

A thick, blue, wavy line that curves across the top of the slide, starting from the left edge and ending at the right edge.

# 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

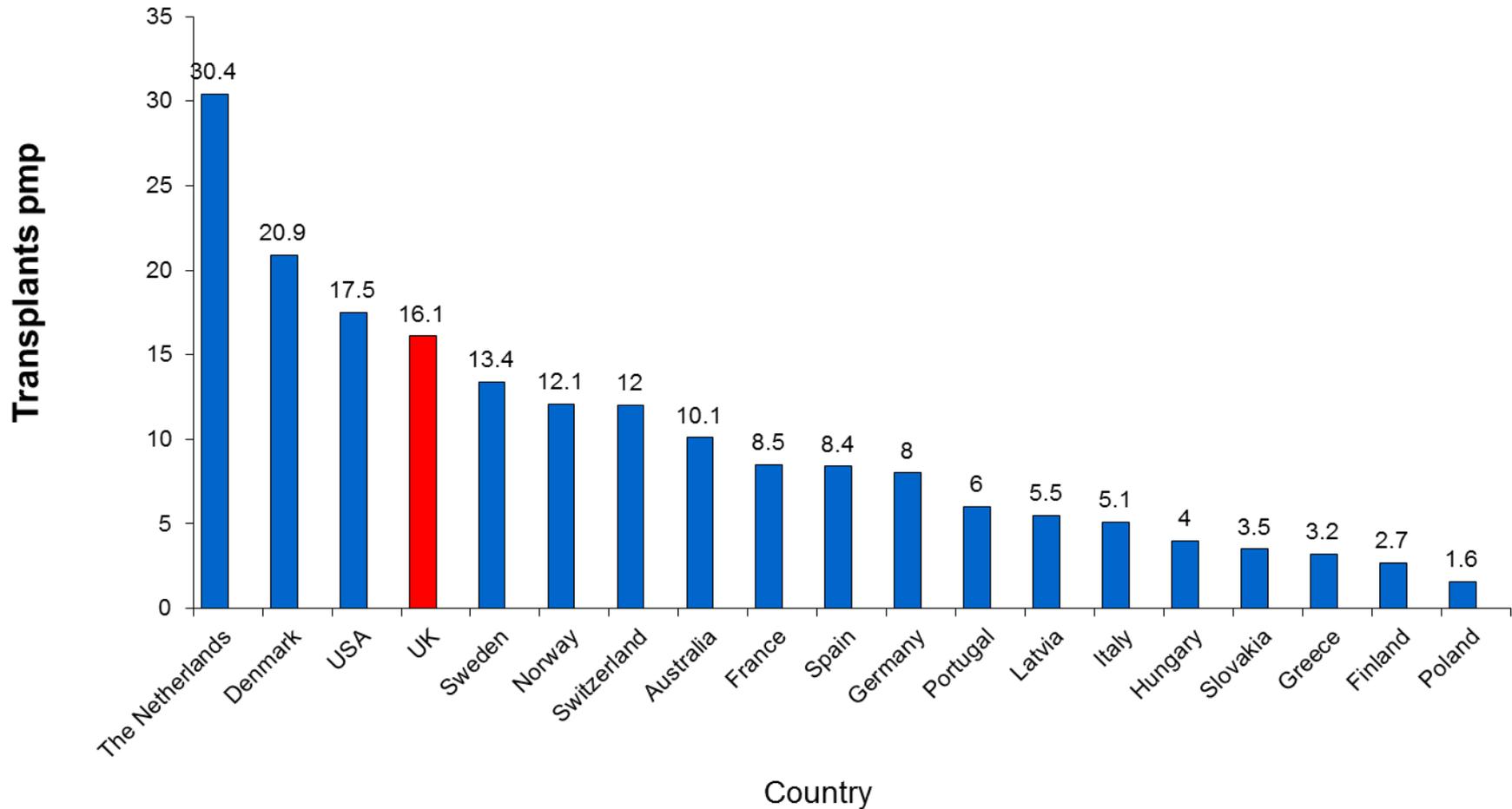
Lisa:

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

# Introduction

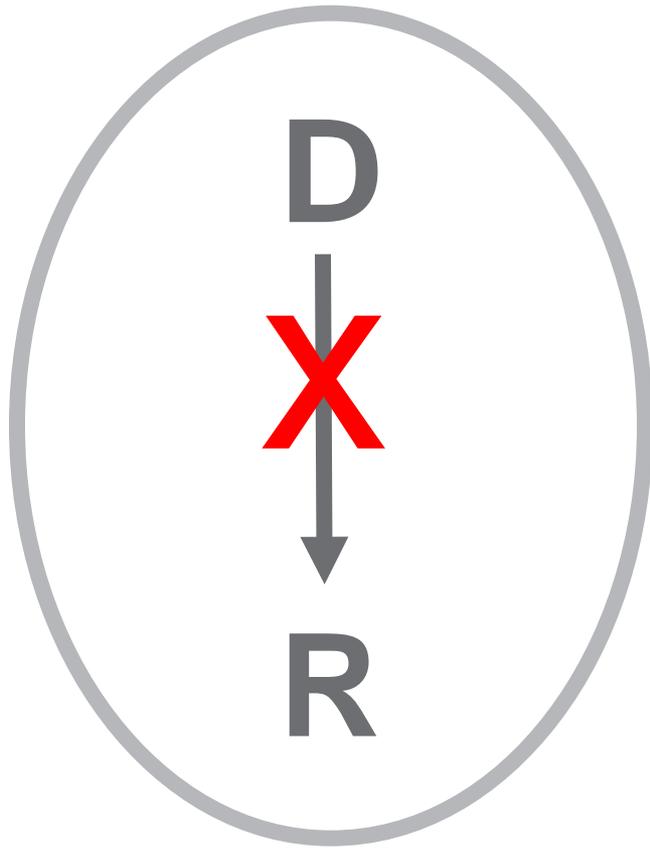
# Living donor kidney transplant rates

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



# Living kidney donation

## Potential Donor-Recipient pair

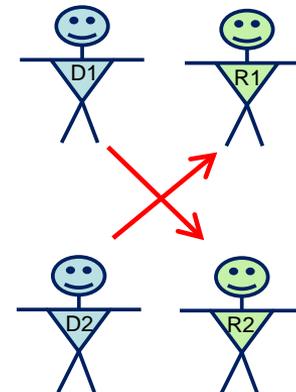


- Blood group incompatibility
- Positive crossmatch

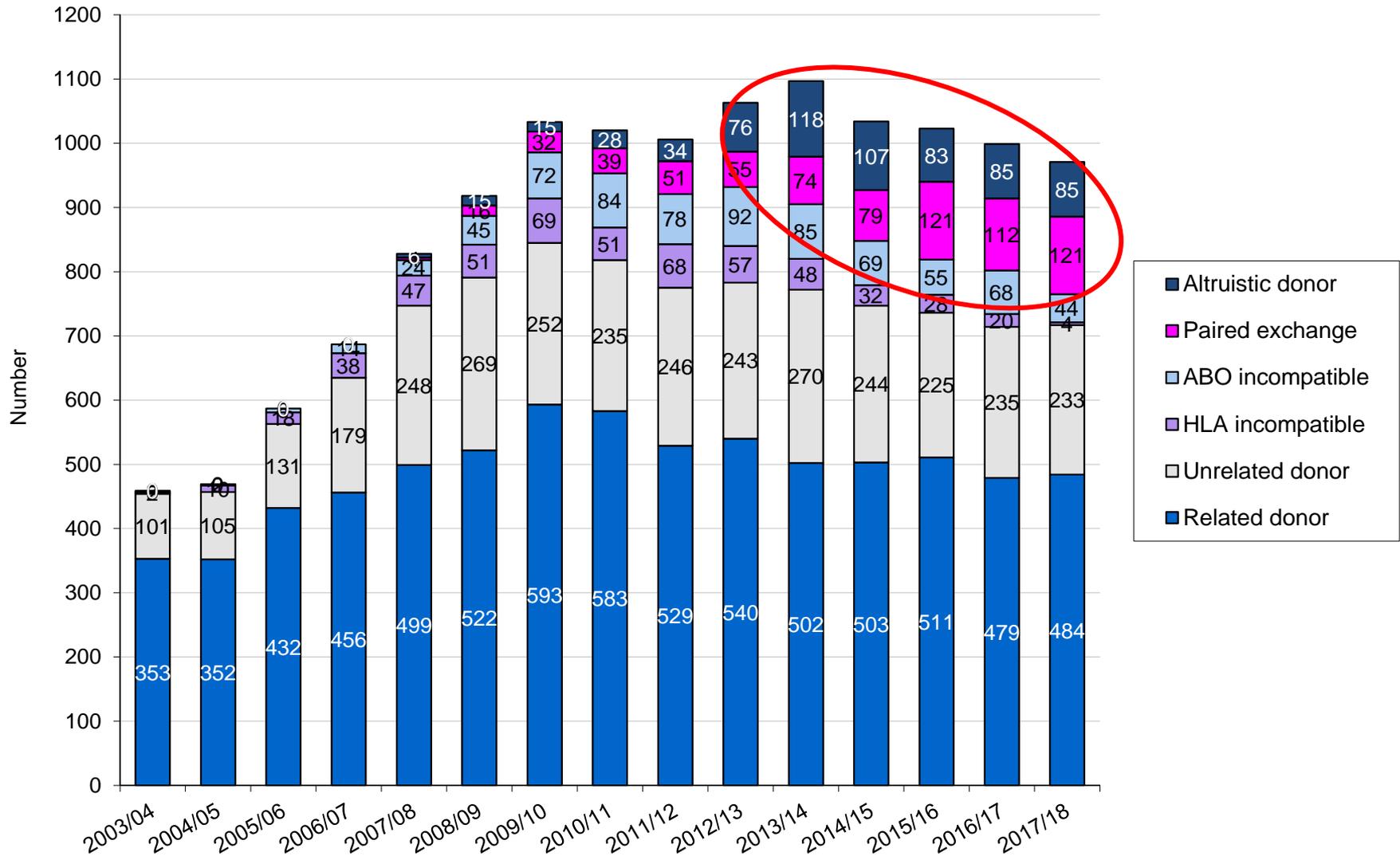
Approx 20-30% of possible living donor transplants

# 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

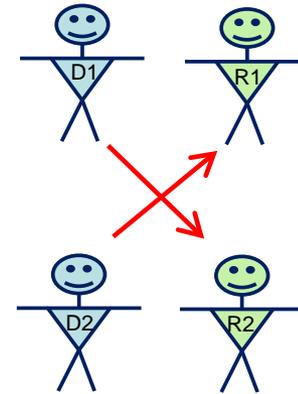


# Development of the current UK scheme

# Simple beginnings

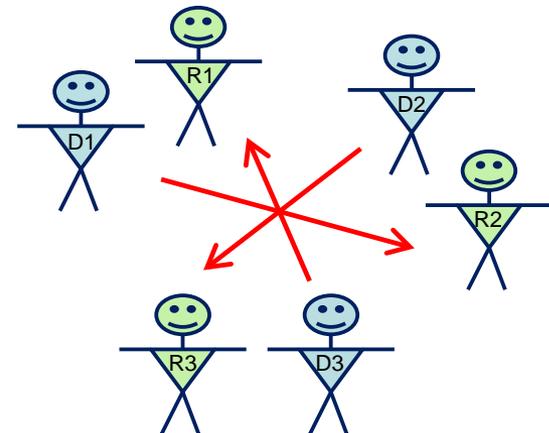
**2007:**

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



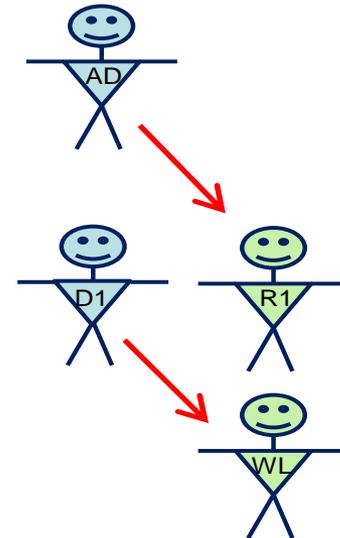
**2008:**

After one year, 3-way exchanges were also considered



# Changes to scheme in 2012

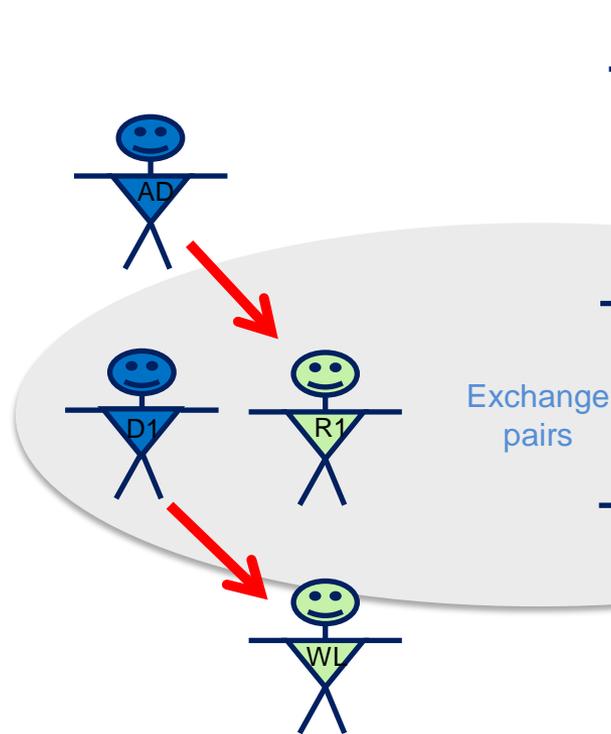
- Short altruistic donor chains introduced
- Compatible pairs can join
- Patients can be registered for blood group or HLA incompatible transplant through the scheme



