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The UK Living Kidney Sharing Scheme

Rachel Johnson and Lisa Burnapp
NHS Blood and Transplant

Outline

Rachel:

- Introduction
- Development of the current UK exchange scheme
- Current activity

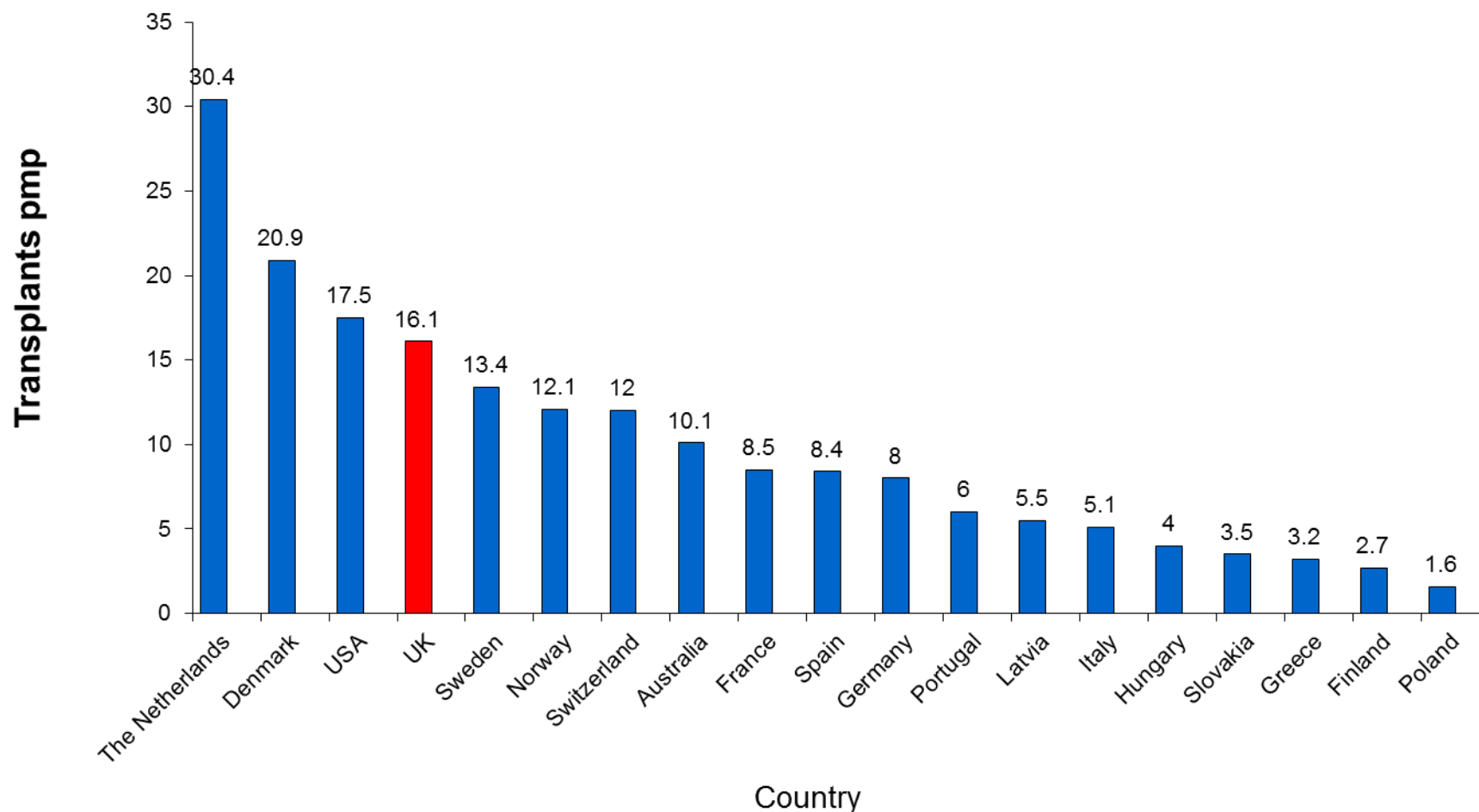
Lisa:

- Operational aspects of the scheme
- Challenges and opportunities
- Summary

Introduction

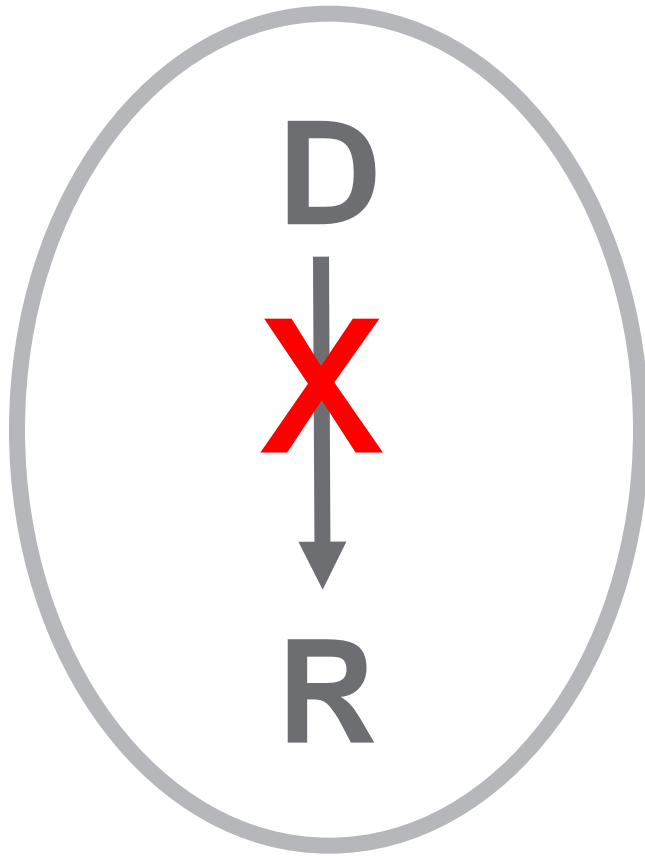
Living donor kidney transplant rates

Living donor kidney transplant rates for Europe, Australia and the USA, 2015



Living kidney donation

Potential Donor-Recipient pair

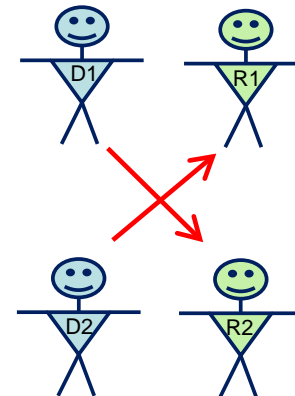


- Blood group incompatibility
- Positive crossmatch

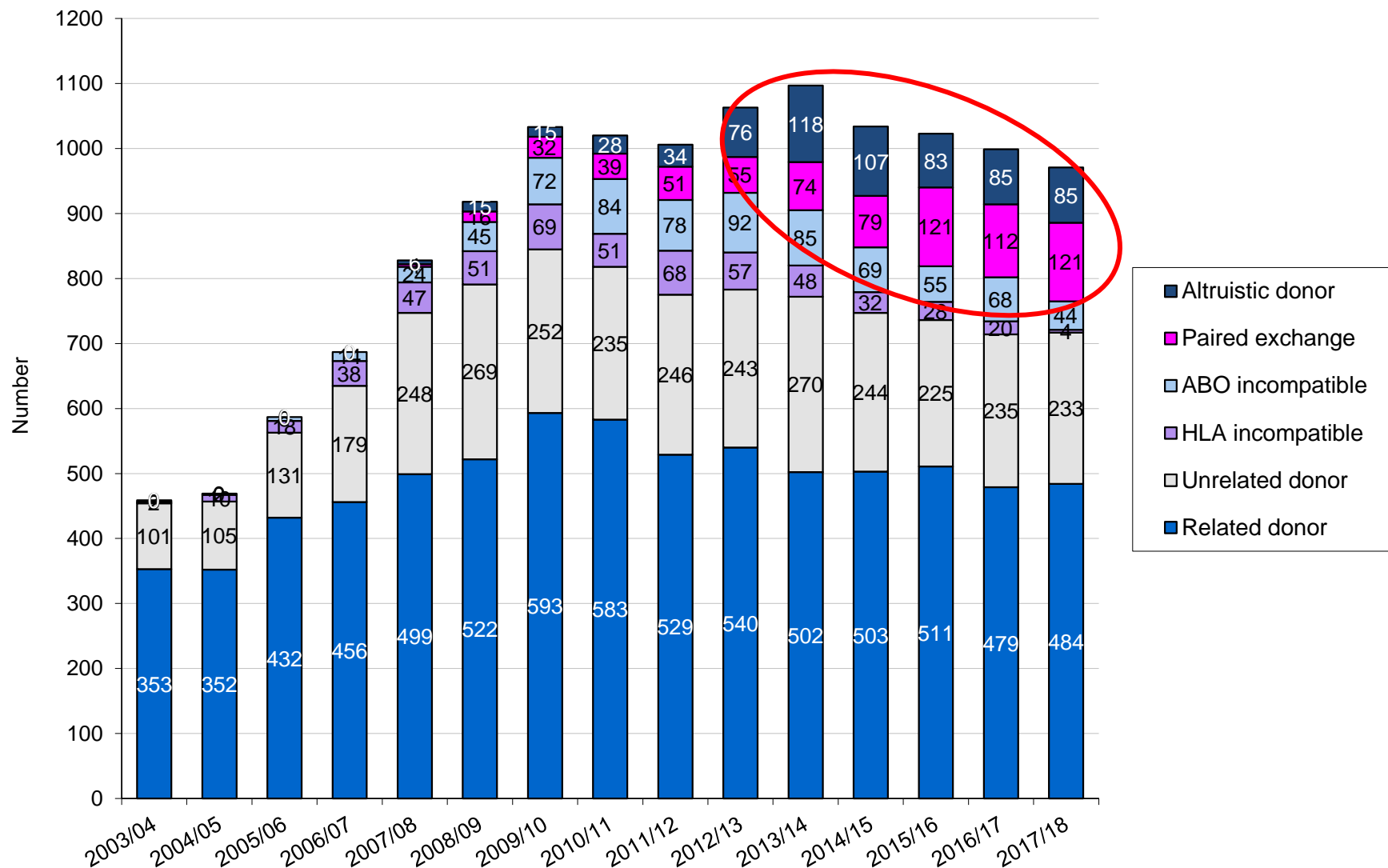
Approx 20-30% of possible living donor transplants

Background

- September 2006 Change in legal framework
Development of national scheme including matching algorithm
- April 2007 First paired exchange matching run
First non-directed altruistic donation
- Ongoing Review and refinement of the sharing schemes



UK Living Donor Kidney Transplants

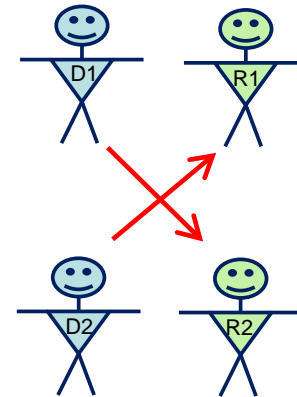


Development of the current UK scheme

Simple beginnings

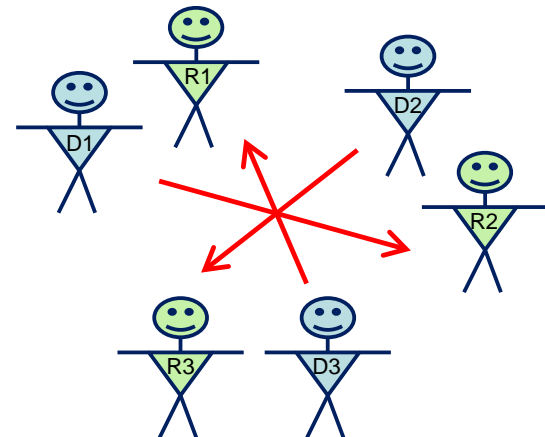
2007:

For the first year only 2-way exchanges were considered in the scheme of HLA and / or blood group incompatible pairs



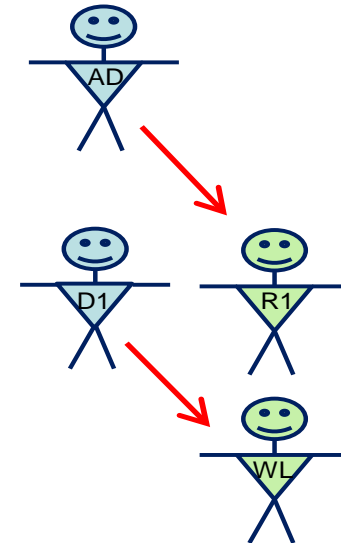
2008:

