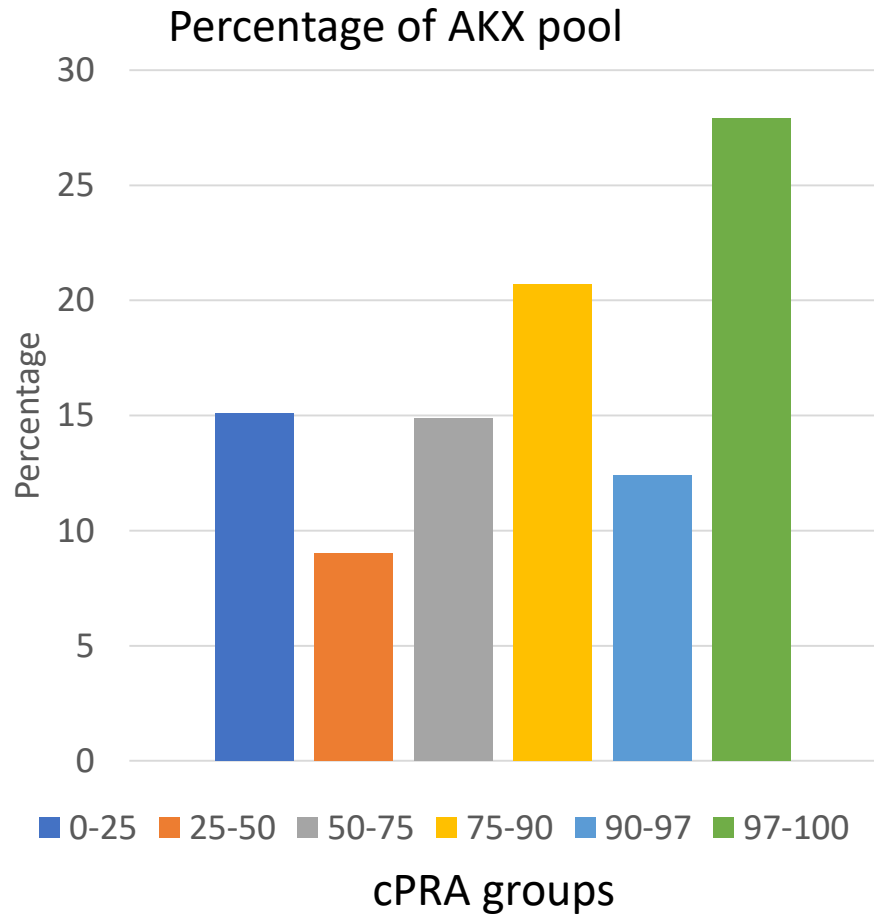
ABOi participants



In total 20.5% of recipients received an ABOi transplant:

- this involved 45.2% of chains
- 47.9% of recipients were in one of these chains (122/257)