# Further changes in 2015 & 2018

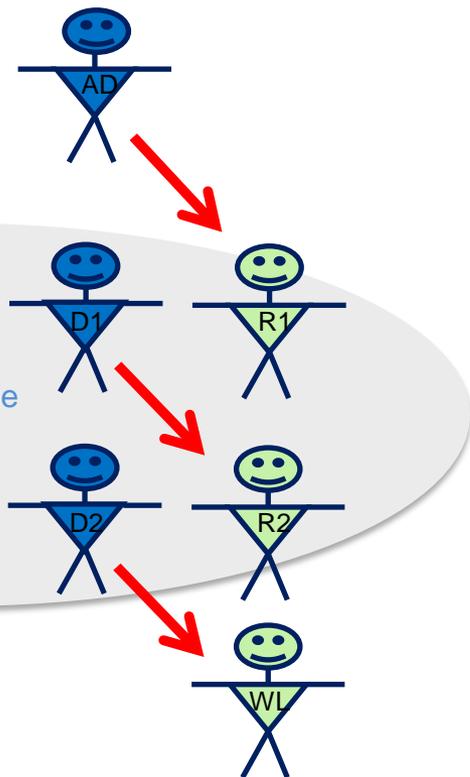
2012:

Short Altruistic Donor Chain



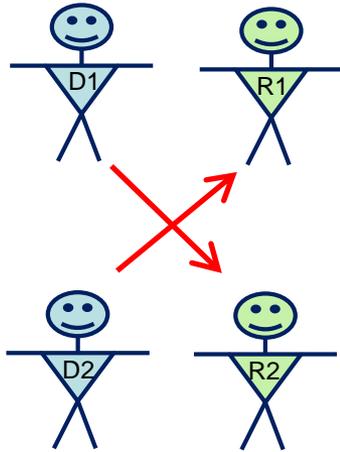
2015:

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

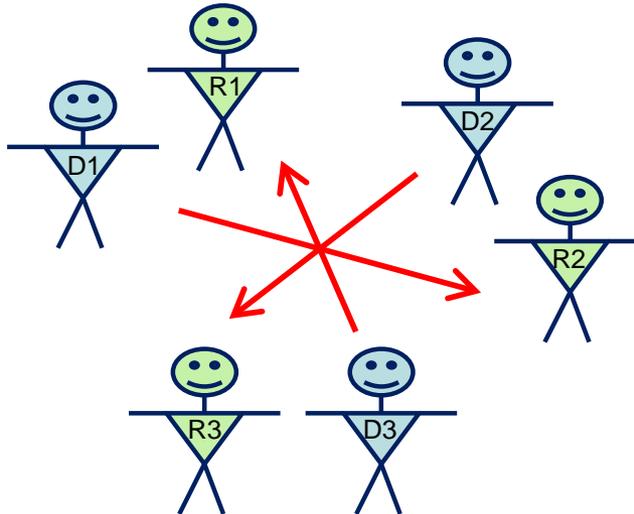


**2018:**  
Chain donation is default option for altruistic donors (rather than have option of donation direct to waiting list)

# The scheme today - matching runs identify....

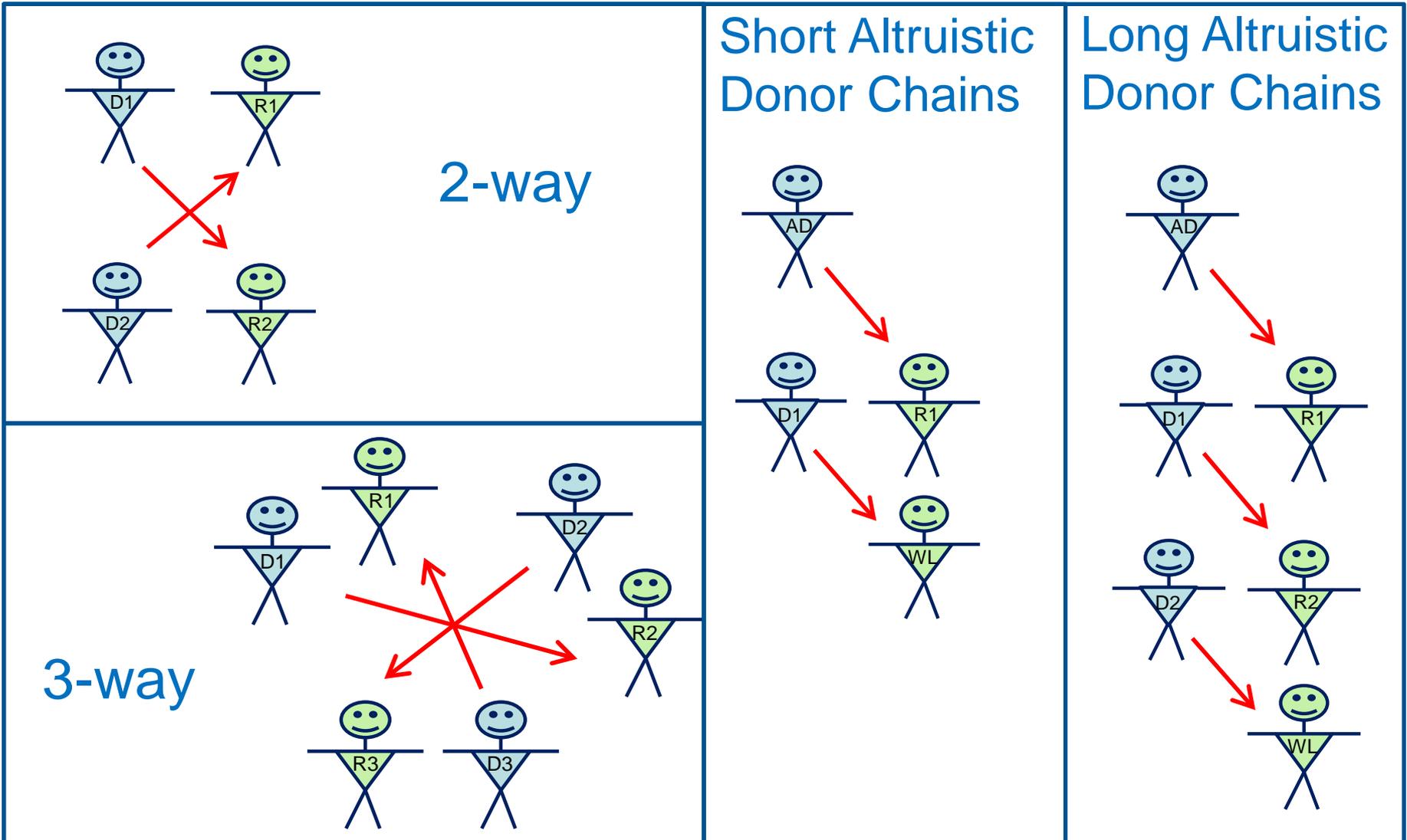


2-way



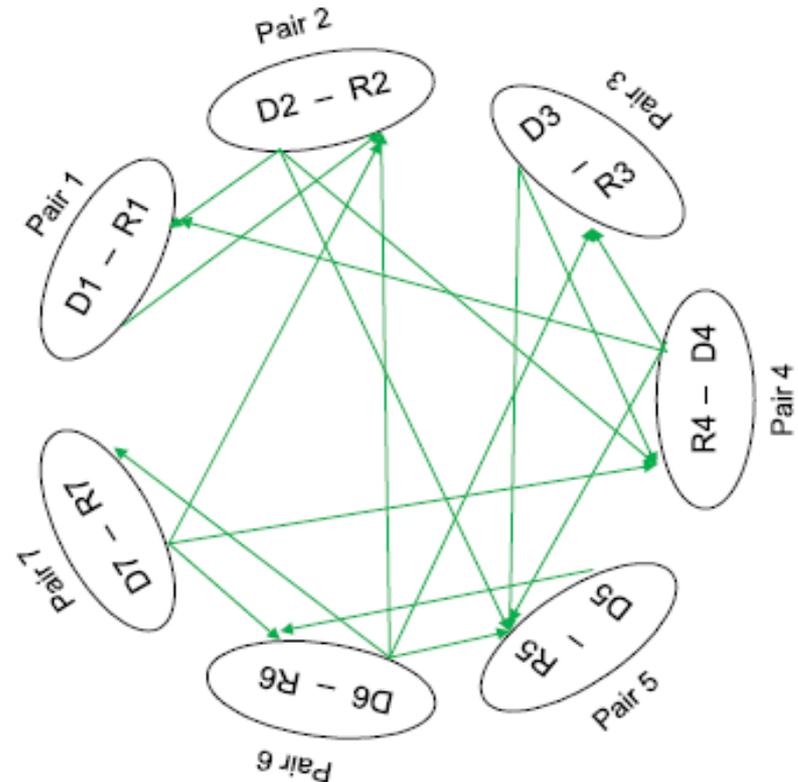
3-way

# The scheme today - matching runs identify....



# Identifying Optimal Combination of Transplants

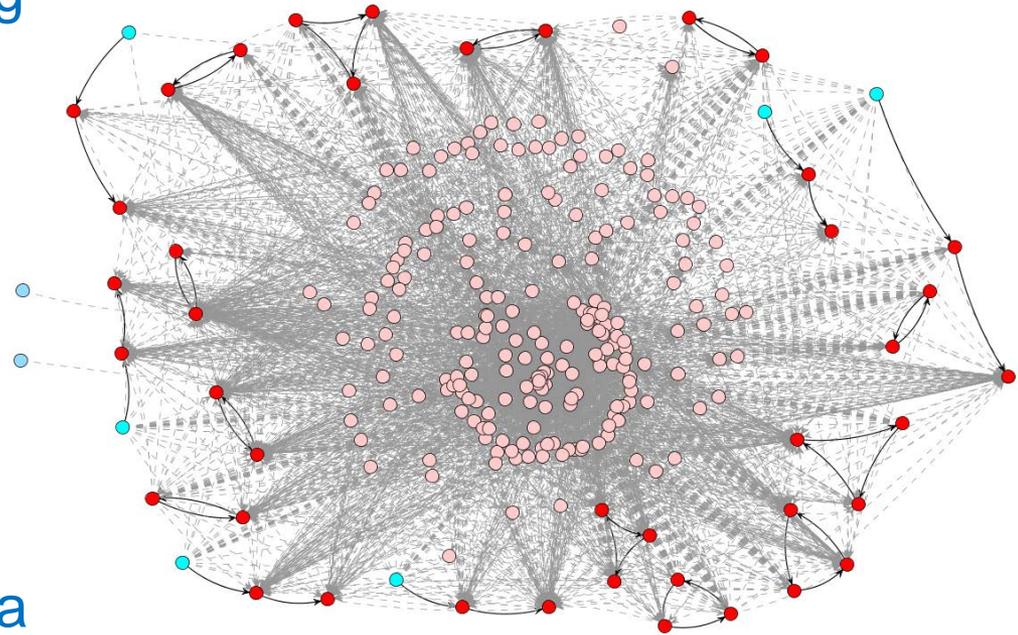
- Over 200 pairs every 'matching run'
- This results in 2000-5000 arcs (donor-recipient matches)
- Arcs are weighted to give preference to certain matches
- Seek to maximise number of transplants according to criteria developed with transplant community