After one year, 3-way exchanges were also considered



Changes to scheme in 2012

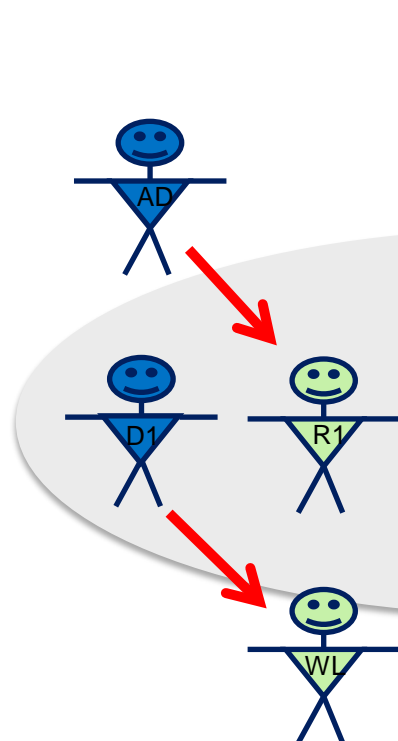
- Short altruistic donor chains introduced
- Compatible pairs can join
- Patients can be registered for blood group or HLA incompatible transplant through the scheme



Further changes in 2015 & 2018

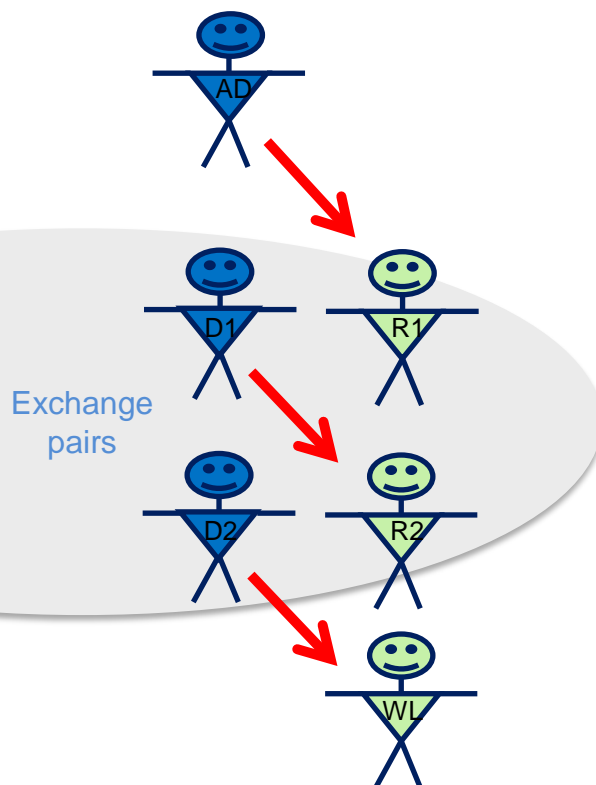
2012:

Short Altruistic Donor Chain



2015:

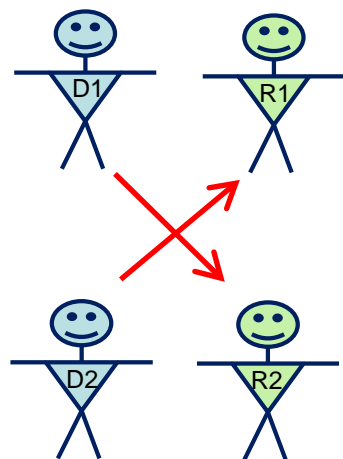
Long Altruistic Donor Chain (and non-simultaneous surgery in chains)



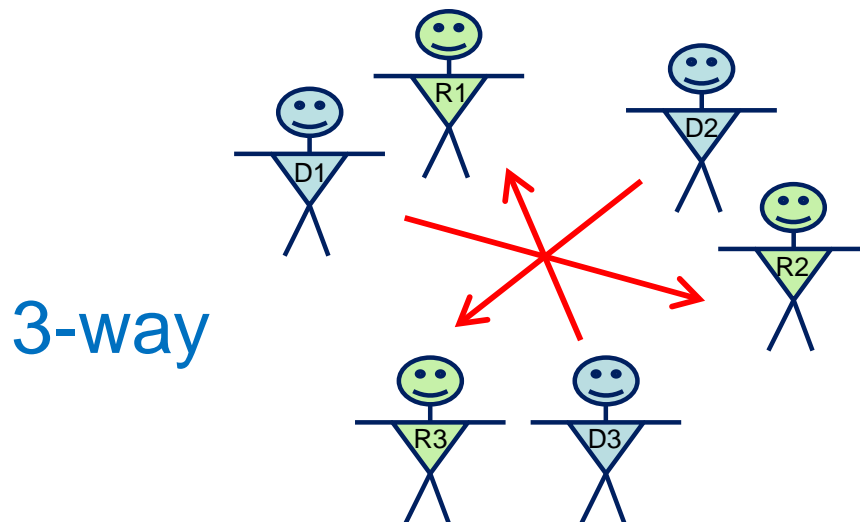
2018:

Chain donation is default option for altruistic donors (rather than have option of donation direct to waiting list)

The scheme today - matching runs identify....

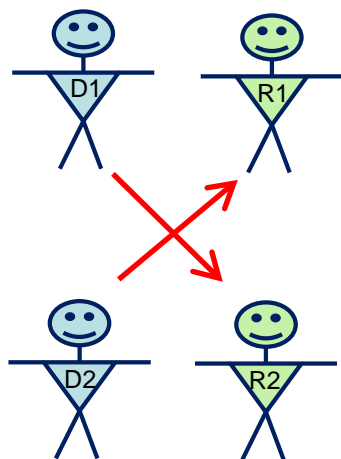


2-way



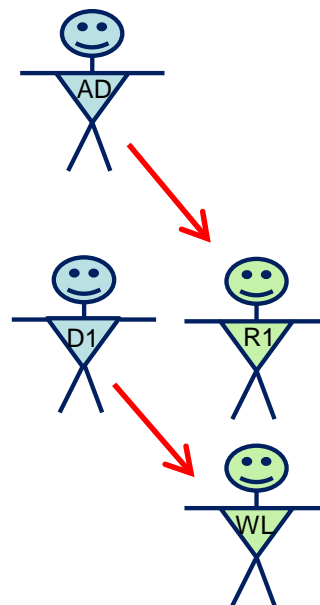
3-way

The scheme today - matching runs identify....

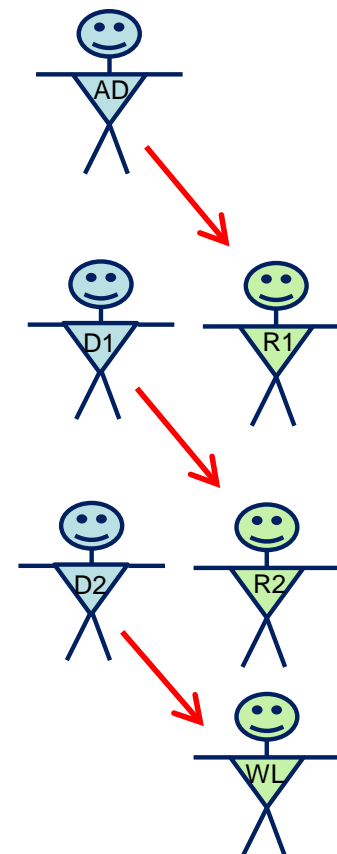


2-way

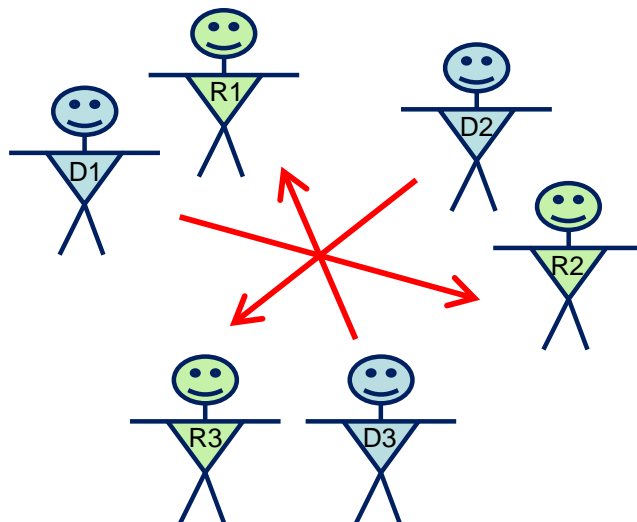
Short Altruistic Donor Chains



Long Altruistic Donor Chains

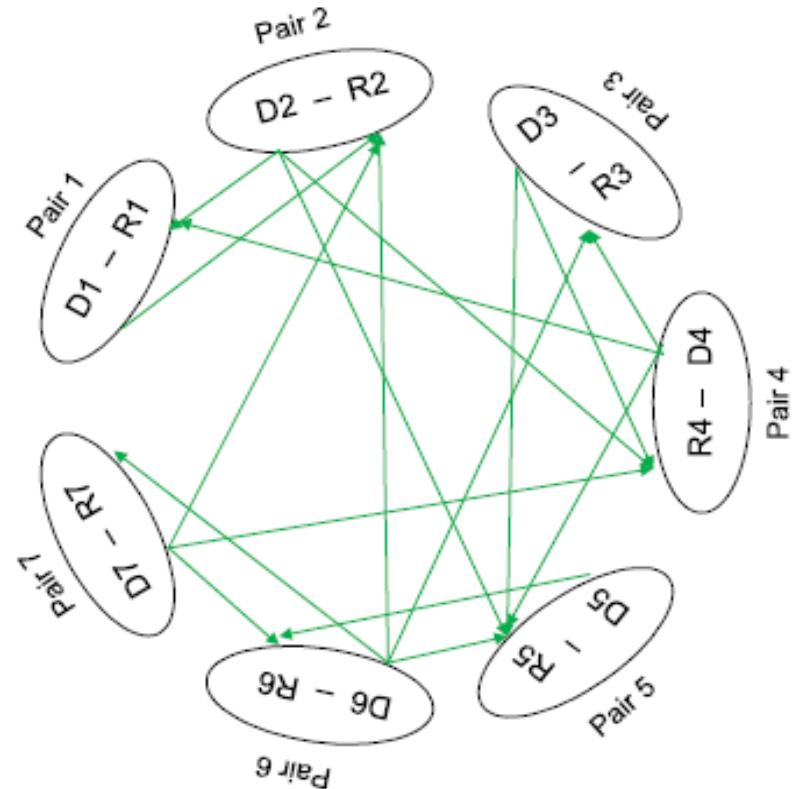


3-way



Identifying Optimal Combination of Transplants

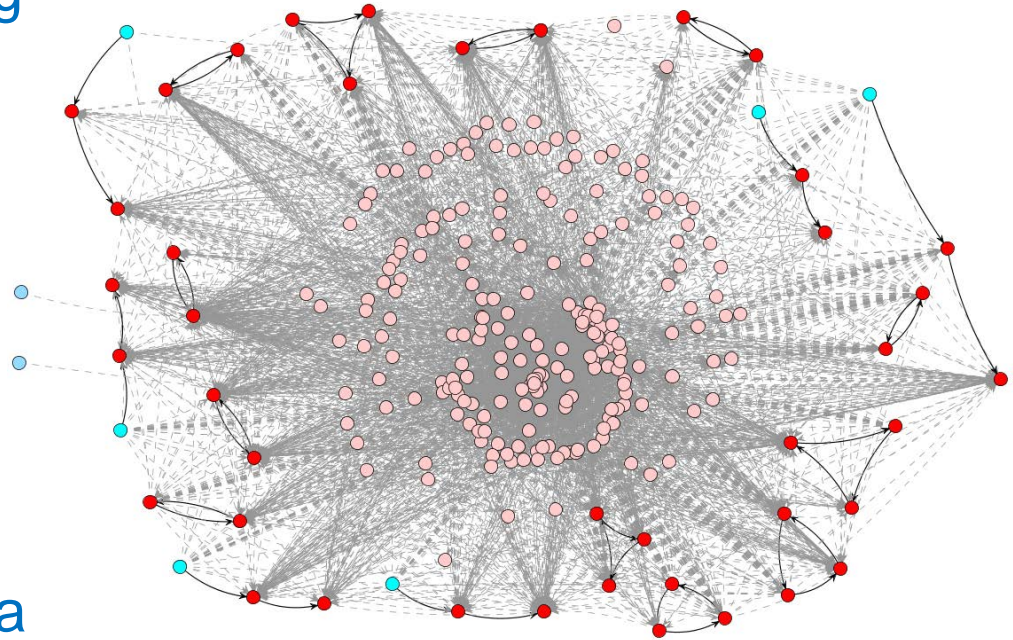
- Over 200 pairs every 'matching run'
- This results in 2000-5000 arcs (donor-recipient matches)
- Arcs are weighted to give preference to certain matches
- Seek to maximise number of transplants according to criteria developed with transplant community



*Matching software implemented by colleagues at University of Glasgow,
School of Computing Science*

Identifying Optimal Combination of Transplants

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Acknowledgement: Tommy Muggleton