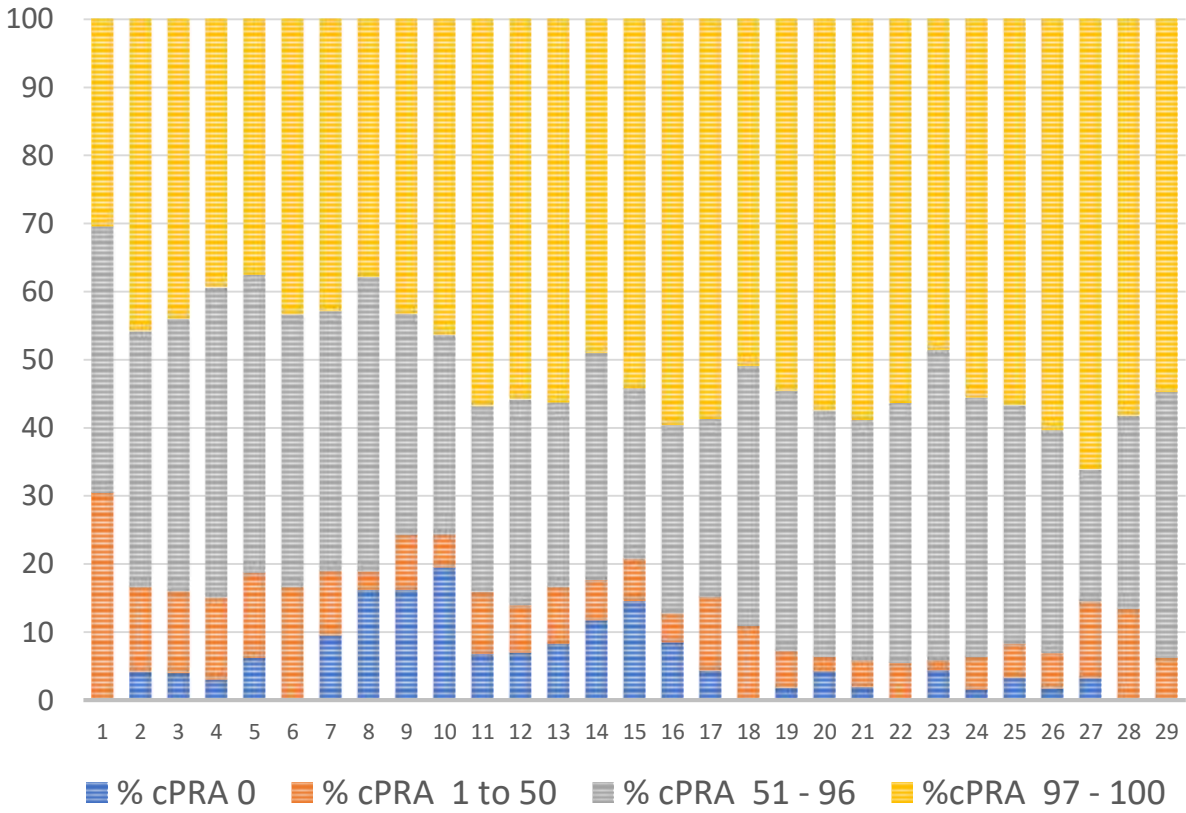
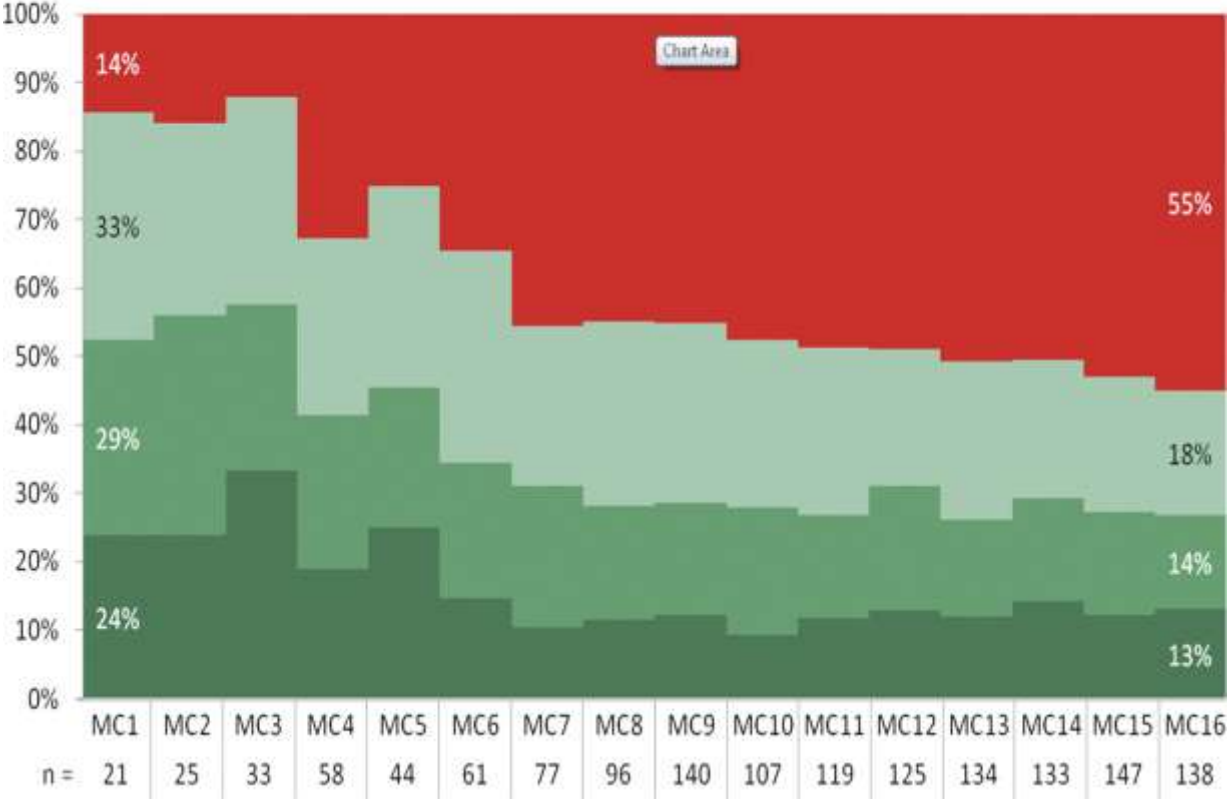
Transplant rate by cPRA