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

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Acknowledgement: Tommy Muggleton

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

## Optimal Combination of Transplants<sup>1</sup>

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

<sup>1</sup>Matching software implemented by colleagues at University of Glasgow, School of Computing Science

# Other scheme developments considered

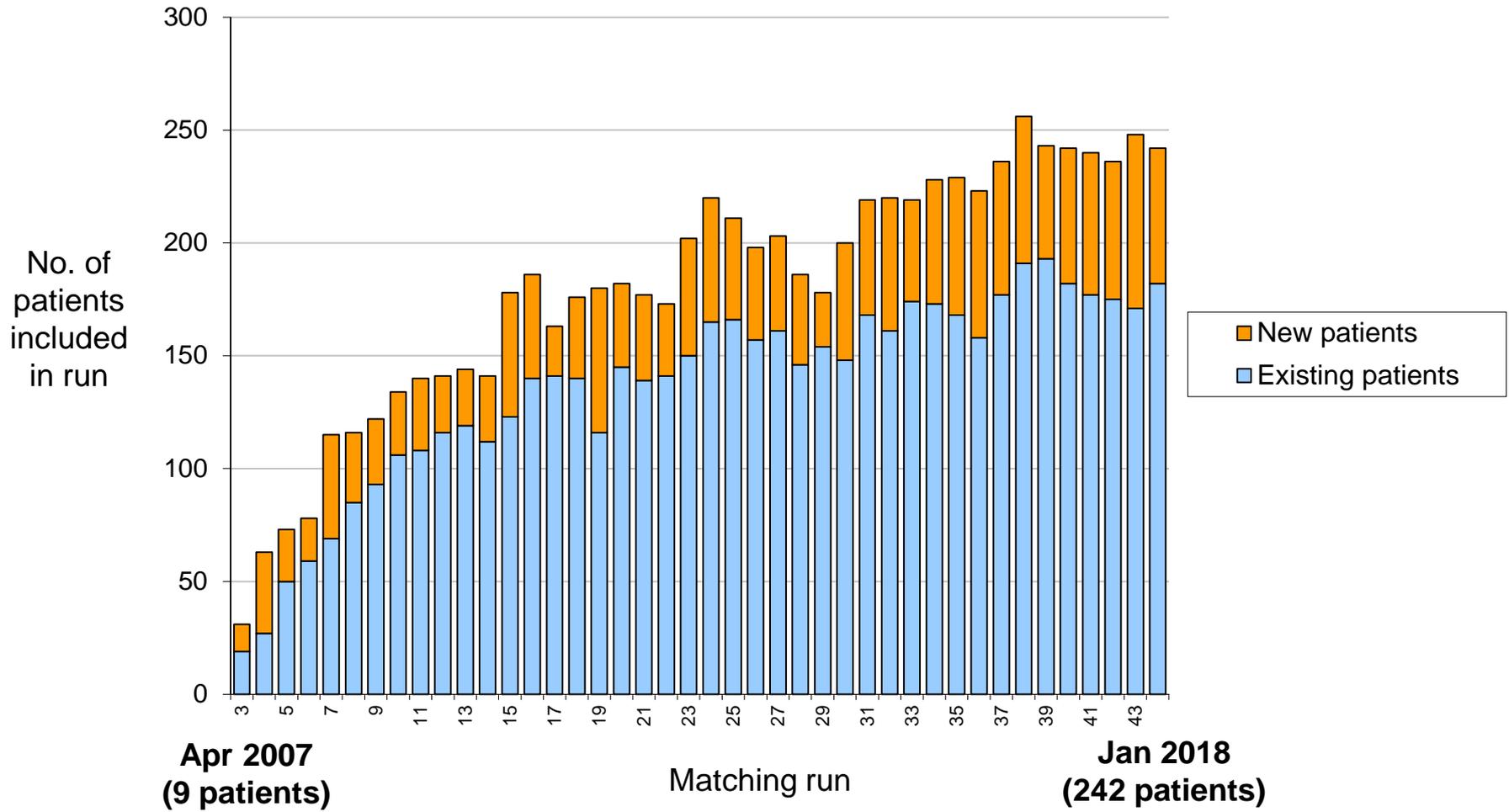
- 1 Should we run the matching more frequently?
- 2 Should we match altruistic donors as and when they arise?
- 3 What about Non-simultaneous Extended Altruistic Donor (NEAD) chains?

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

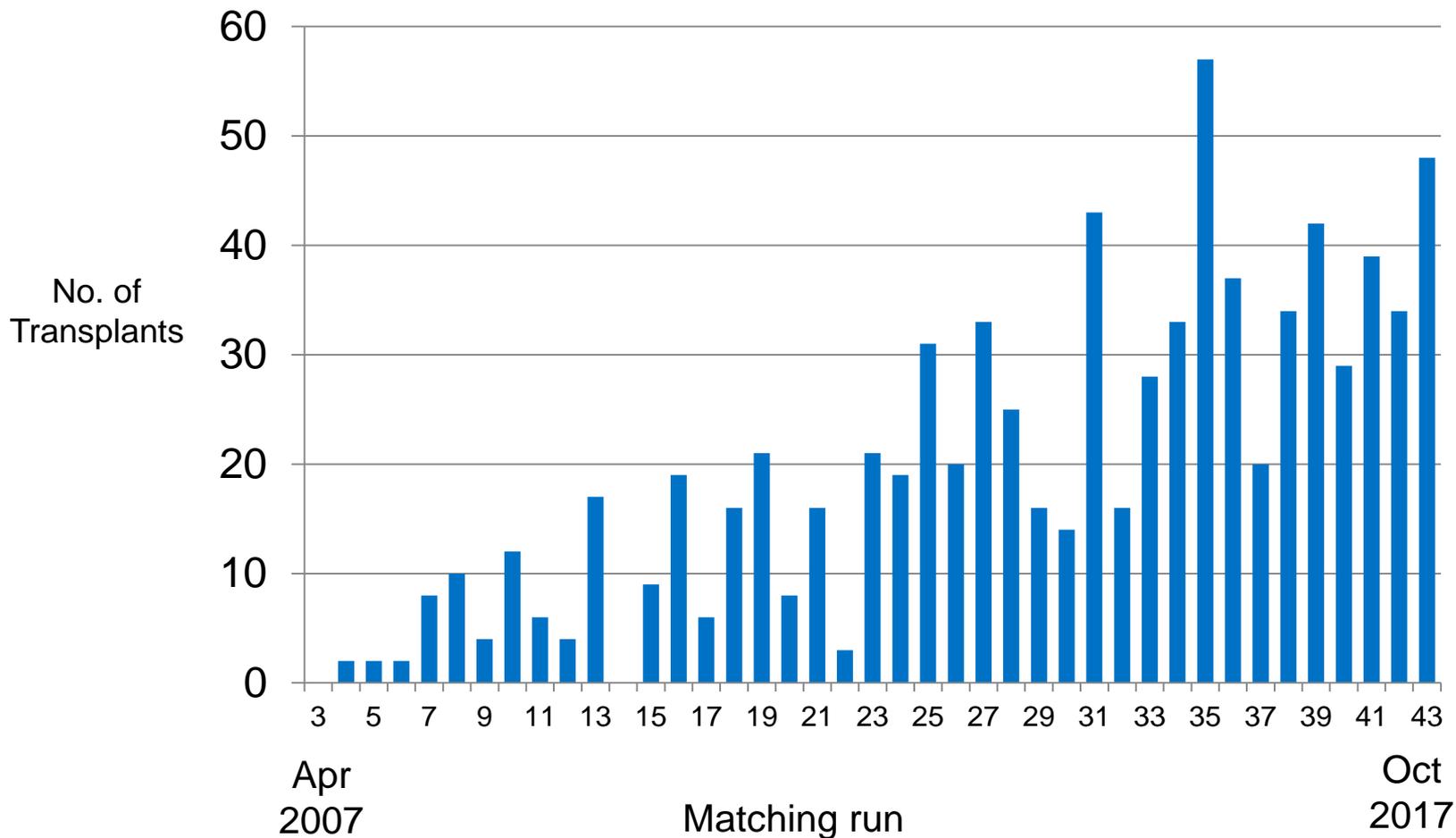


# Summary of Registered Patients

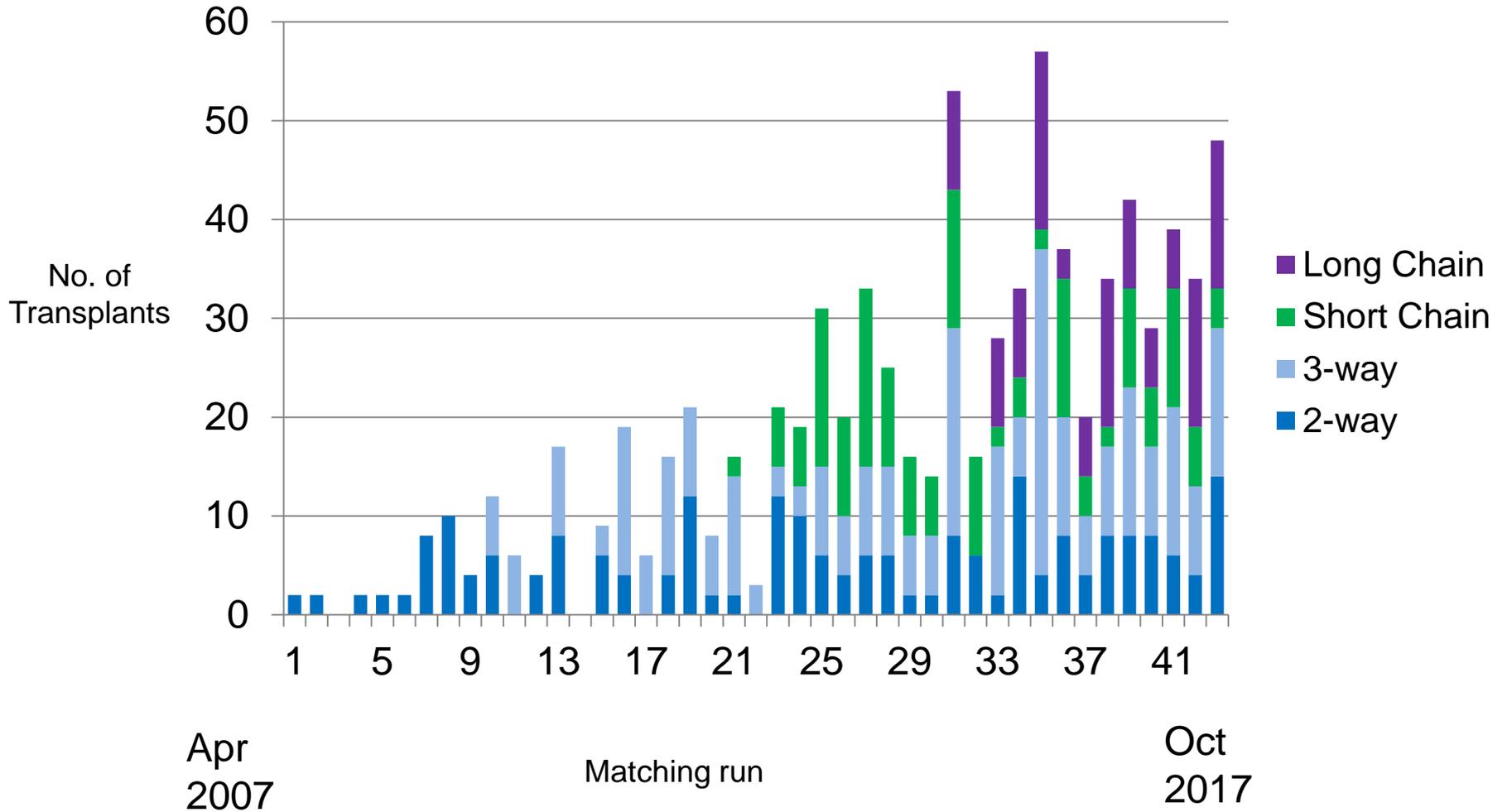
Of 1874 patients (2068 pairs) enrolled (to Jan 2018)