*Matching software implemented by colleagues at University of Glasgow,
School of Computing Science*

Optimal Combination of Transplants¹

1. Maximise 2-way exchanges (inc. embedded in 3-way)
2. Maximise number of transplants
3. Minimise 3-way exchanges
4. Maximise 3-way with embedded 2-way and long chains
5. Maximise 'score' of set of transplants

Score based on

- Previous matching runs for patient
- Sensitisation of patient
- HLA mismatch of identified transplant
- Donor-donor age difference

¹Matching software implemented by colleagues at University of Glasgow, School of Computing Science

Other scheme developments considered

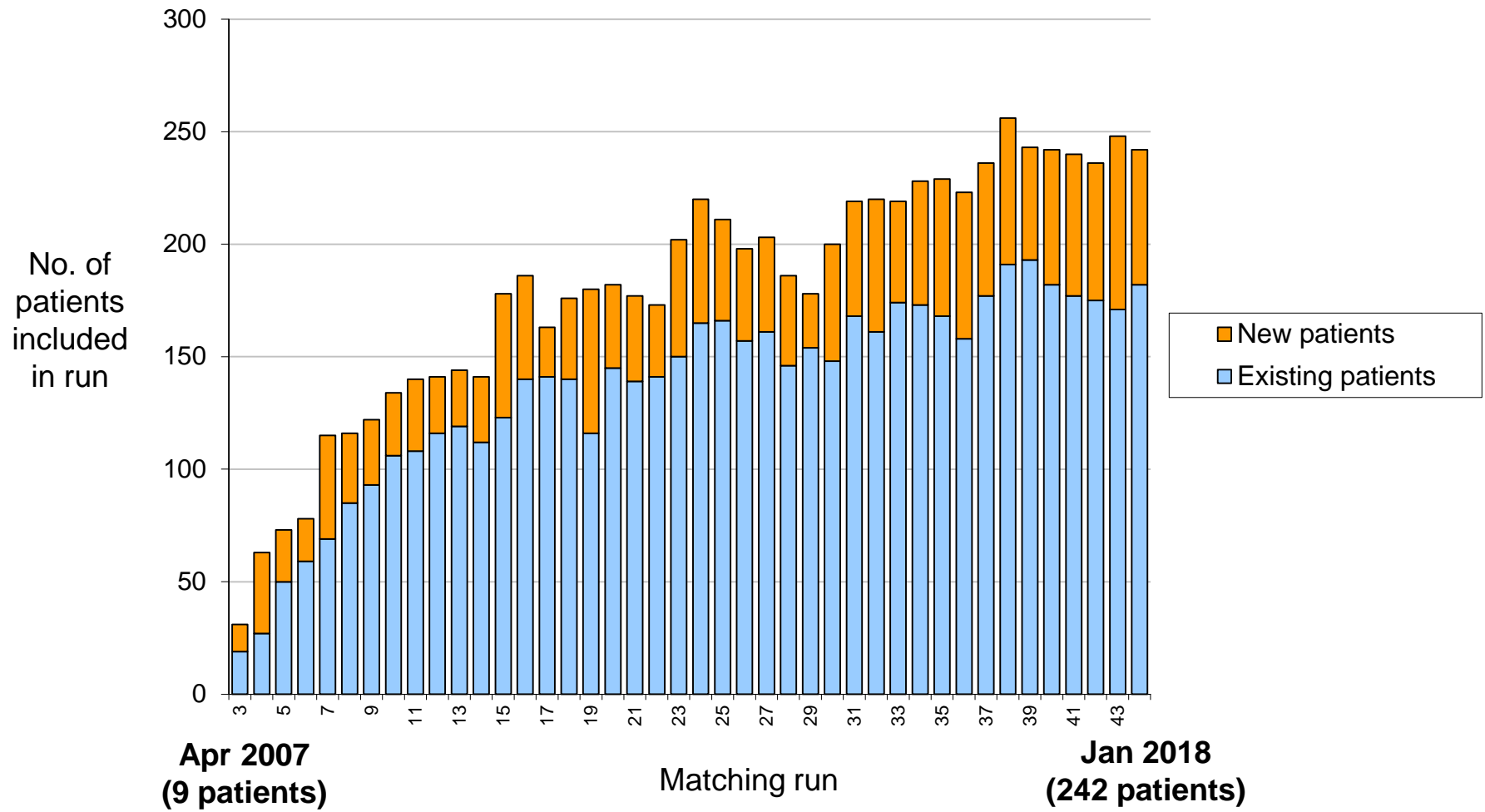
- 1 Should we run the matching more frequently?
- 2 Should we match altruistic donors as and when they arise?
- 3 What about Non-simultaneous Extended Altruistic Donor (NEAD) chains?

No conclusive (simulation) evidence of any strong benefit of such changes:

Policy	Transplants over 5 years
Current scheme policy	(Baseline)
Matching runs every 2 months	+ 3%
Matching altruistic donors every week	- 2%
NEAD chains	+ 2-3% (2% renege rate) - 7% (10% renege rate)

Current activity

Number of Patients in Quarterly Matching Runs

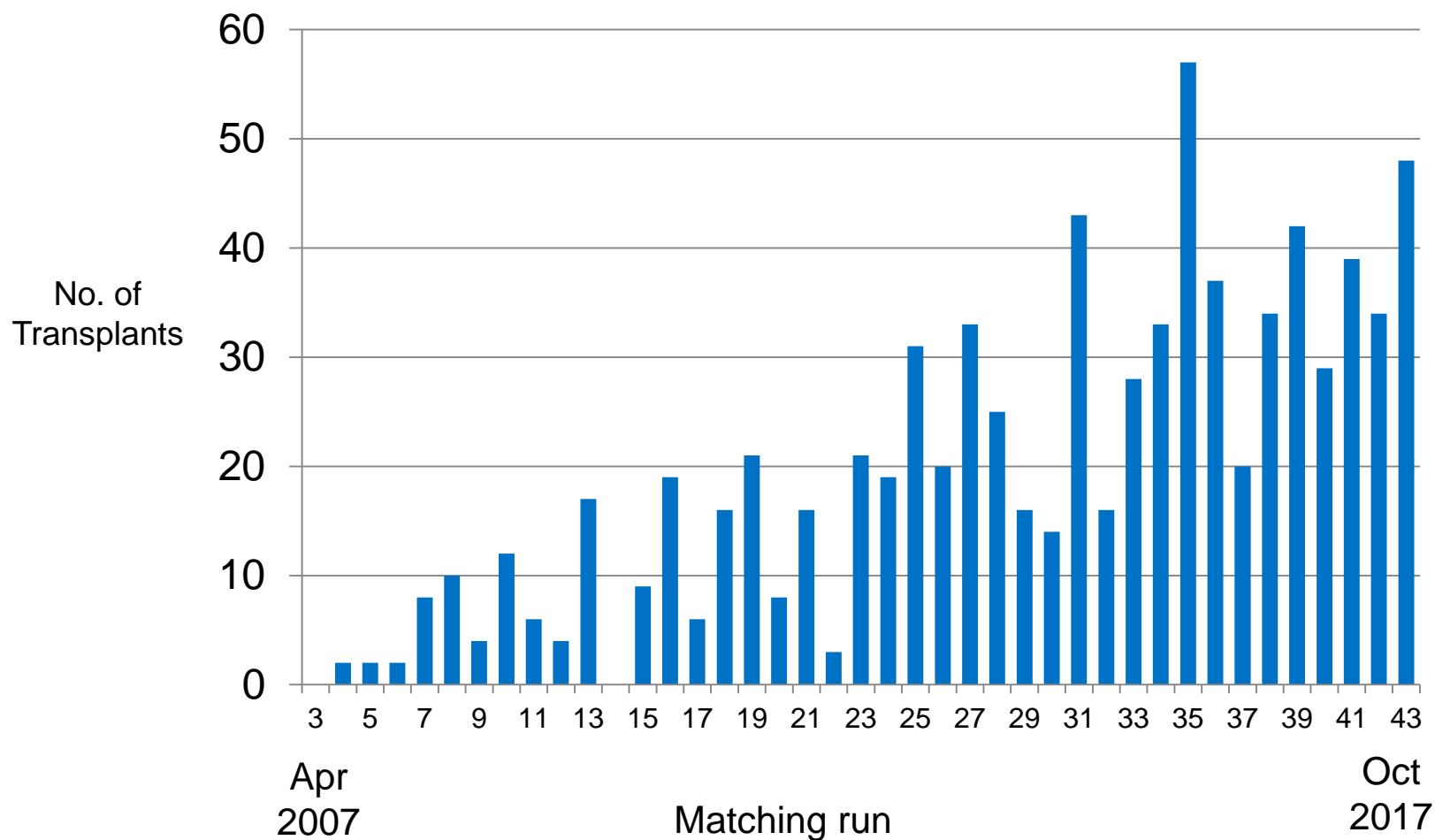


Summary of Registered Patients

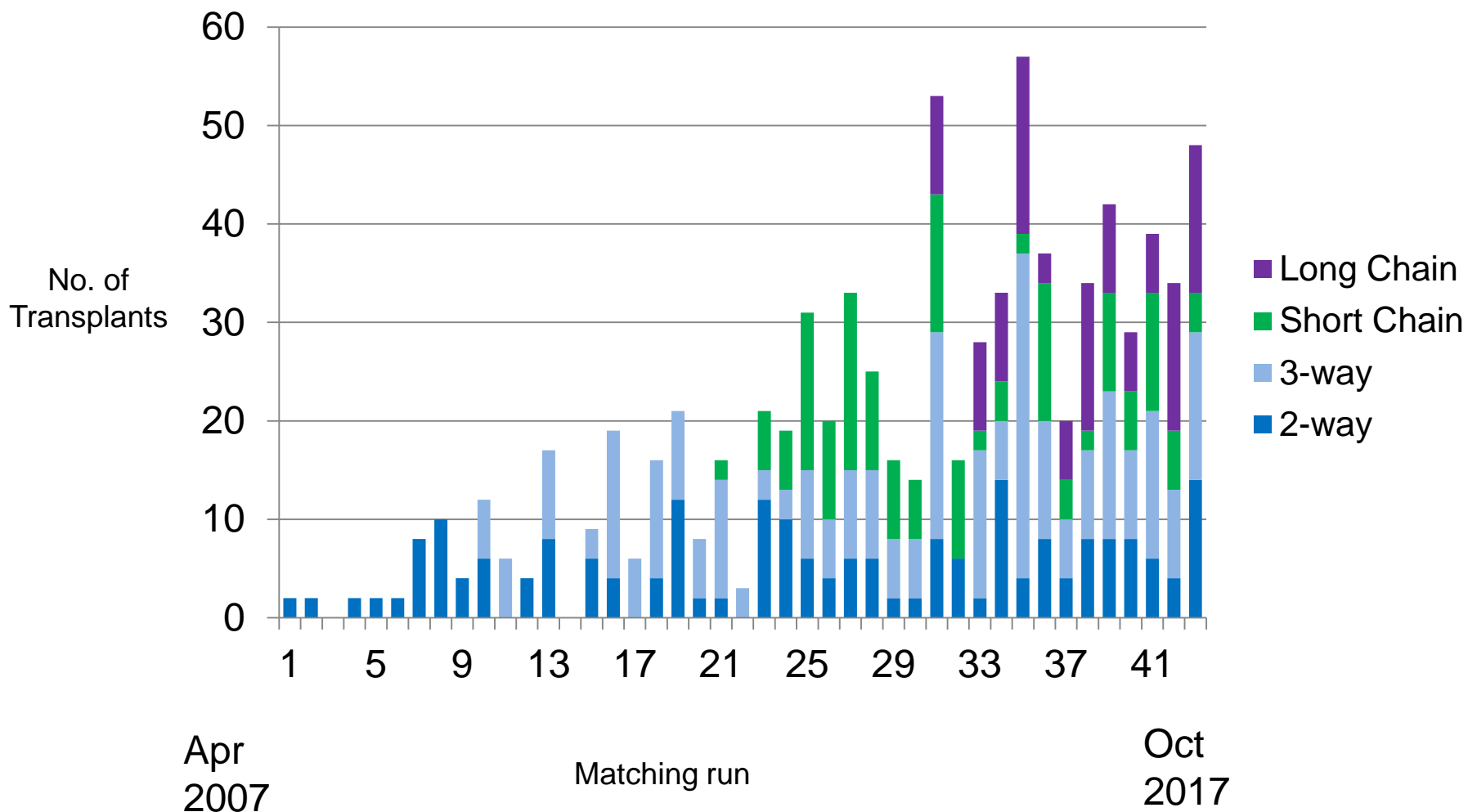
Of 1874 patients (2068 pairs) enrolled (to Jan 2018)

- 44% spouse/partner pairs, 55% female patients
- Mean age at first matching run 46 years (range 2-78 yrs)
- 61% HLA incompatible, 34% ABO incompatible, 5% compatible pairs
- 42% patients with high level of antibodies ($\geq 85\%$ sensitised)