Highly sensitised patients accumulate in the pool

cPRA of Registered Candidates Through Time

■ cPRA 0% ■ cPRA 1% - 50% ■ cPRA 51% - 96% ■ cPRA 97%+



Cole EH et al. Transplantation 2015; 99:985-90

Compatible pairs

- Variable level of (in)compatibility
 - Positive crossmatch
 - DSA with low positive flow cytometric crossmatch
 - DSA with negative crossmatch
 - Woman with previous pregnancies with partner as donor
 - Young recipient with very high number of eplet mismatches against own donor
- All of the above with or without ABO incompatibility
- Who is this more relevant to?
 - Younger recipients
 - Higher rate of dnDSA formation
 - More likely to require a second or third transplant
 - Pre-emptive recipients
 - Those with poor matching at an epitope or eplet level

Other possible future changes

1. Explore the possibility of matching between match runs
 - Increase the flexibility to allow more pairs to enter
 - Particularly those with lower levels of incompatibility
2. Never ending NDAD chains
 - Rather than the final donor donating to a transplant waiting list recipient, they act as a bridge donor and restart the chain at a later date
3. Moving donors not organs
4. Non simultaneous

Success for a PKX program

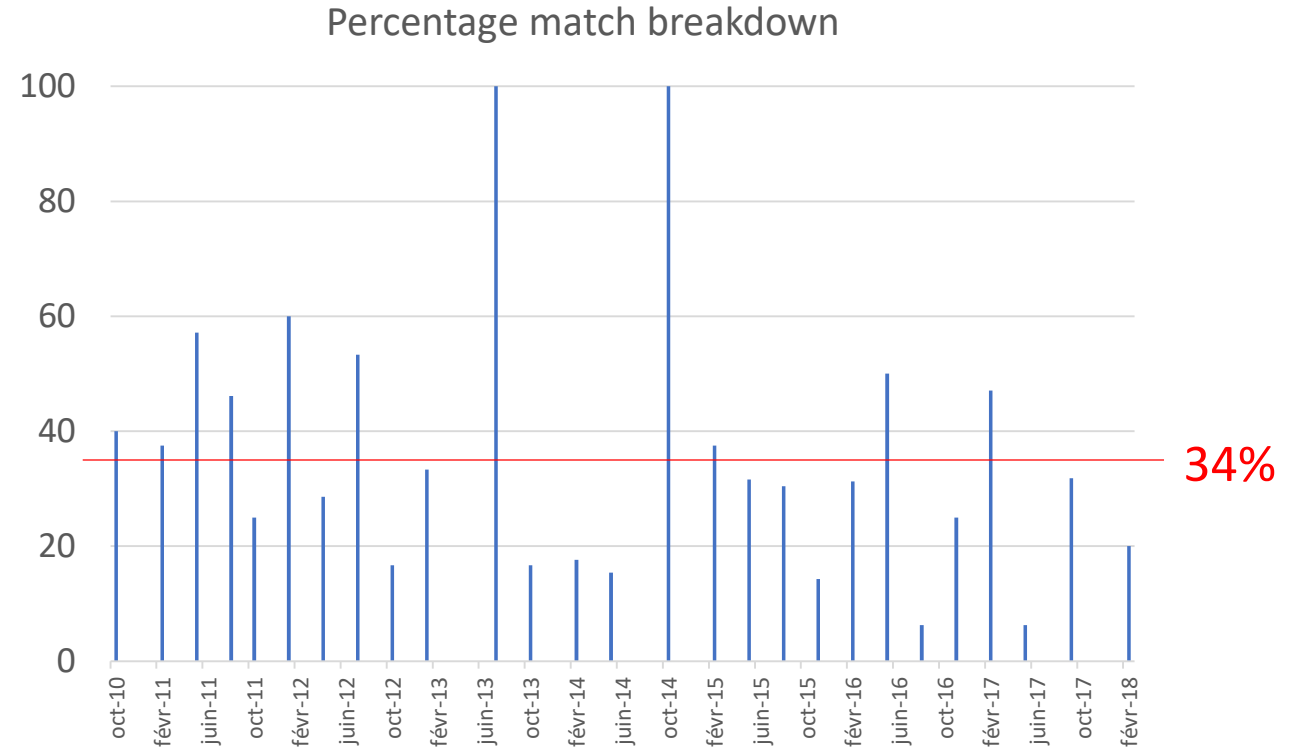
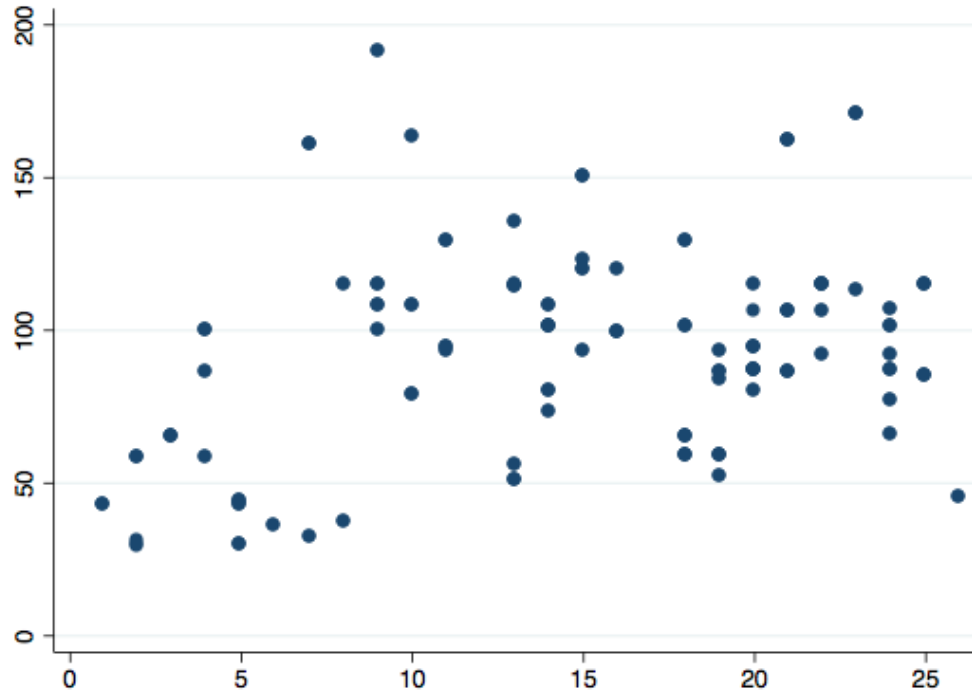
1. Fit for purpose
2. Organisational support
3. Oversight committee
4. Defined (donor and recipient) criteria
5. Flexibility to grow and respond
6. Data collection

Acknowledgements

Peter Hughes- Director AKX

Linda Cartwell- Tissue typist

Time from match to transplant and rate of chain breakdown



- Overall, 34% of chains breakdown prior to transplantation (after an offer is accepted and crossmatches performed)