- 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

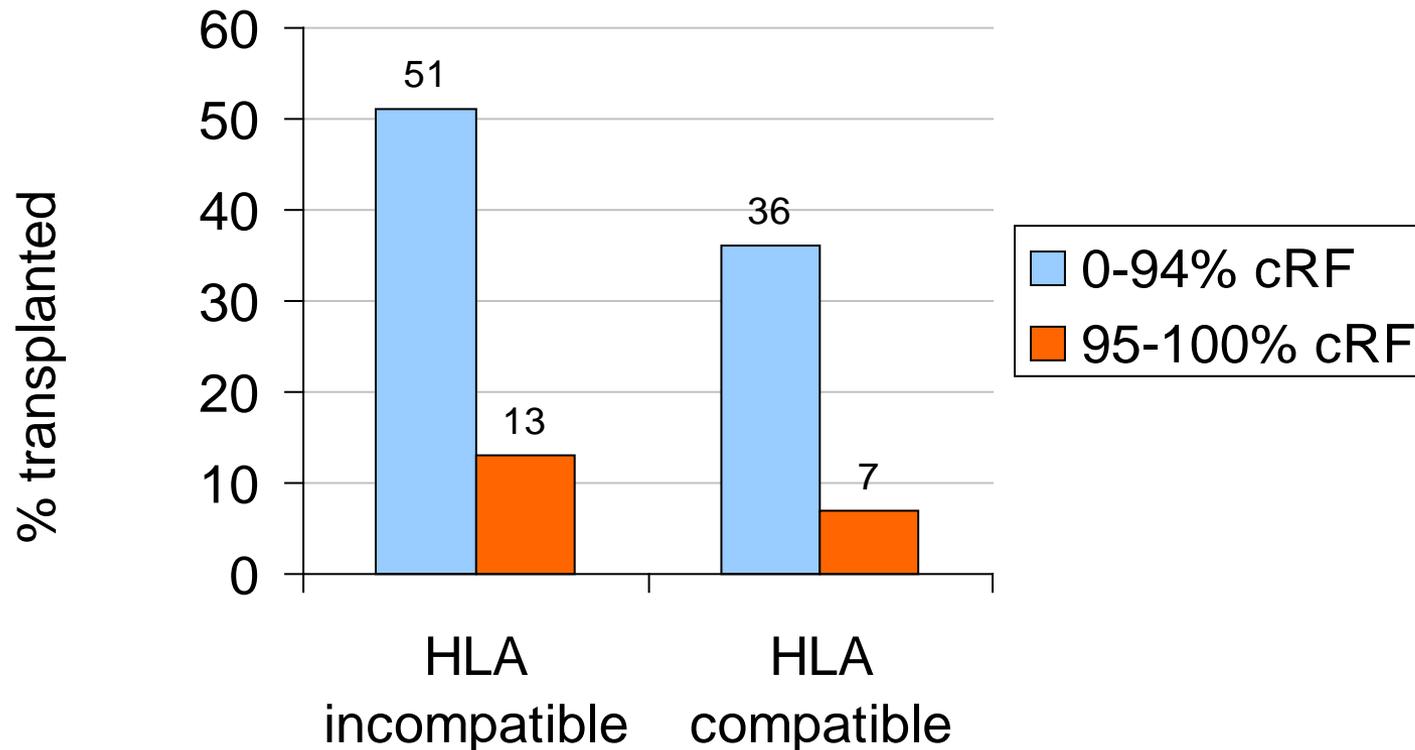
2012 - 2017

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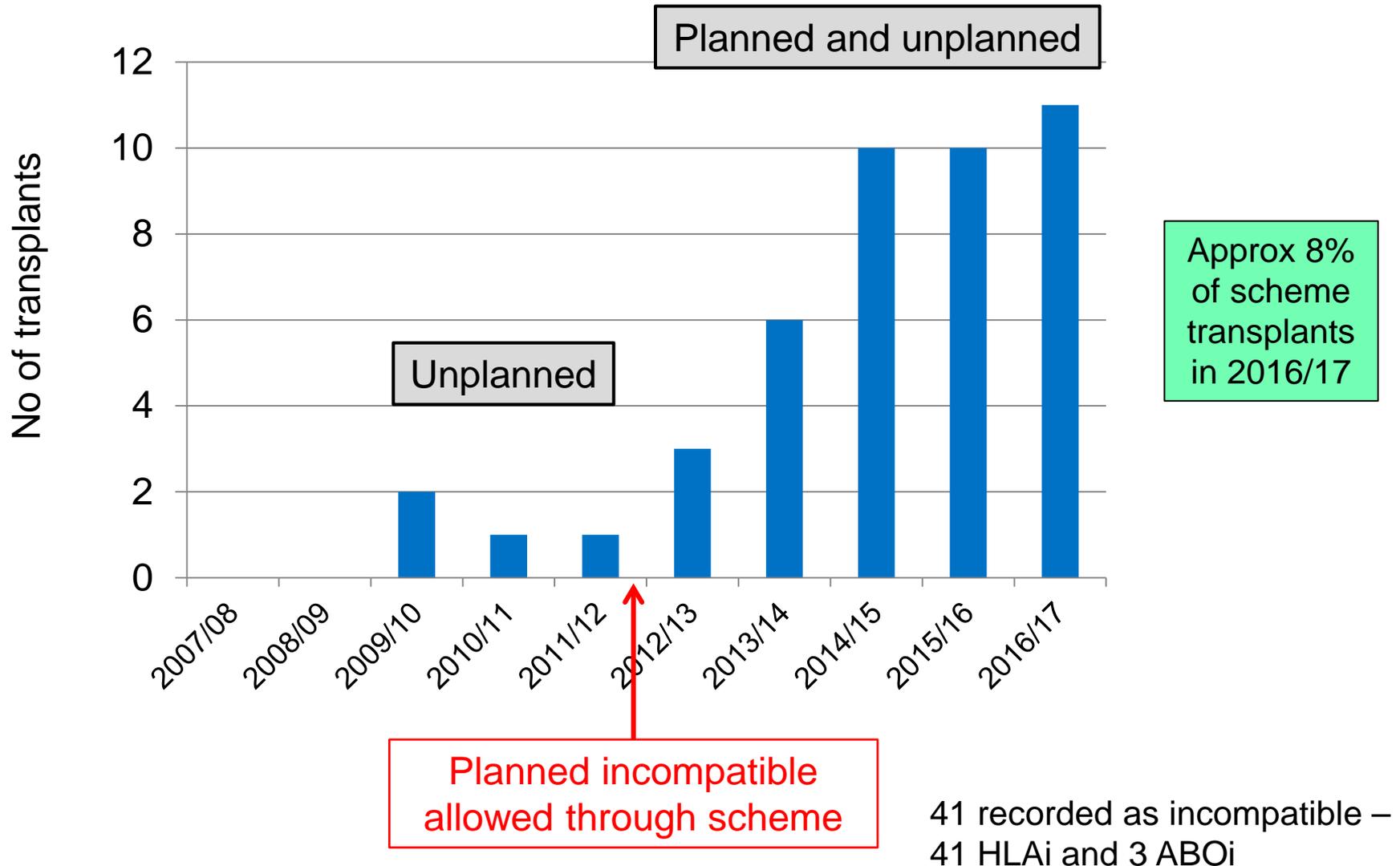
# Chance of transplant by cRF\*



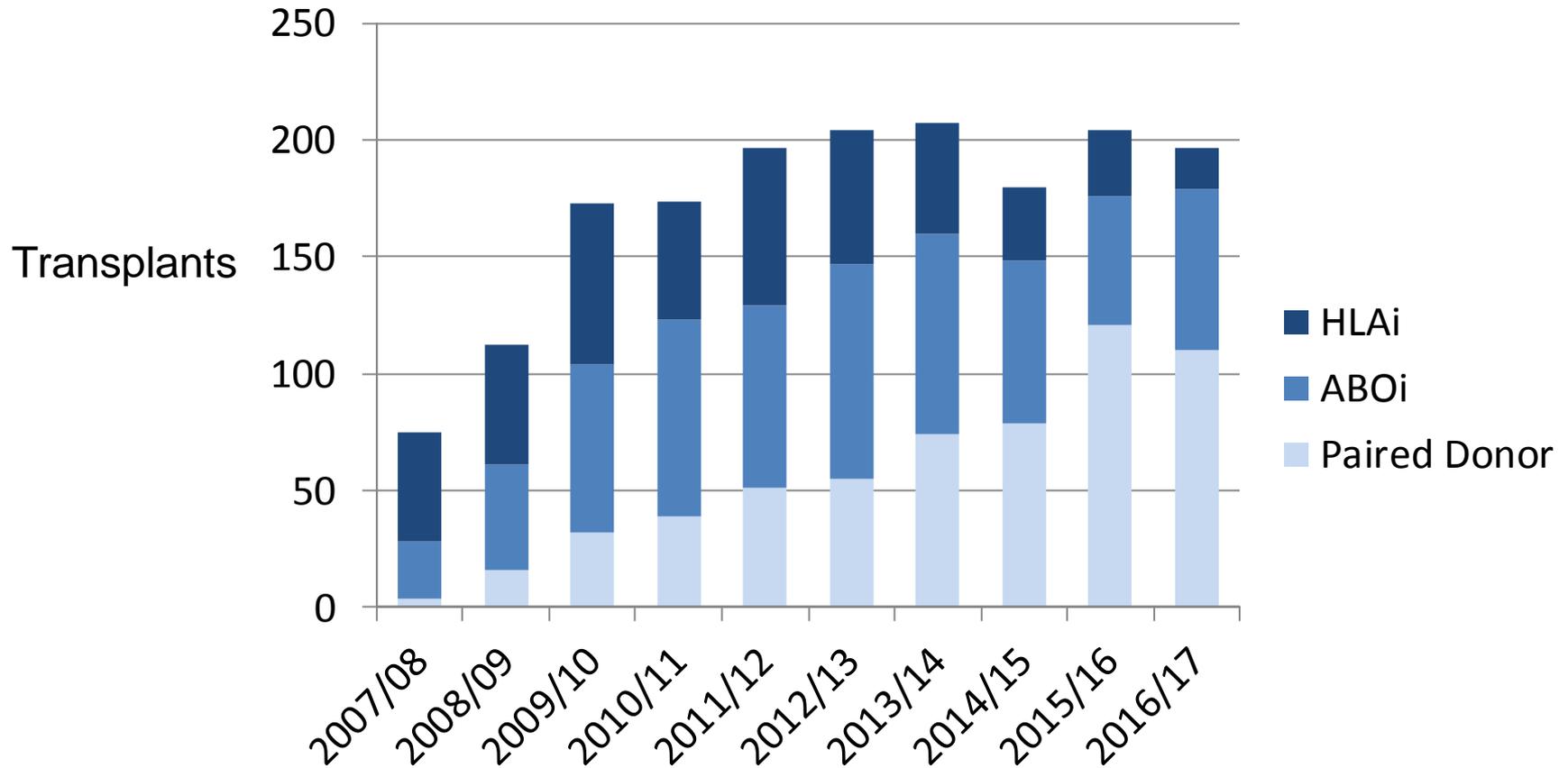
\* Calculated Reaction Frequency

(overall to Jan 2018)