Number of Transplants



Transplants by Exchange Type



Chance of transplant by blood group

2012 - 2017

Recipient ABO

Donor
ABO

	O	A	B	AB
O	95/307 (31%)	81/144 (56%)	21/43 (49%)	6/12 (50%)
A	106/429 (25%)	56/192 (29%)	27/57 (47%)	2/14 (14%)
B	32/107 (30%)	21/54 (39%)	13/44 (30%)	1/6 (17%)
AB	4/17 (24%)	8/16 (50%)	3/14 (21%)	0/5 (0%)

Chance of transplant by blood group

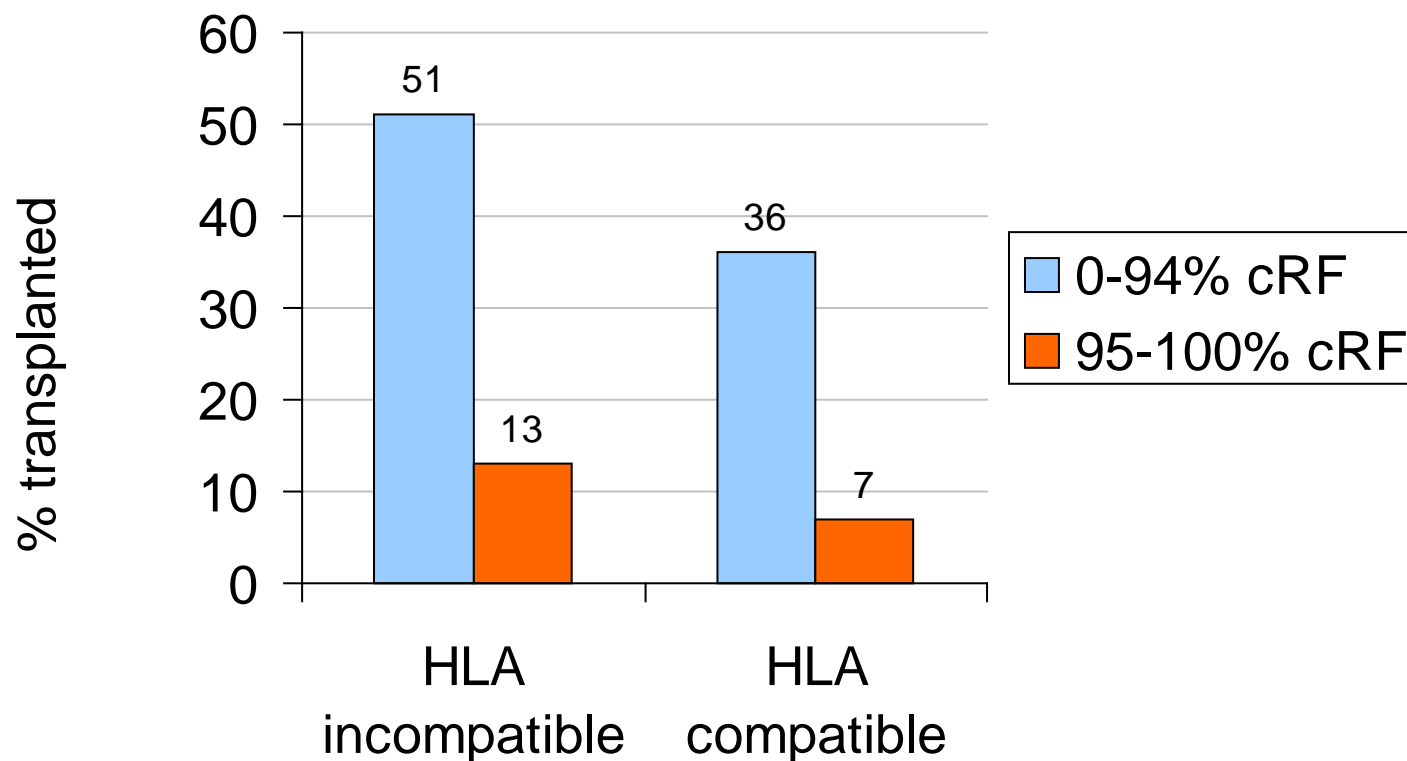
2012 - 2017

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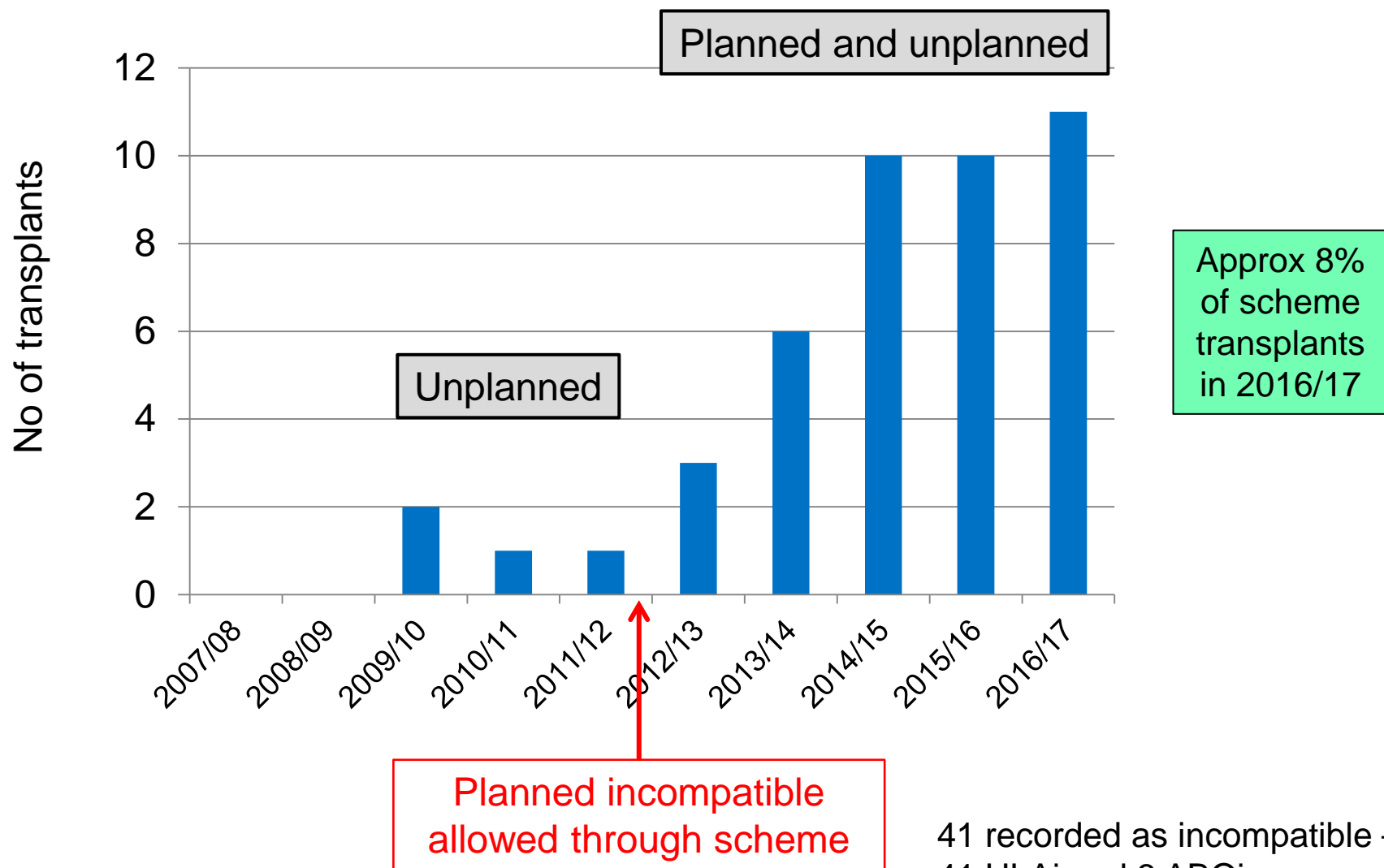
Chance of transplant by cRF*



* Calculated Reaction Frequency

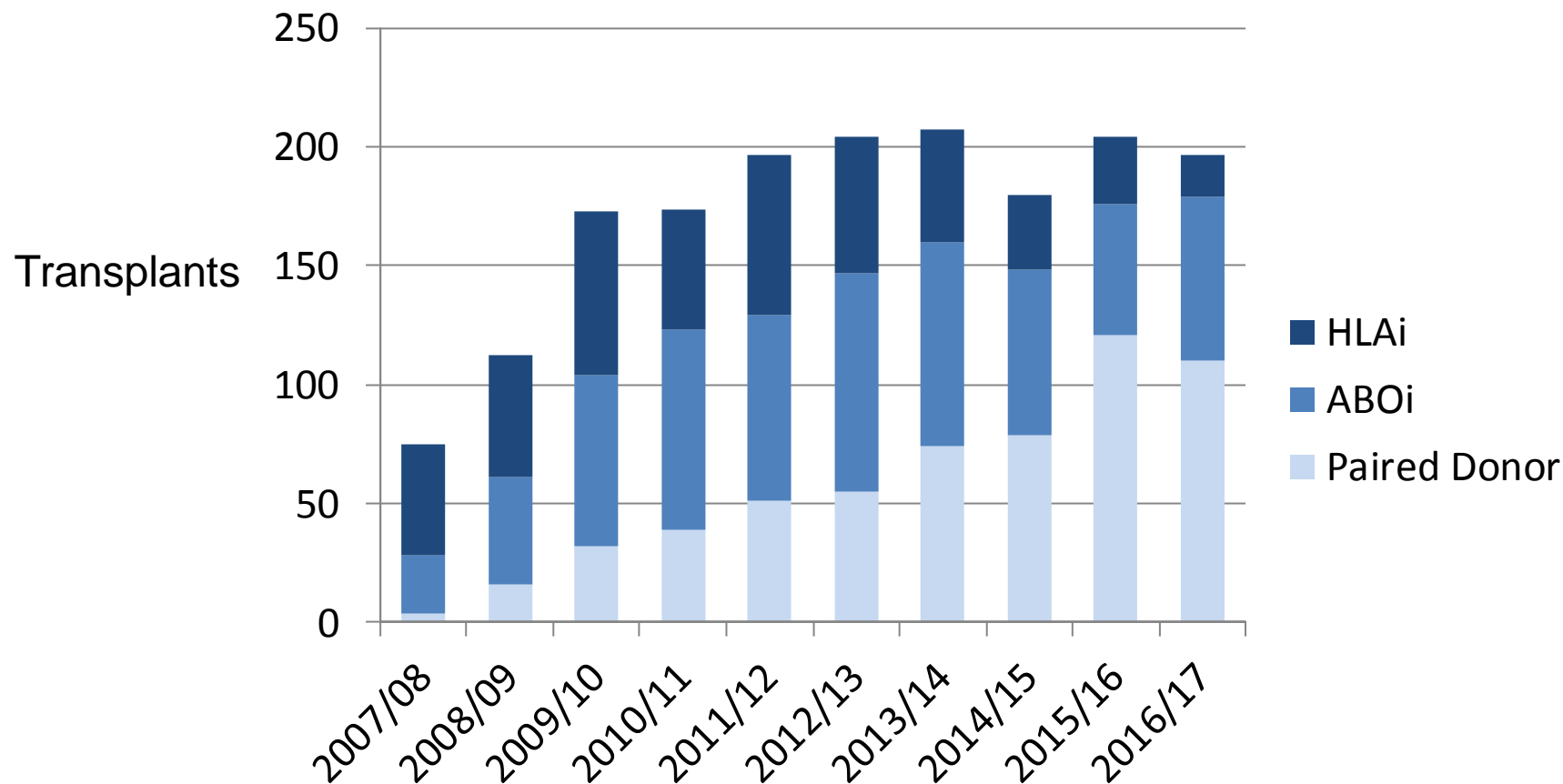
(overall to Jan 2018)