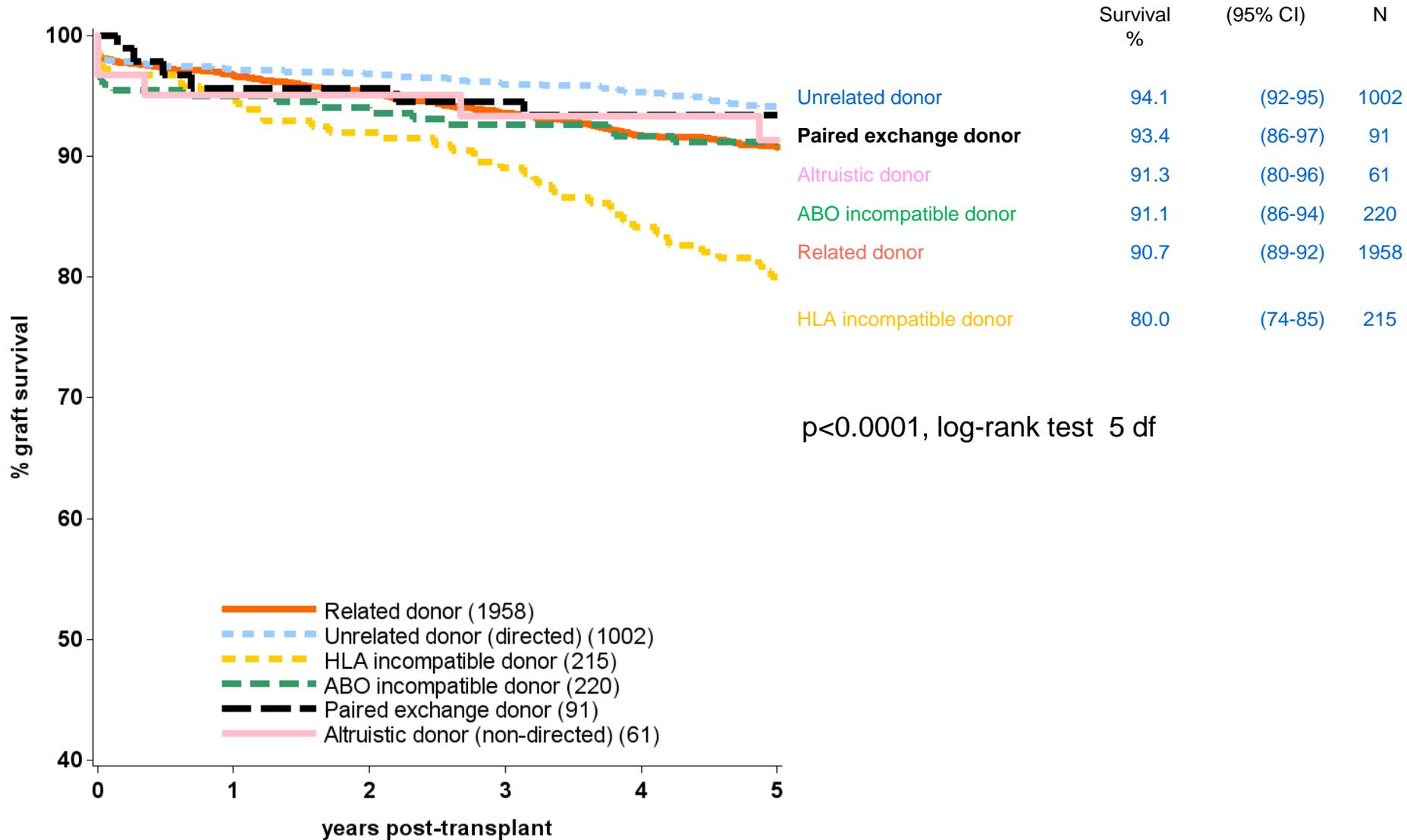
# Antibody incompatible transplants through the scheme



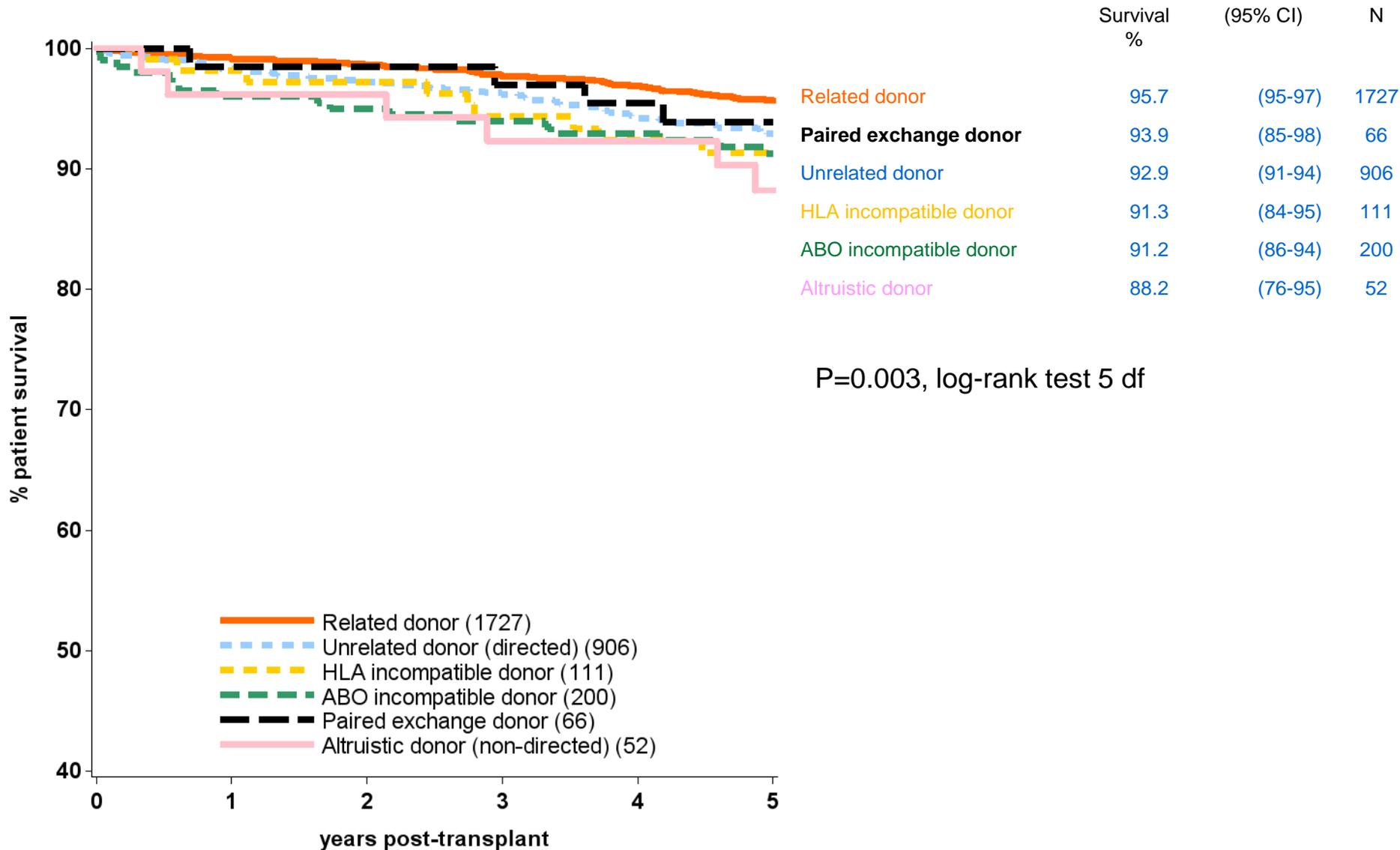
# Impact on Antibody Incompatible Transplants



# Survival Outcomes – Graft Survival

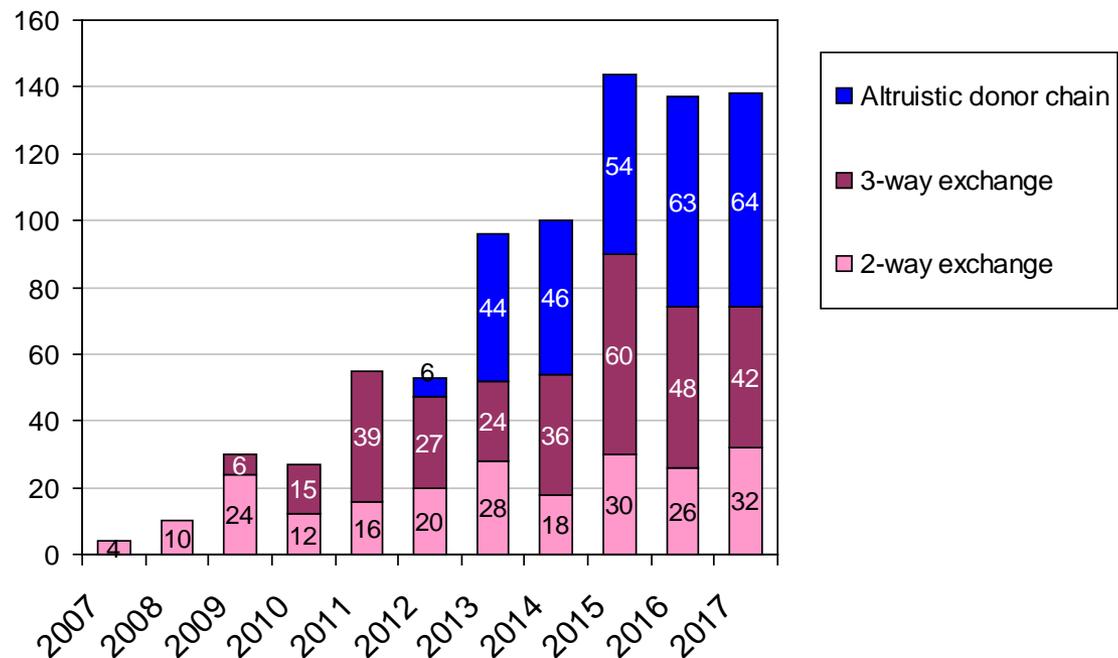
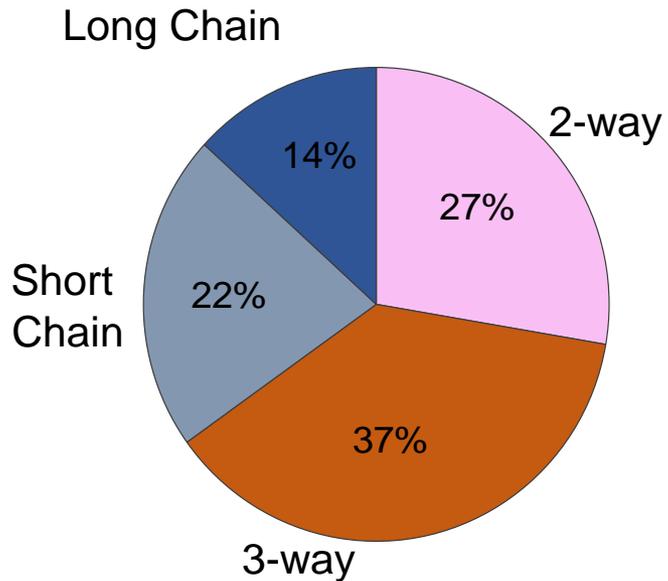


# Survival Outcomes – Patient Survival



# 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

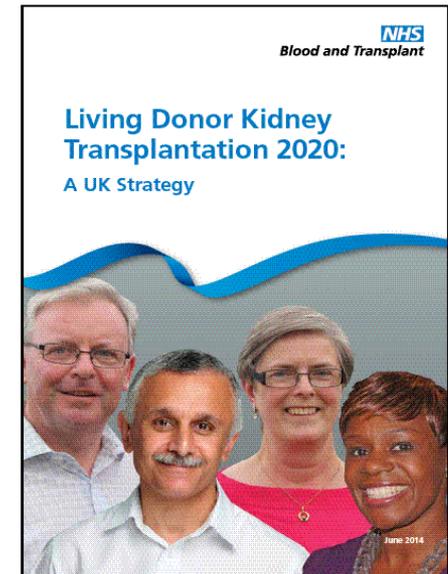
# Making it happen.....



# 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

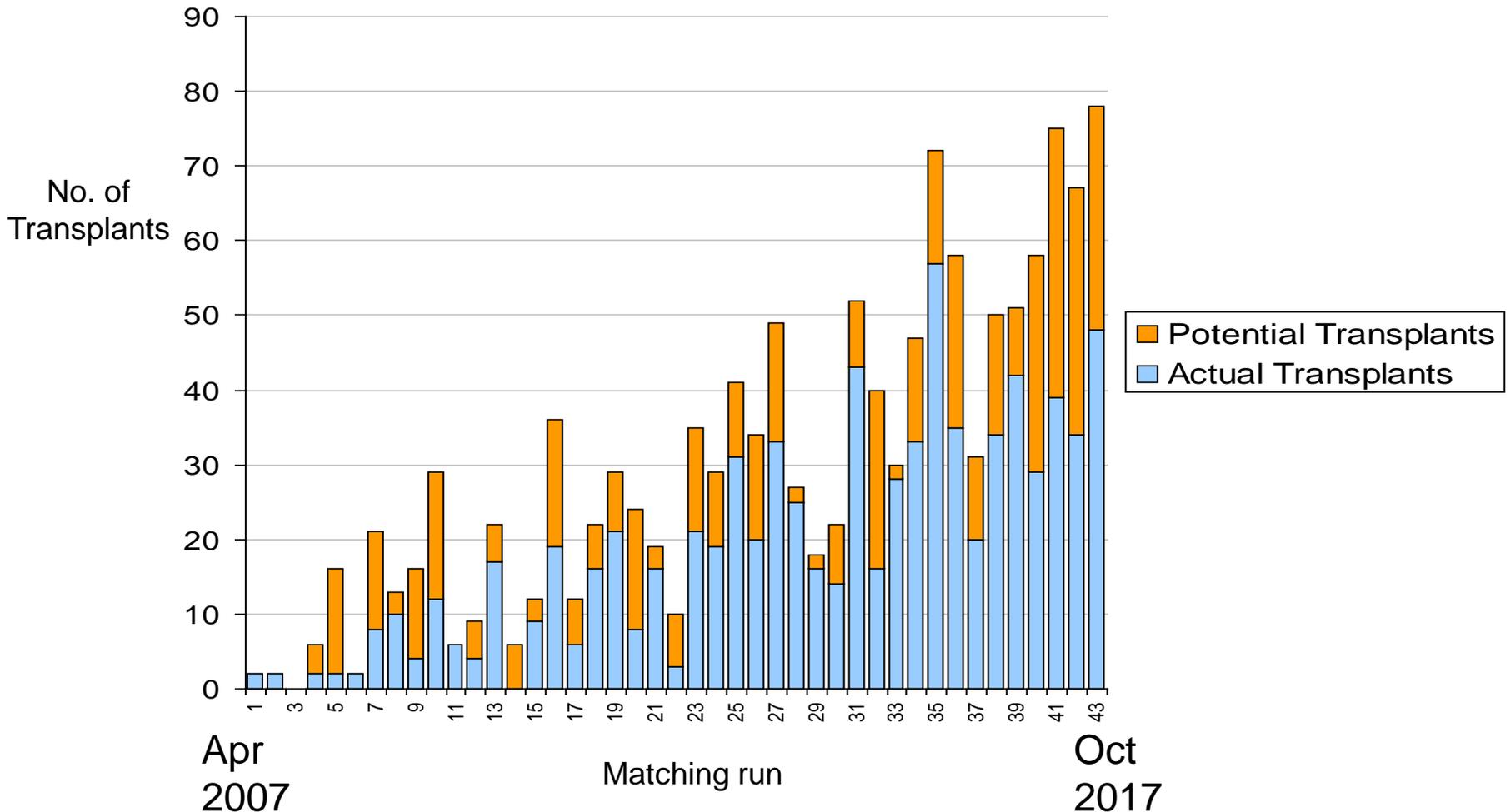
- Presented to Kidney Advisory Group (KAG)
- Implementation by LDKT 2020 Strategy Group