Antibody incompatible transplants through the scheme

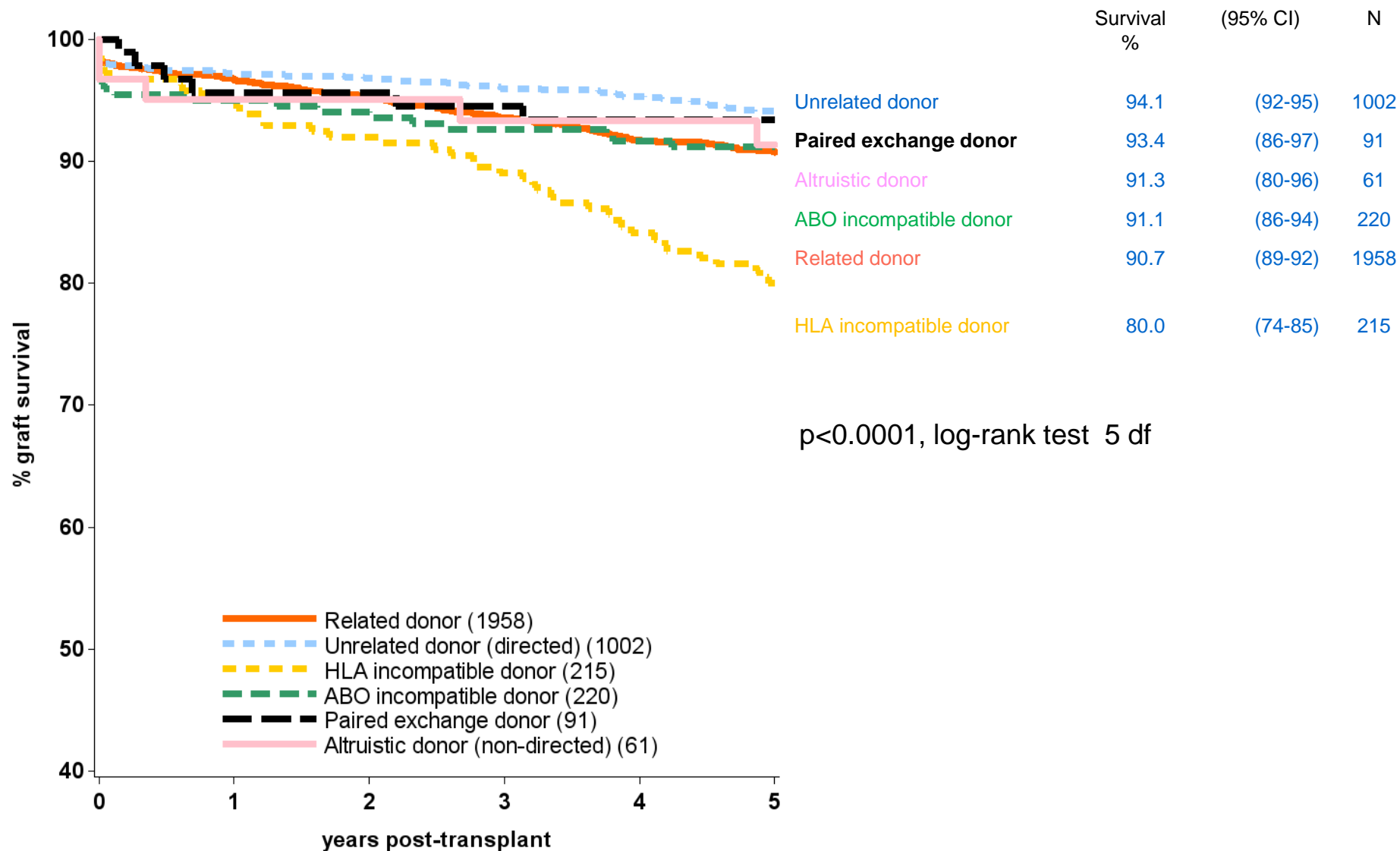


41 recorded as incompatible –
41 HLAi and 3 ABOi

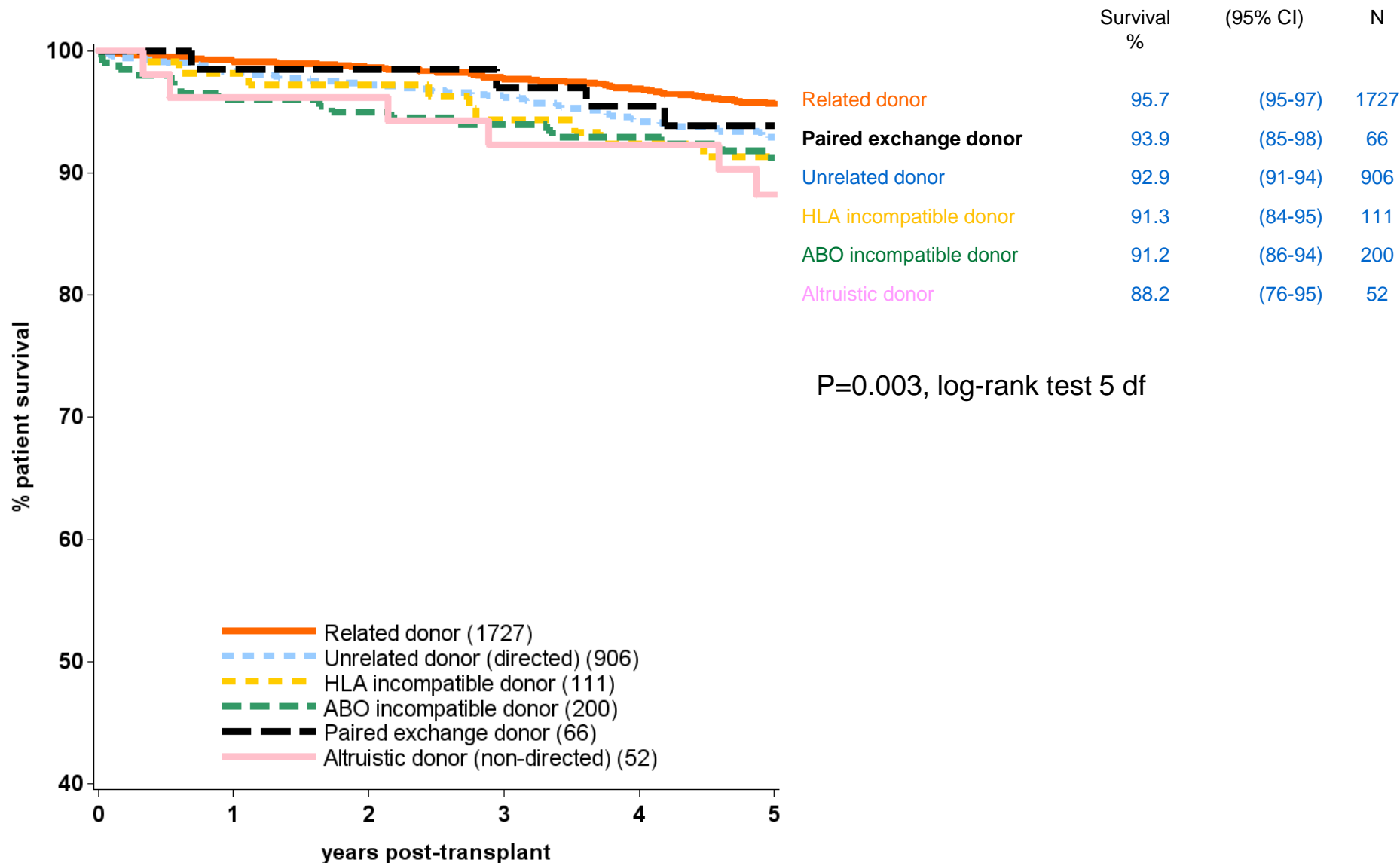
Impact on Antibody Incompatible Transplants



Survival Outcomes – Graft Survival

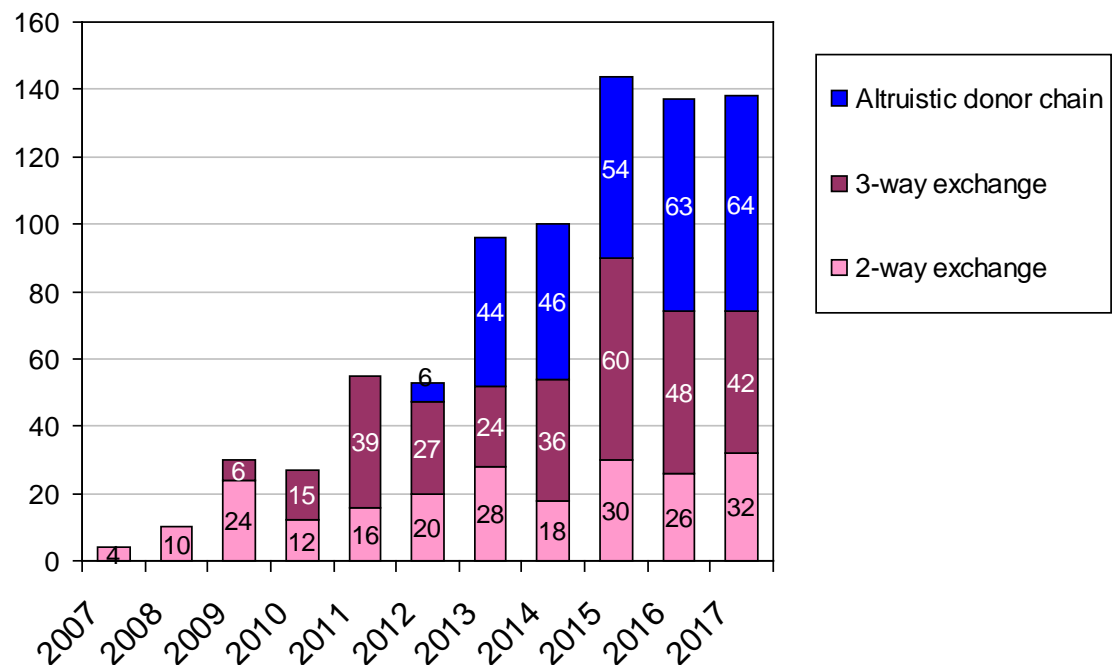
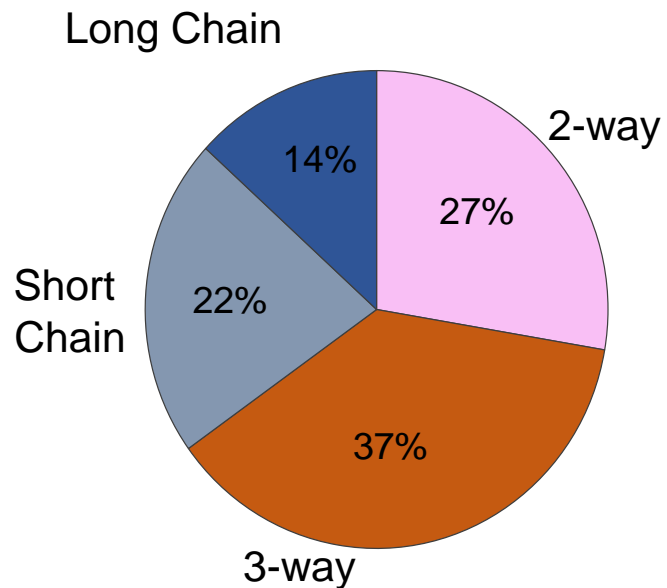


Survival Outcomes – Patient Survival



Summary of activity

- 1874 patients registered in the scheme since 2007
- 842 patients have received a transplant through the scheme



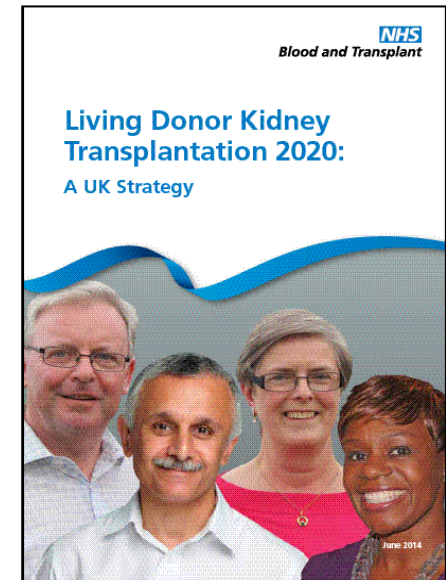
- 15 transplants in children
- 32 transplants (44% of registered) for compatible pairs = transplants for 50 others

Making it happen.....