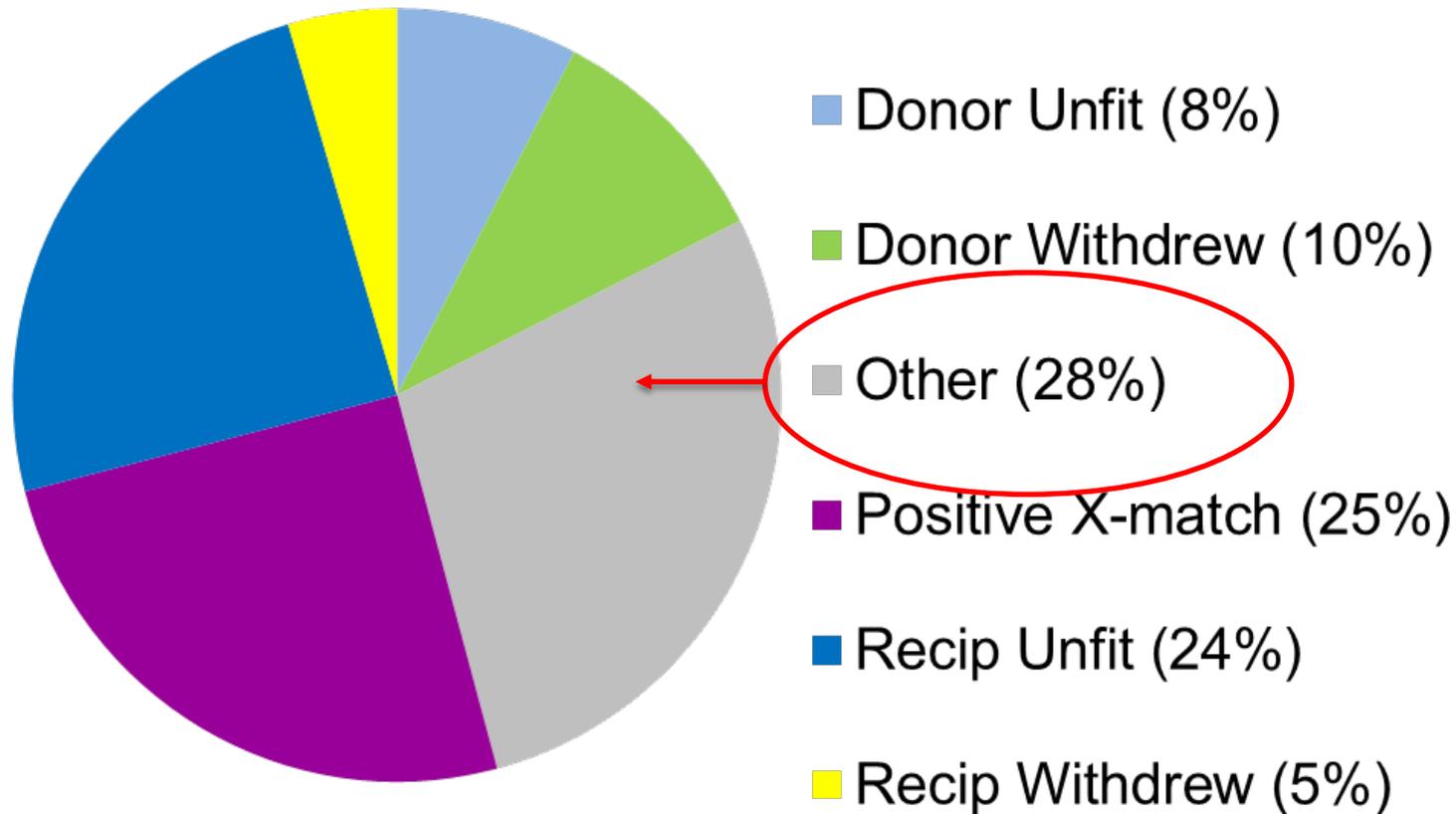
# Non-proceeding Transplants

# Non-proceeding transplants

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

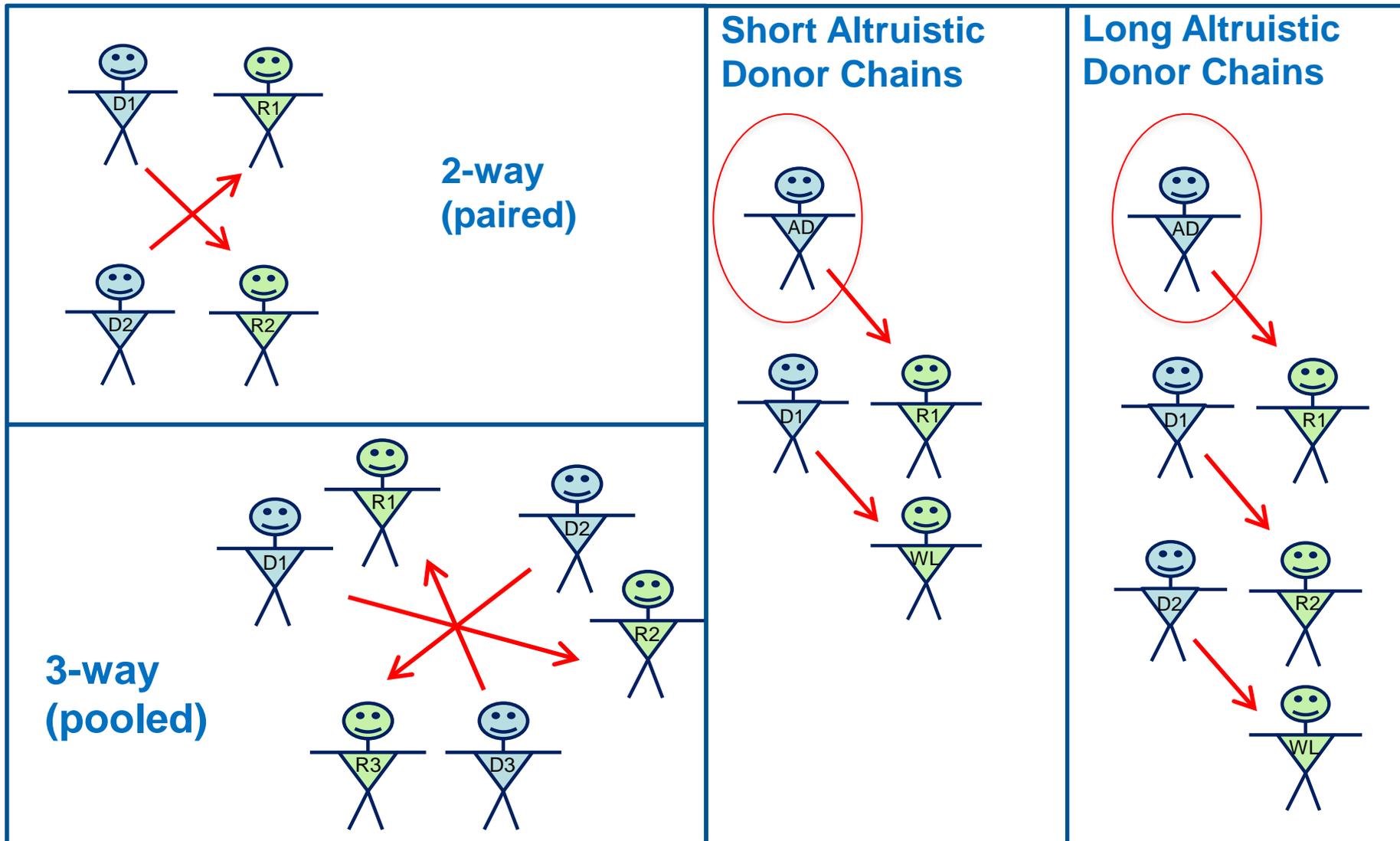


# Non-proceeding transplants (2012-2017)

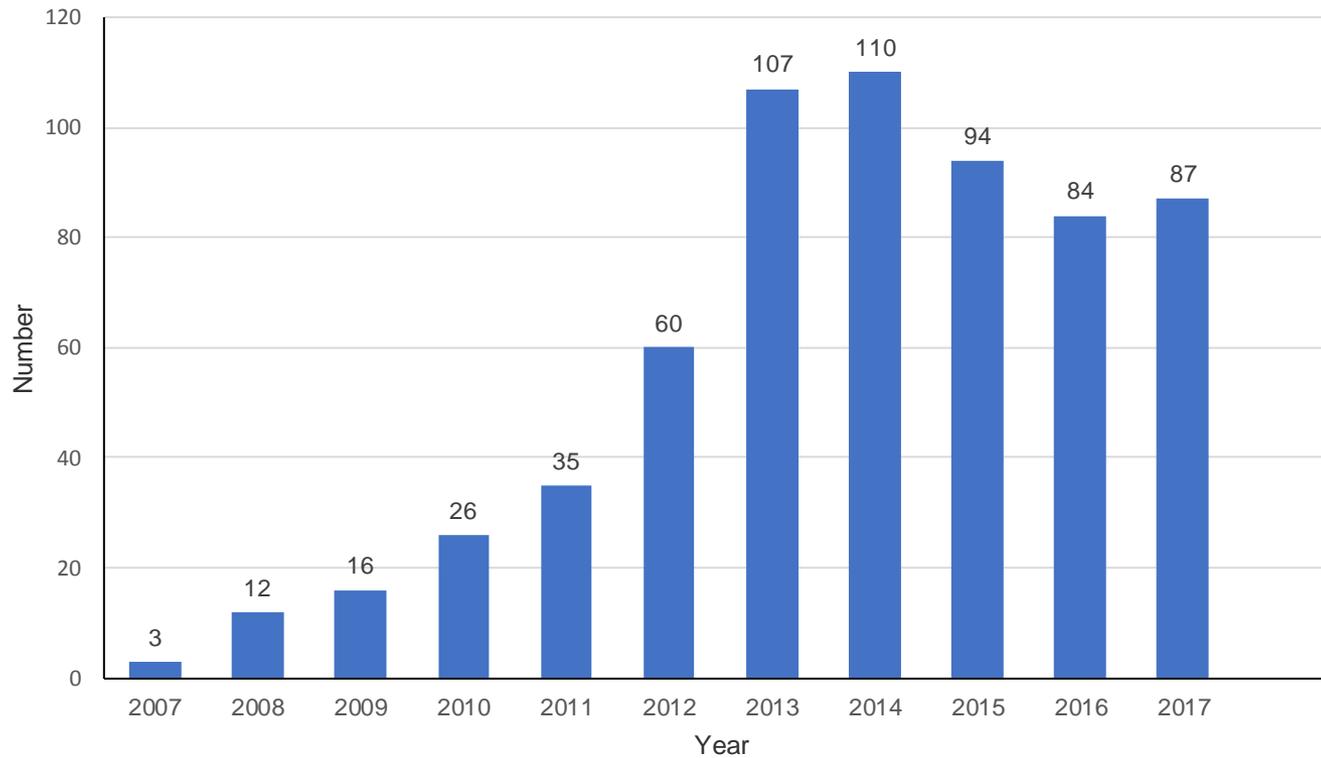


# Opportunities

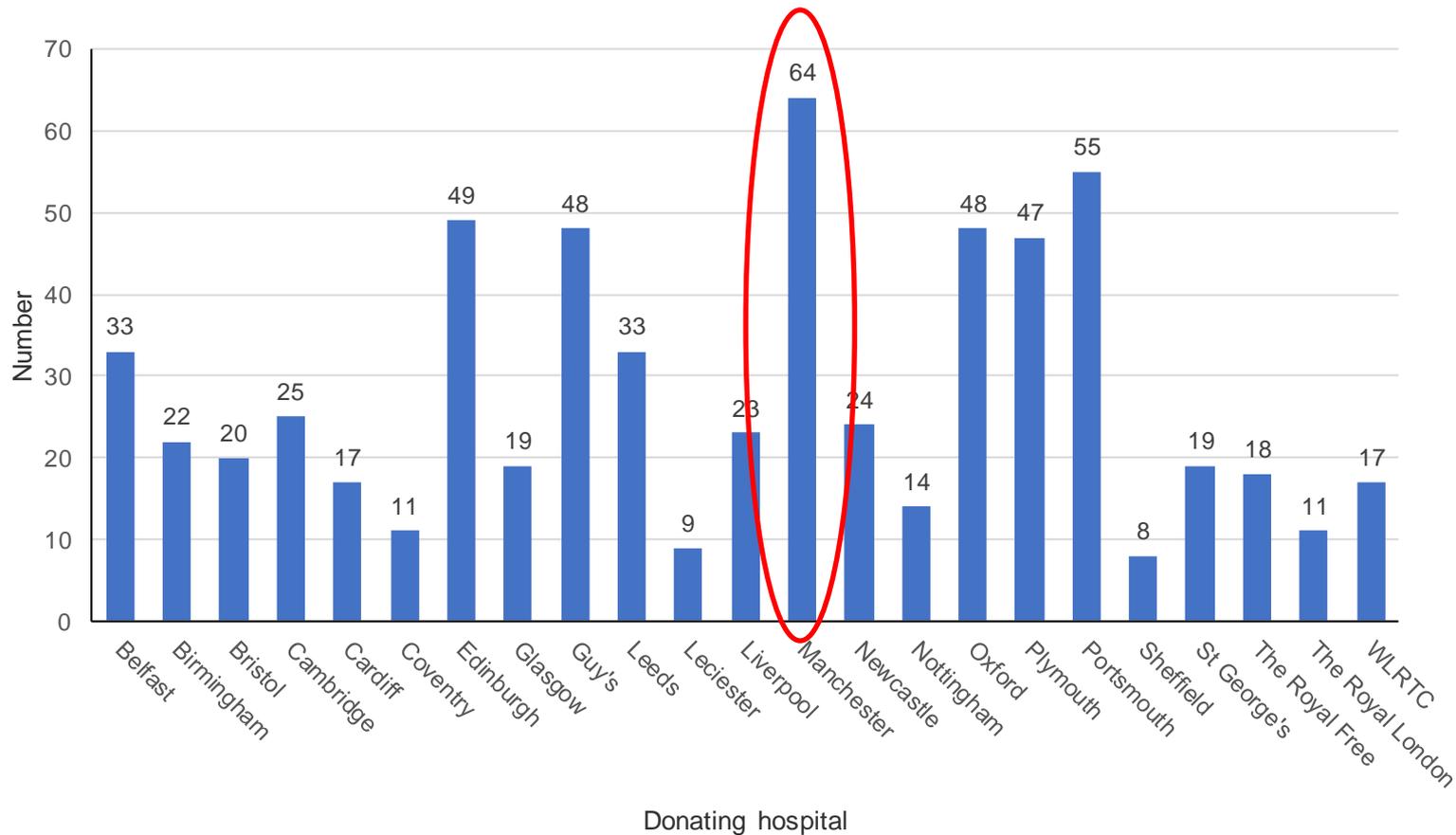
# Non-Directed Altruistic Donors



# Non-Directed Altruistic Kidney Donors (NDADs)

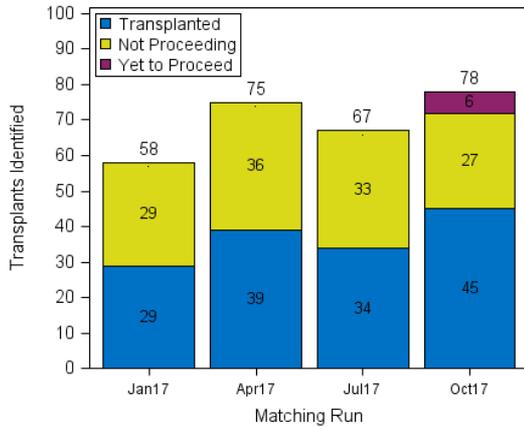


# NDADs By Donating Hospital



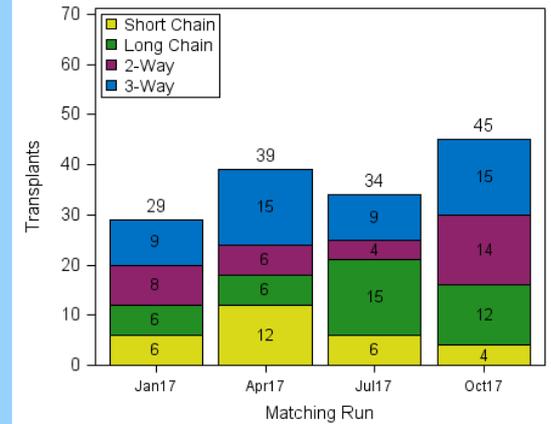
# UK Living Kidney Sharing Schemes Performance Figures

## Paired Donation Transplants Identified

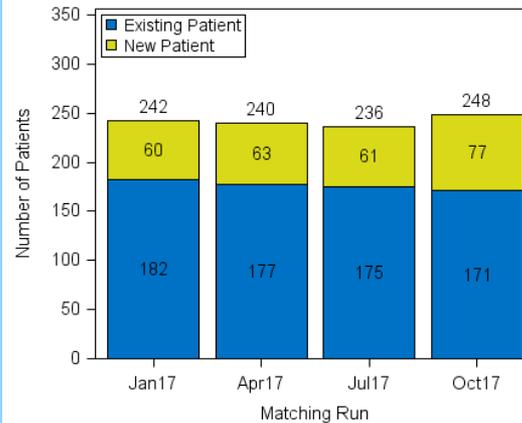


	Total May 2007-October 2017
Pairs Registered	2004
Patients Registered	1814
Altruistic Donors in Paired Donation Matching Runs	200
Compatible Pairs Registered	95
Transplants	805