Our Ambition

Maximise opportunities for donors and recipients to contribute to and benefit from the UKLKSS by ensuring that the schemes are clinically and cost effective

- 75% of matched donors proceed to donation and achieve maximum number of transplants
- All donors and recipients proceed to surgery within 8 weeks of a suitable match being identified



“To match world class performance in living donor kidney transplantation”

Operational Aspects

Key Characteristics

- UK-wide scheme; centrally run by NHSBT
 - All UK transplant centres participate (adults & children)
 - All work up complete
 - Recipients can be registered with >1 donor
 - Incompatible and compatible pairs
 - Can define individual age & HLA match requirements
 - Permit simple HLA or ABO incompatible transplants through scheme
 - Kidneys travel
- Annual timetable; quarterly matching runs
- 'Pre-run' to confirm inclusion of potential donor matches
- All recipients suspended from national deceased donor transplant list once match identified

Challenges

- Size and complexity of the scheme; managing success
- Non-proceeding transplants; delays and cancellations
- Timely surgery and simultaneous coordination
- Complex cases; exchange of information between centres
- Completeness of registration data
- Maximising potential of non-directed altruistic kidney pool
- Awareness and access; clinical decision-making
- Clinical governance and reporting



Workshops: biennial/triennial



Workshop Outcomes and Actions

- Presented to Kidney Advisory Group (KAG)
- Implementation by LDKT 2020 Strategy Group

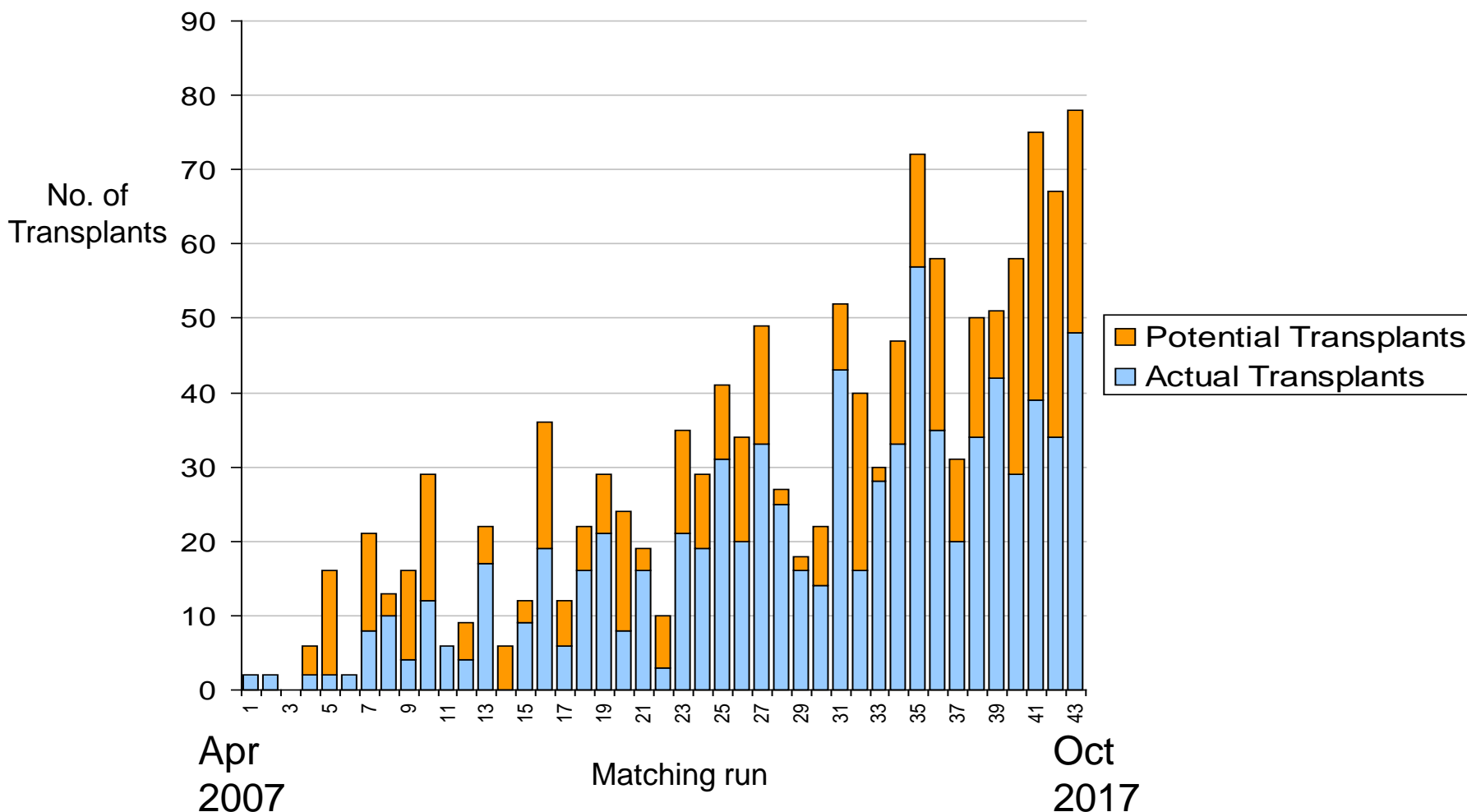


Non-proceeding Transplants

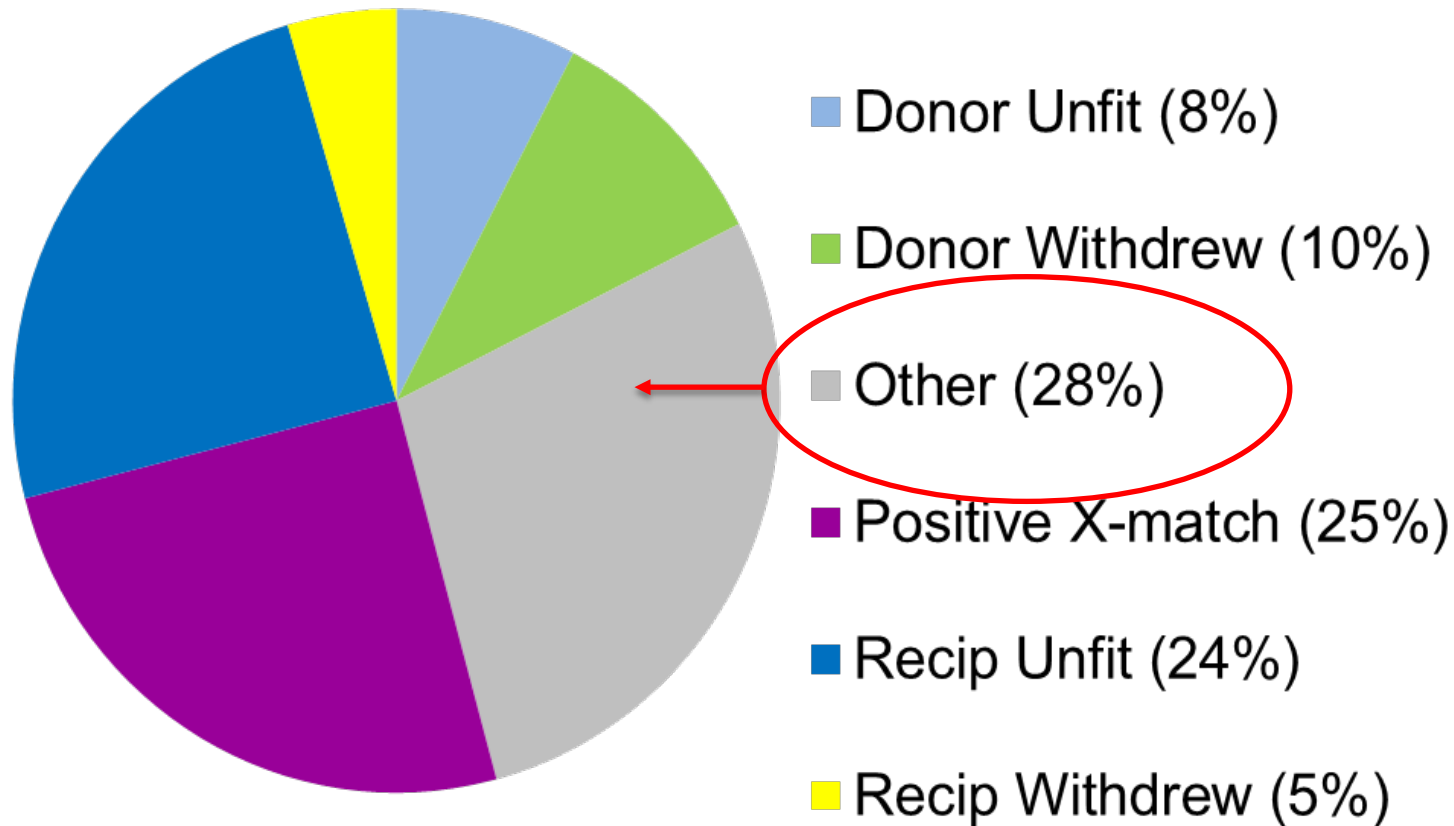
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Non-proceeding transplants

- 54% of identified transplants proceeded 2007-2011
- 67% proceeded 2012 - 2017



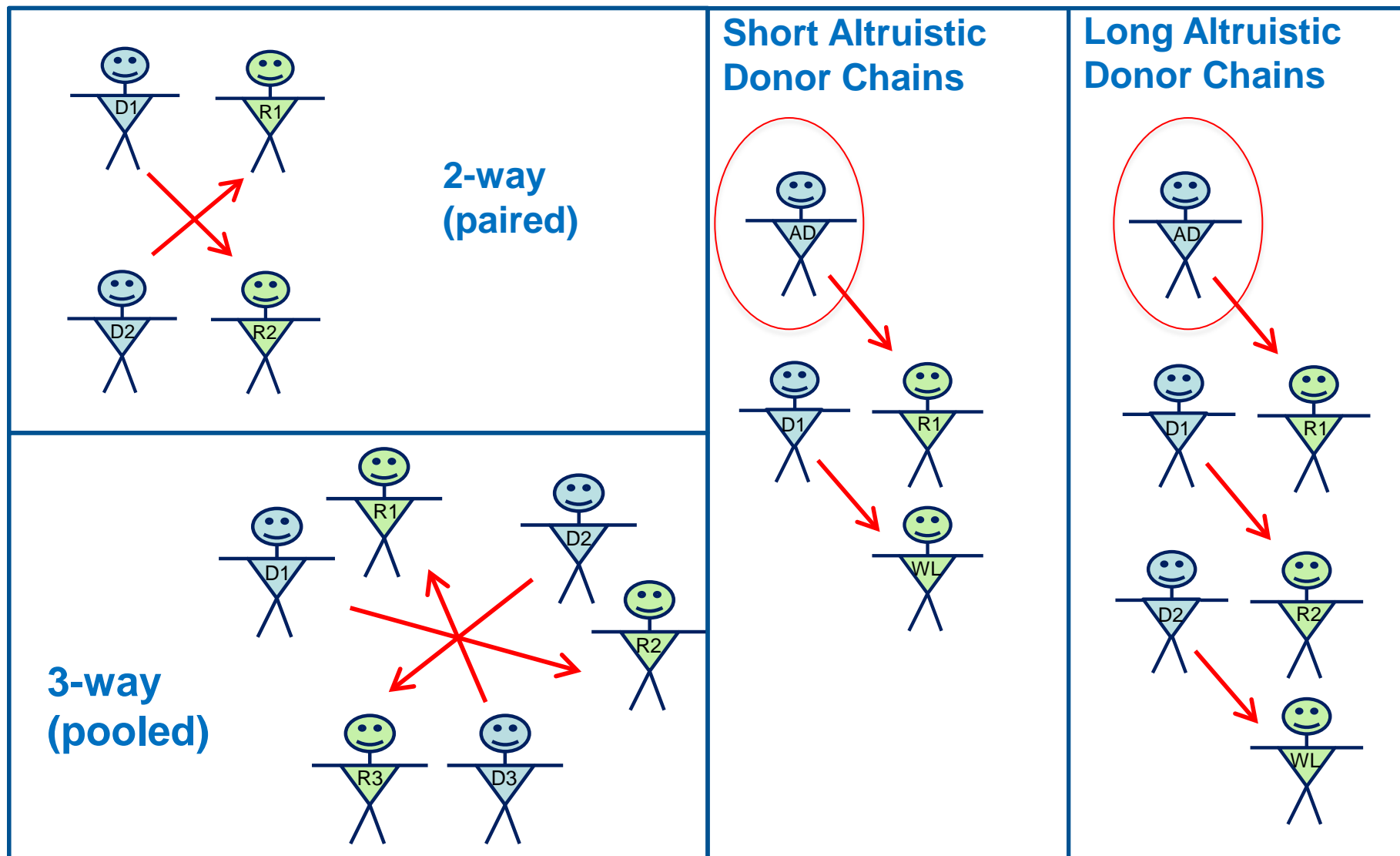
Non-proceeding transplants (2012-2017)



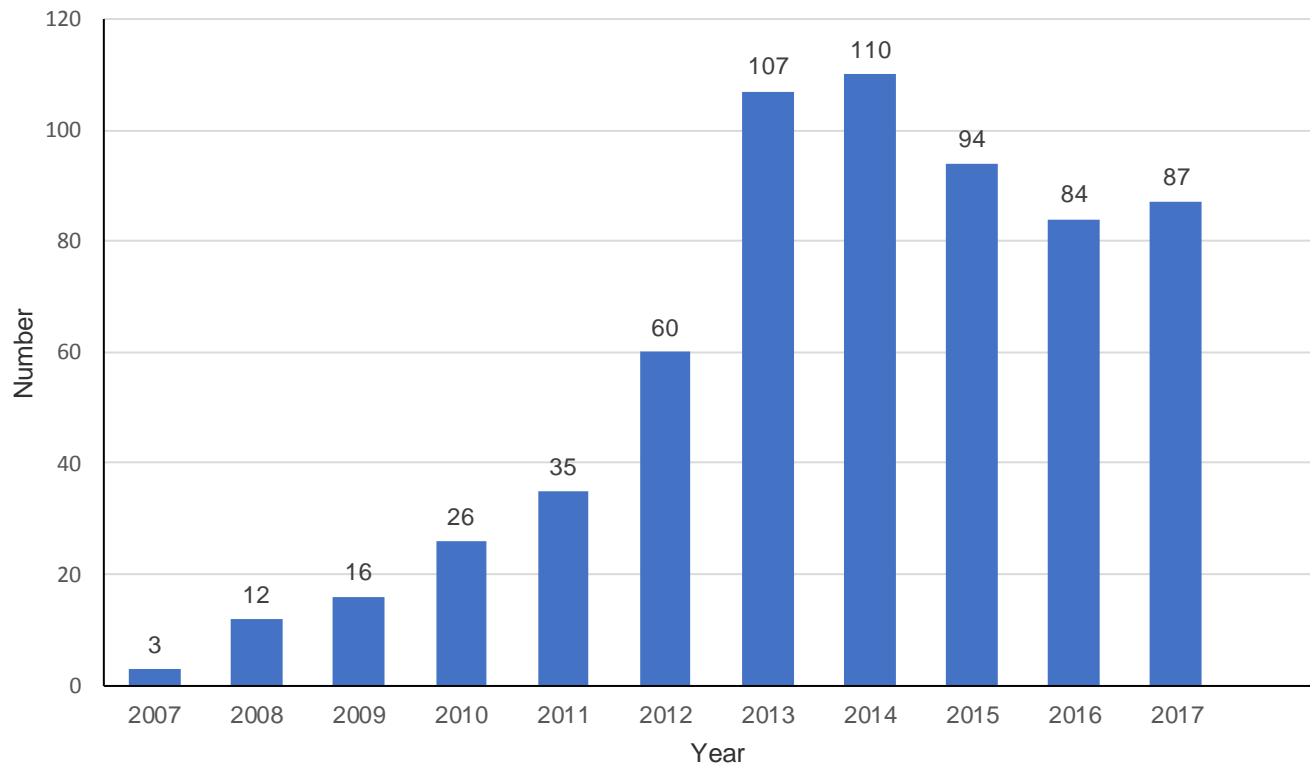
Opportunities



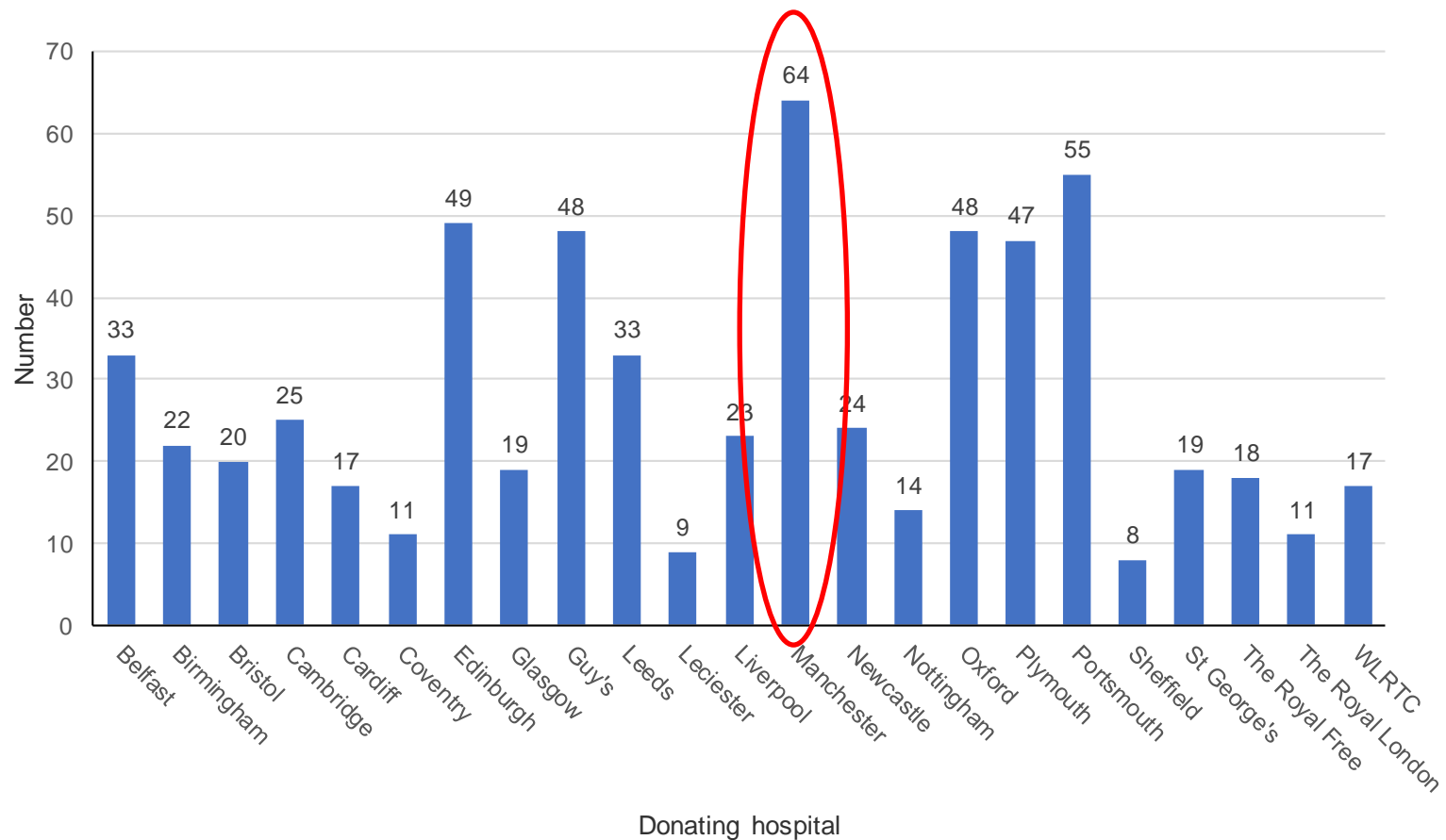
Non-Directed Altruistic Donors



Non-Directed Altruistic Kidney Donors (NDADs)

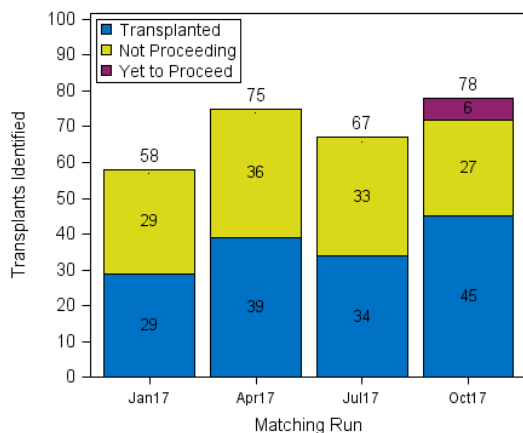


NDADs By Donating Hospital



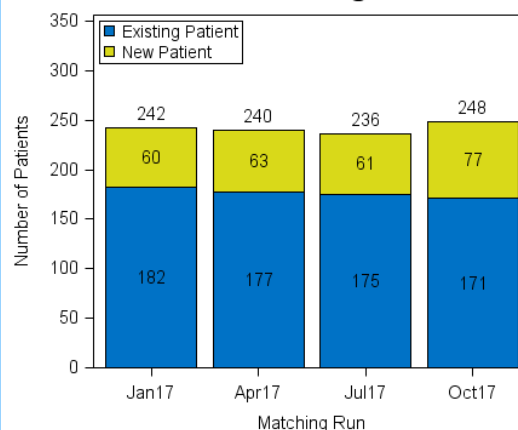
UK Living Kidney Sharing Schemes Performance Figures

Paired Donation Transplants Identified

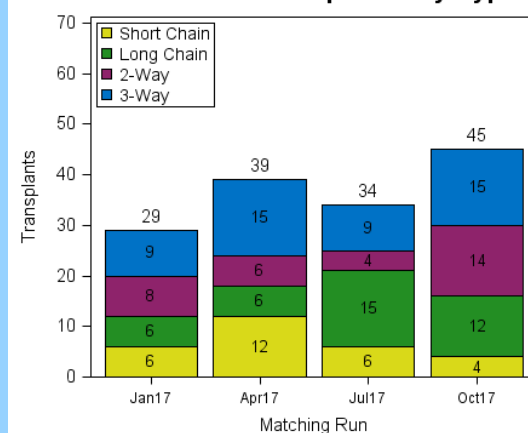


	Total May 2007-October 2017
Pairs Registered	2004
Patients Registered	1814
Altruistic Donors in Paired Donation Matching Runs	200
Compatible Pairs Registered	95
Transplants	805

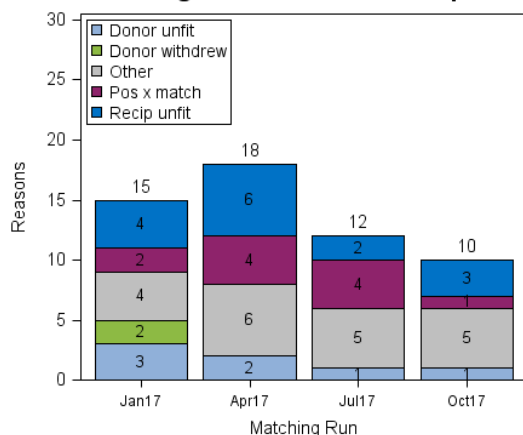
Patients in Each Matching Run



Paired Donation Transplants by Type

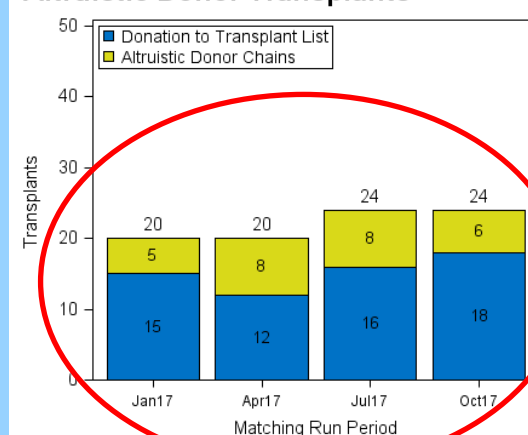


Non Proceeding Paired Donation Transplants



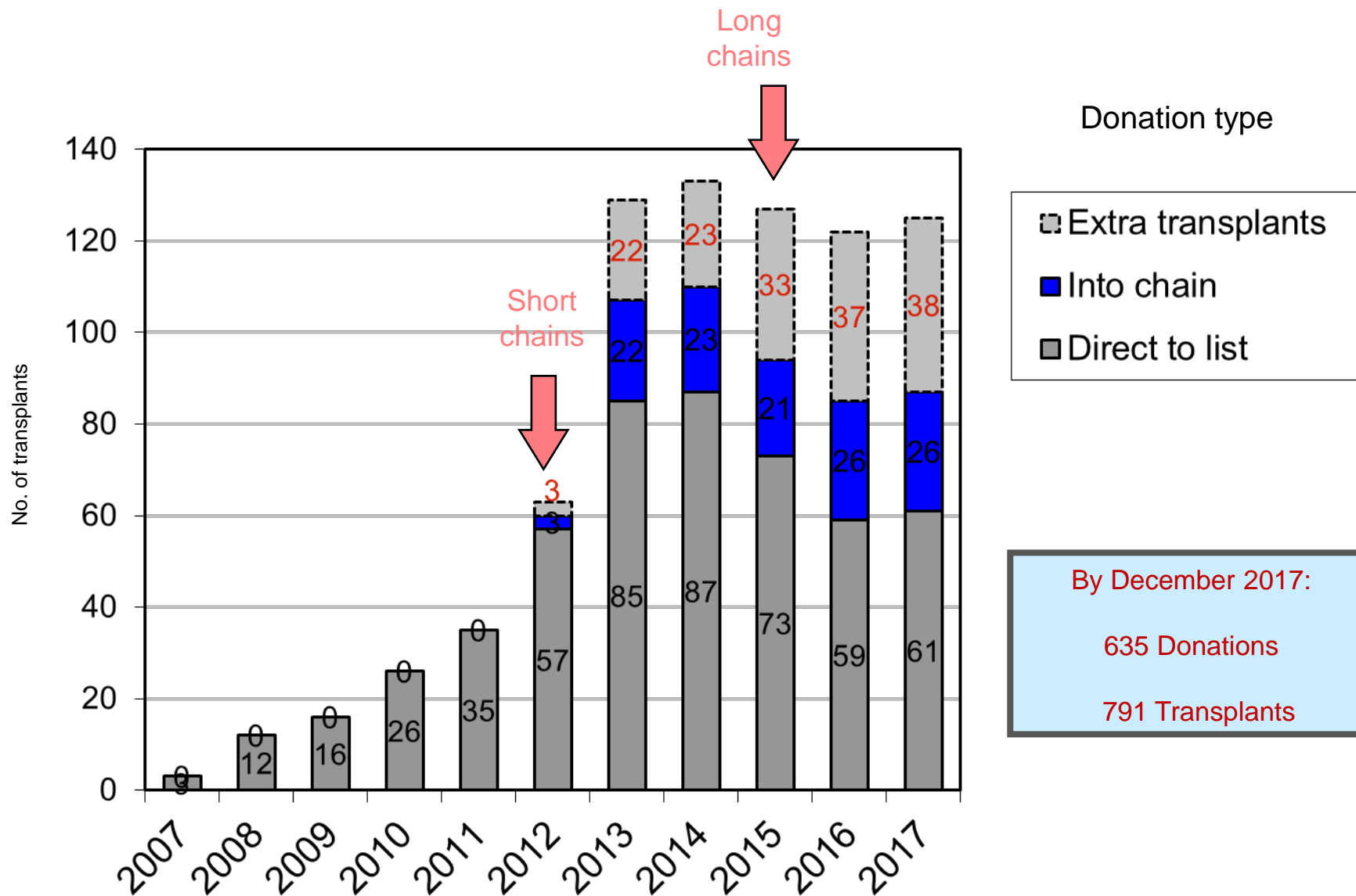
UKLKSS Records	In a Matching Run
Pairs Included	284 (Jul 2016)
Patients Included	256 (Jul 2016)
Altruistic Donors Included	15 (Oct 2013)
Transplants Identified	78 (Oct 2017)
Transplants Proceeded	57 (Oct 2015)