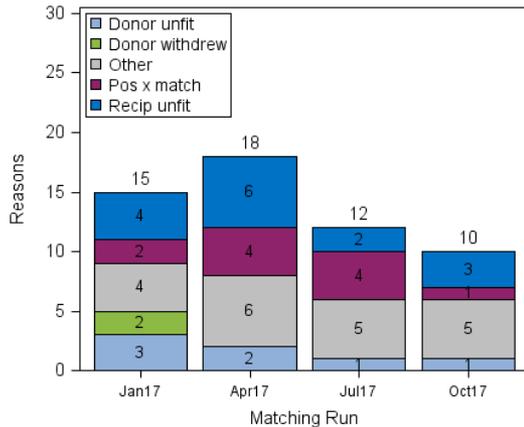
## Paired Donation Transplants by Type



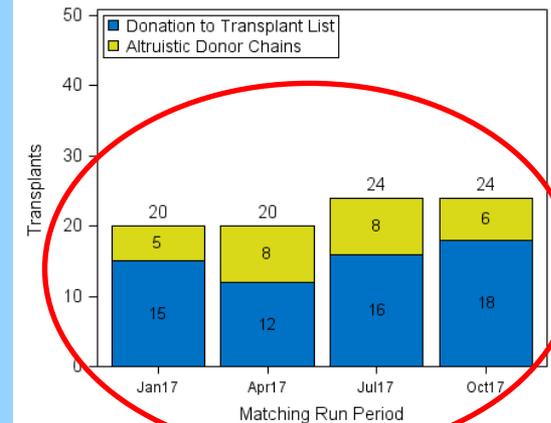
## Patients in Each Matching Run



## Non Proceeding Paired Donation Transplants



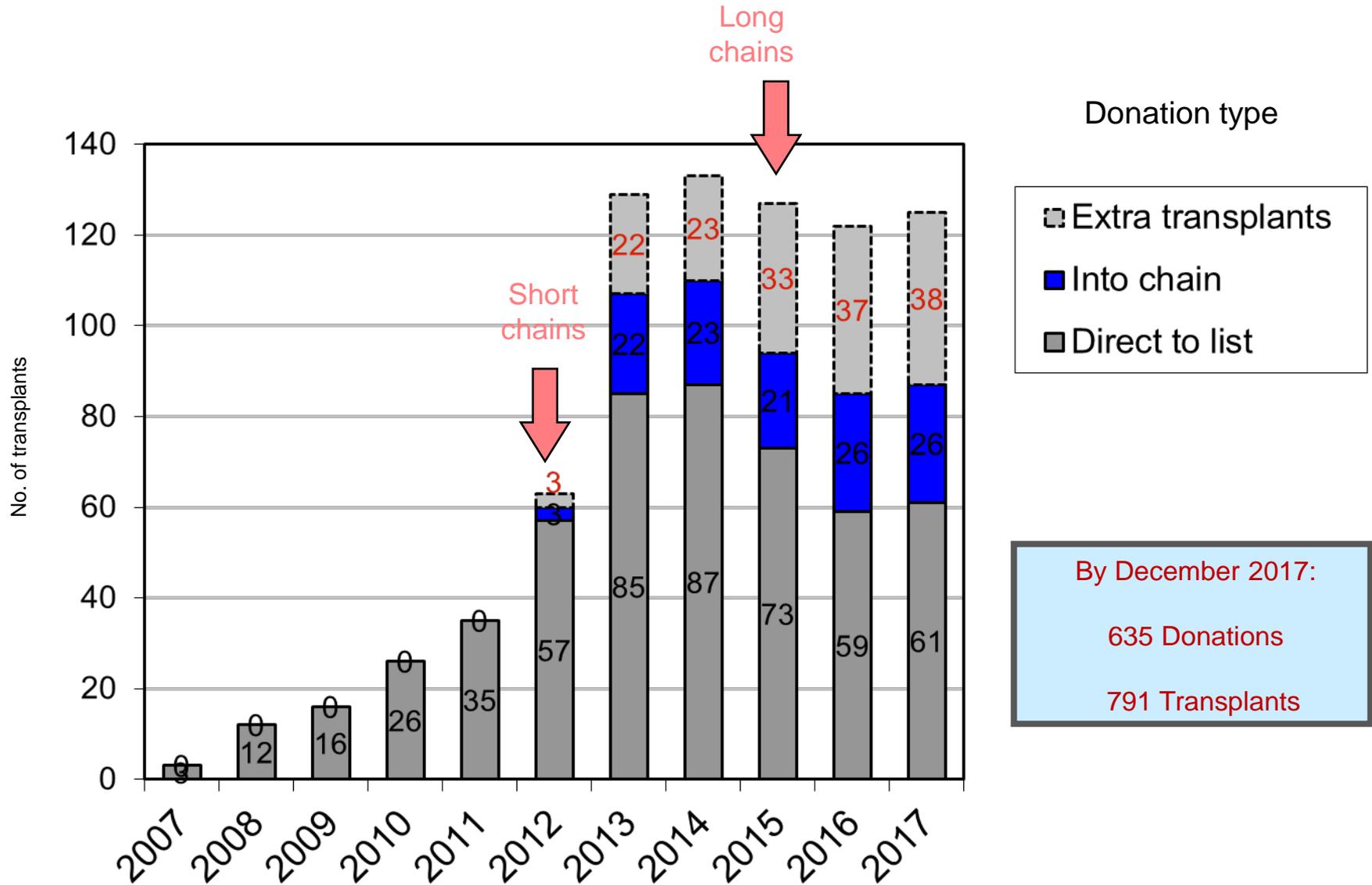
## Altruistic Donor Transplants



UKLSS 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)

Note: each reason may account for multiple transplants

# Altruistic Kidney Donors



# Innovations Maximising Transplants

A decorative graphic at the bottom of the slide consisting of two overlapping blue waves. The top wave is a lighter shade of blue and curves upwards from left to right. The bottom wave is a darker shade of blue and curves downwards from left to right, creating a layered effect.

# 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)<sup>1</sup>
- Revised portfolio of donor-recipient information<sup>2</sup>

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

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

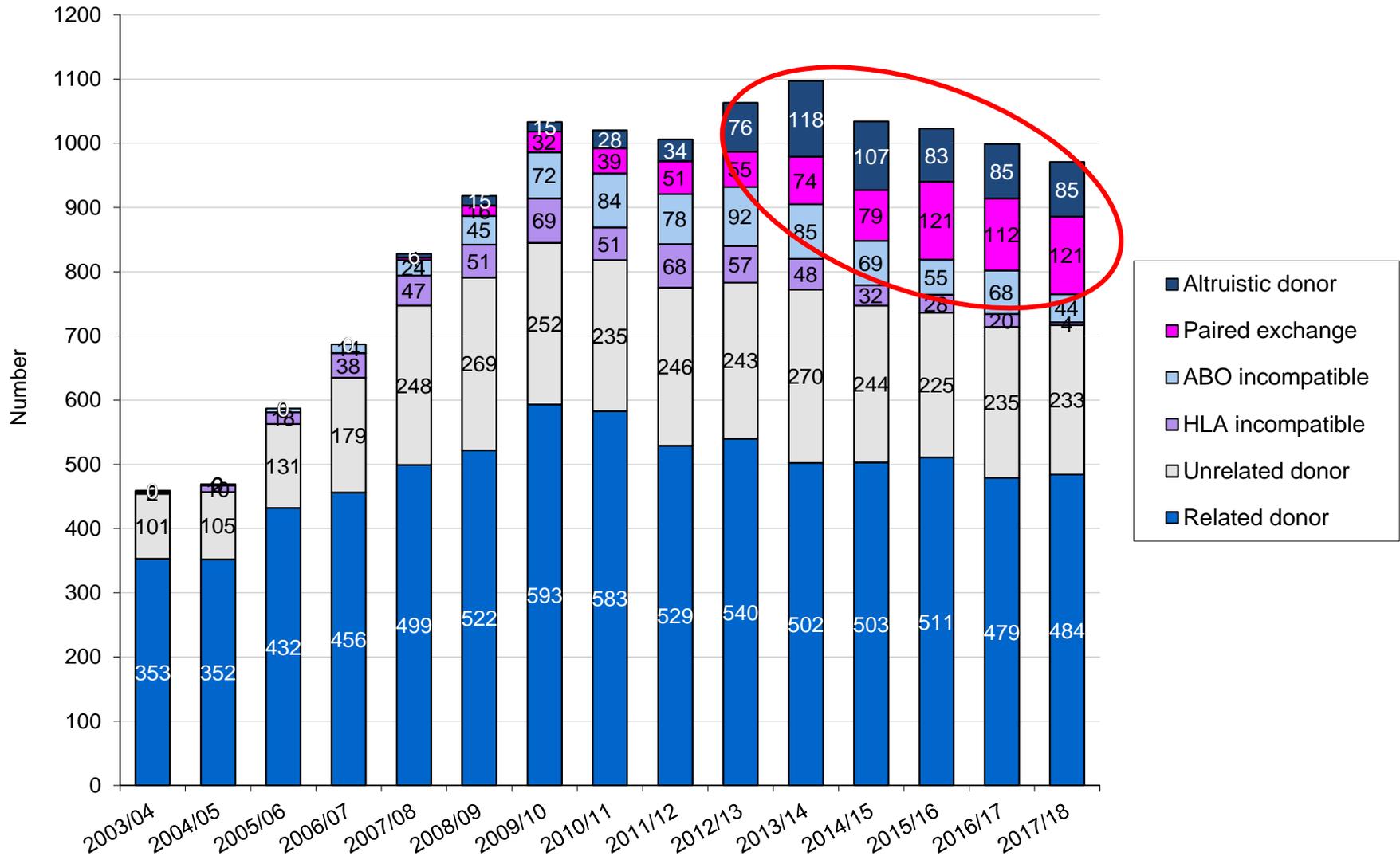
# What else could we do?

- 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)

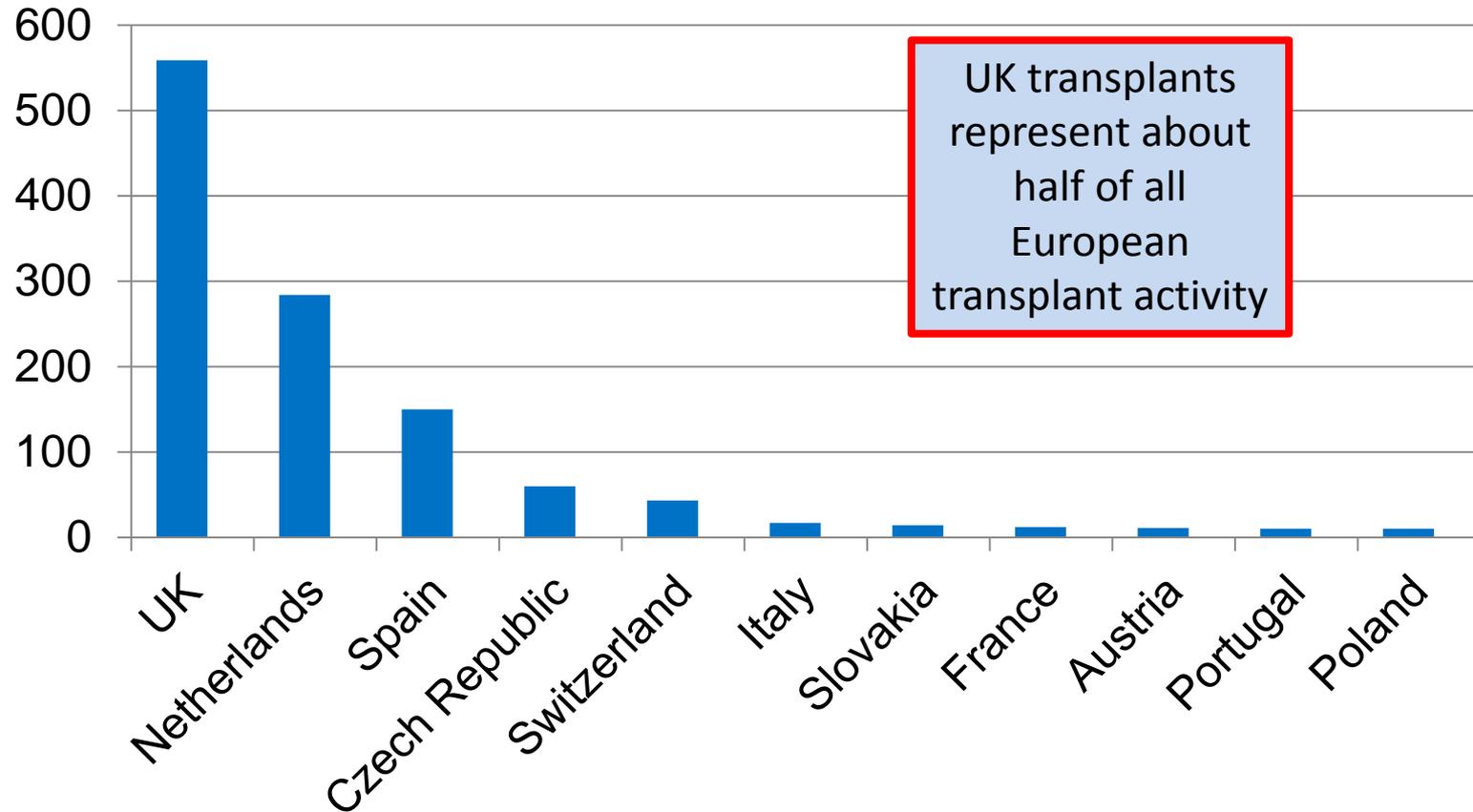


# Impact?

# 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)

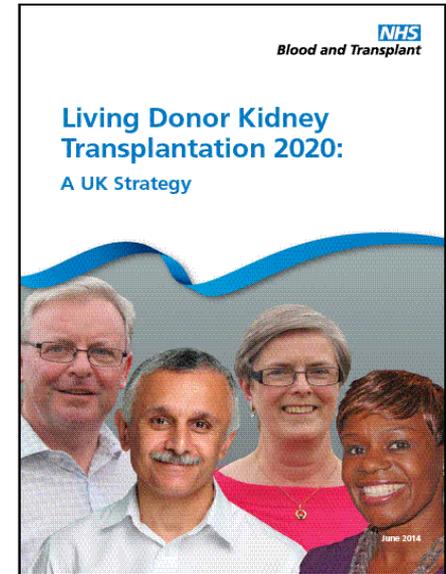
David Manlove, Peter Biro, Gregg O'Malley, James Trimble

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](http://www.nhsbt.nhs.uk)

[www.odt.nhs.uk](http://www.odt.nhs.uk)