Altruistic Donor Transplants



Note: each reason may account for multiple transplants

Altruistic Kidney Donors



Innovations Maximising Transplants

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Tackling Non-Proceeding Transplants

- Donor-recipient registration
 - Electronic; mandatory fields for recipient preferences
 - Simplified timetable for including clinical and H&I data
- Agreed criteria for donor complexity and exchanging essential donor-recipient information
- Monitoring performance
 - Agreed governance structure- prior approval and reporting
 - On-line survey monkey for non-proceeding transplants
 - Re-categorisation for non-proceeding transplants
 - Quarterly UKLKSS bulletin: activity and performance

Increasing Flexibility

- Inclusion of compatible pairs, desensitisation and low risk ABOi for highly sensitised recipients
- Recipient age and HLA preferences registered at inclusion
- Streamlined timetable of key dates
- Agreed framework for non-simultaneous surgery
- Designated weeks of surgery- extended from 2 to 3 weeks (weeks 5,6,&8 post matching run)
- Electronic registration and reporting

Improving Access and Awareness

- All NDADs enter matching run unless there is a high priority recipient on the national transplant list
- Shared learning
 - UK Living Donor Kidney Network
 - Quarterly UKLKSS bulletin: activity and performance; shared learning, trends and solutions; KAG updates
- On-line decision-making resources (slides; ‘chance of transplant’ calculator)¹
- Revised portfolio of donor-recipient information²

¹<https://www.odt.nhs.uk/living-donation/living-donor-kidney-transplantation/>

²<https://www.organdonation.nhs.uk/about-donation/living-donation/>

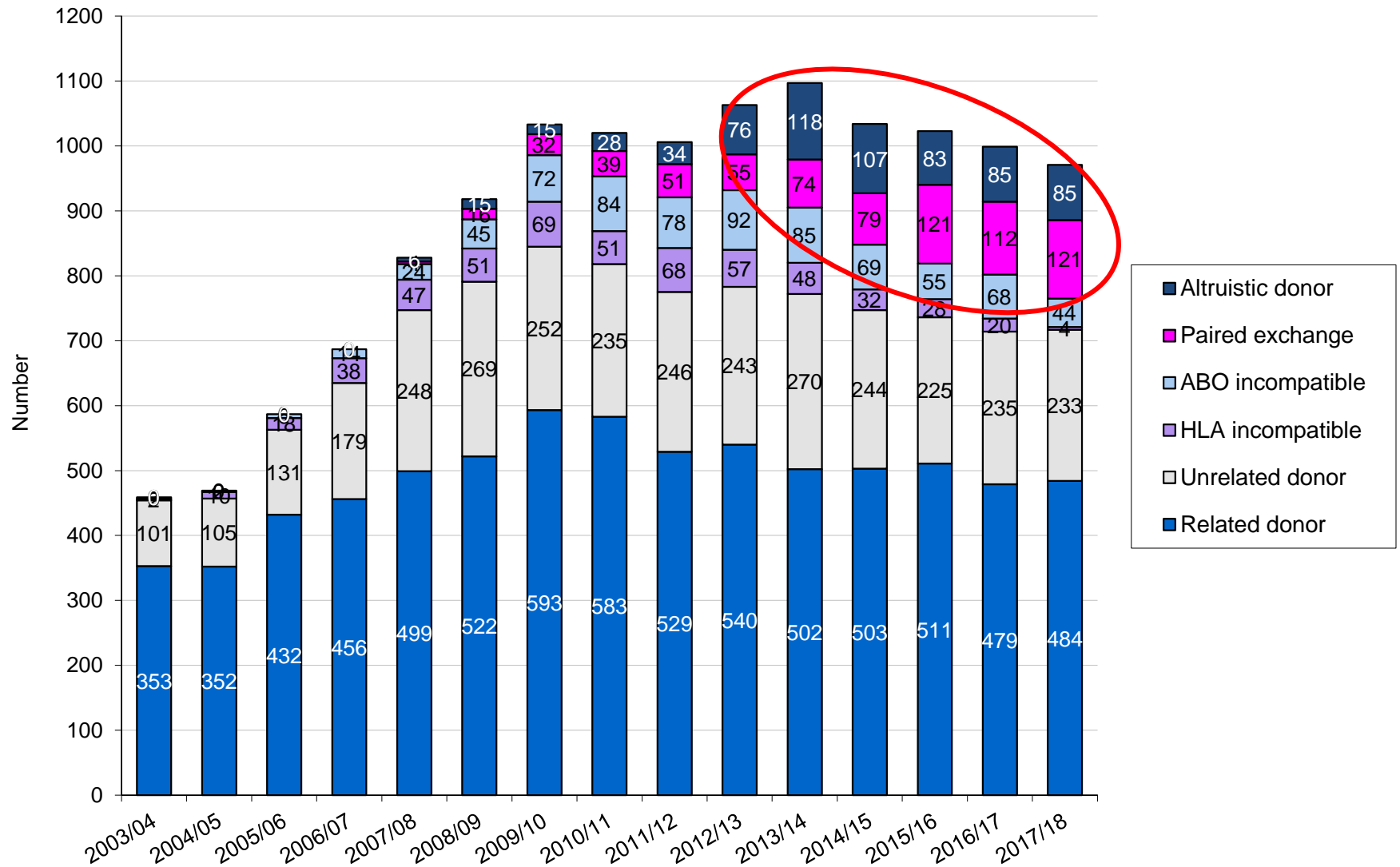
What else could we do?

- Electronic offering system for UKLKSS- 'Living EOS'
- Develop recipient 'acceptable risk' score to replace donor complexity
- Use on-line survey monkey reporting to inform further developments and improvements
- International collaboration to extend donor pool and transplant opportunities (COST- ENCKEP)

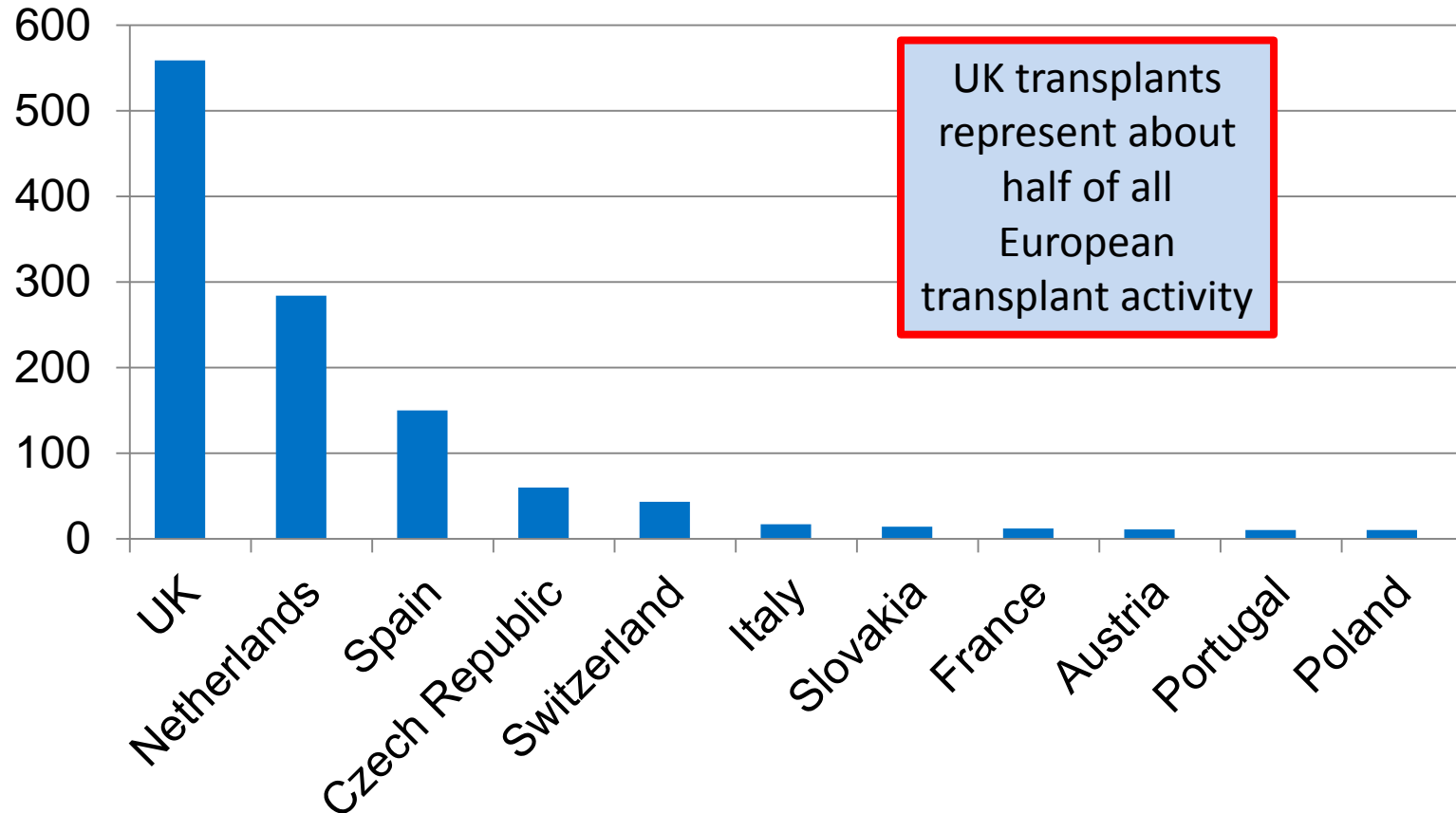


Impact?

UK Living Donor Kidney Transplants



Number of paired donation transplants by country



Summary

- Delivers effective kidney sharing across the UK
 - 842 (36%) registered recipients transplanted
 - 59% of identified transplants proceeded
 - 62% of transplants proceed within 8 weeks
- International reputation
 - Largest national scheme in Europe; central coordination
 - Maximises transplants and outcomes
- As transplant activity has increased, antibody incompatible transplant activity has decreased
- Continuous innovation and improvement is key to success

Acknowledgements

NHS Blood and Transplant colleagues

Lisa Mumford, Matthew Robb, Chloe Brown, Iain Harrison, Lin Shelper, David Clegg, Debbie West

University of Glasgow (matching algorithms)

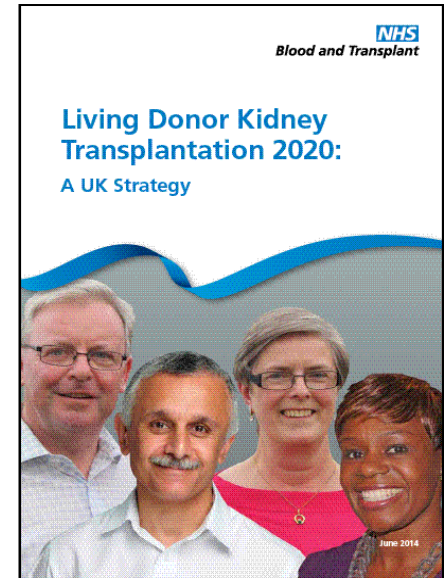
David Manlove, Peter Biro, Gregg O'Malley, James Trimble

Transplant centres and referring renal units

Kidney Advisory Group

LDKT 2020 Strategy Implementation Group

Aisling Courtney (Chair) and members



“To match world class performance in living donor kidney transplantation”

Thank You



www.nhsbt.nhs.uk

www.odt.nhs.uk