

Kidney Offering Scheme – Operational aspects

Lisa Mumford

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Key Objectives

- Unify DBD and DCD offering with all DBD and DCD kidneys allocated through the scheme
- More effective 'quality' matching between donor and recipient
- Better tailored HLA matching by age
- Geographical equity of access
- Avoid prolonged waiting times that are predictable
- Waiting time from earliest of start of dialysis or activation on the list
- Age should be a continuous factor

Summary of basic principles

All **deceased** donor kidneys are allocated through scheme:

Tier A Patients with matchability score = 10 or 100% cRF or ≥ 7 years

Allow blood group O to B, HLA level 4 transplants

Within Tier A; patients prioritised by matchability and waiting time from dialysis

Tier B All other patients

Allow HLA level 4 transplants for matchability score 8 and 9 only

Within Tier B, patients prioritised by point score

Factors included in points score:

Donor and recipient risk index match (D1-D4, R1-R4),

Waiting time from earliest of start of dialysis or activation date on the list,

HLA match & age points combined,

Location points,

Matchability points,

Total mismatch points,

Blood group points

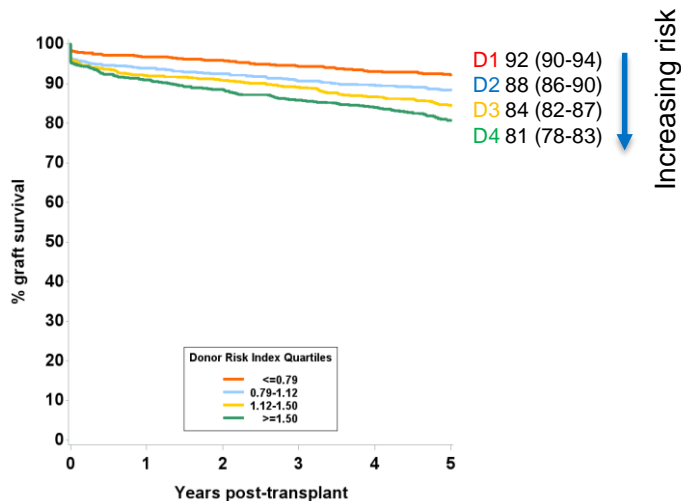
Risk indices

Blood and Transplant

Donor Risk Index

Cox model: 5 year graft survival

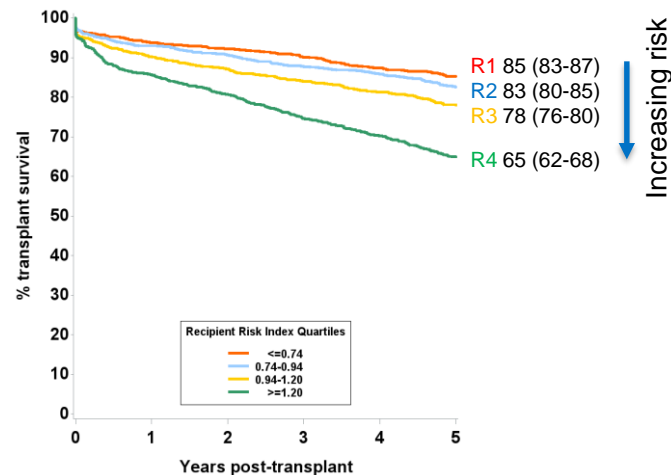
Donor Factor	Hazard Ratio	p-value
Age	1.02	<0.0001
Height	0.86	0.0005
Hospital stay	1.02	0.006
CMV	1.2	0.02
eGFR	0.98	0.02
Female	0.83	0.04
Hypertension	1.15	0.1



Recipient Risk Index

Cox model: 5 year transplant survival

Recipient Factor	Hazard Ratio	p-value
Age (≤ 25)	1.00	0.9
Age (> 25)	1.02	<0.001
Dialysis	1.43	<0.001
Diabetic	1.32	0.003
Time on dialysis (years)	1.03	0.004

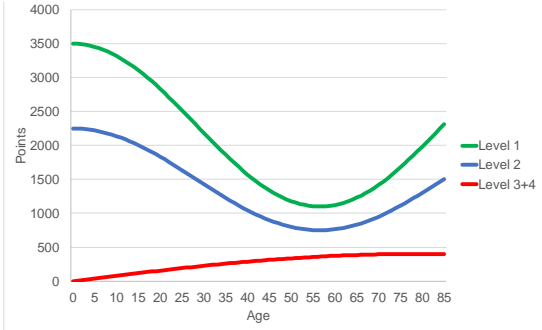


Points score

Donor and recipient risk index match

Donor Risk group	Recipient Risk Group			
	R1	R2	R3	R4
D1	1000	700	350	0
D2	700	1000	500	350
D3	350	500	1000	700
D4	0	350	700	1000

HLA and age combined points



- Level 1 $1200 \cdot \cos(r\text{-age}/18) + 2300$
- Level 2 $750 \cdot \cos(r\text{-age}/18) + 1500$
- Level 3+4 $400 \cdot \sin(r\text{-age}/50)$

Waiting time points from dialysis
 1 point will be awarded for every day

Location points
 DCD within region 5000 points
 DBD within region 750 points
 DCD within centre 250 points

Matchability points
 $40 \cdot (1 + \text{matchability score} / 4.5)^{4.7}$
 Total mismatch points (HLA-A,B,Cw,DR,DQ)
 =1 -100 points = 4-8 -200 points
 =2-3 -150 points = 9-10 -300 points

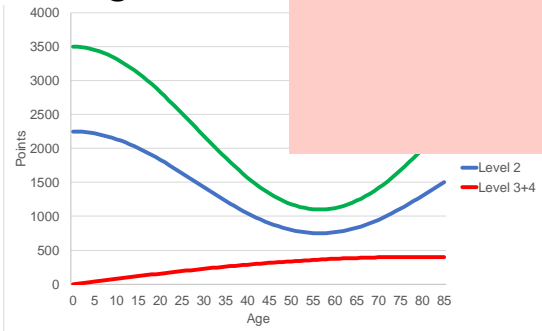
Blood group points
 O donor to B patient -1000 points
 Age difference points
 $-\frac{1}{2} (\text{donor-recipient age difference})^2$

Points score

Donor and recipient risk index match

Donor Risk group	Recipient Risk Group			
	R1	R2	R3	R4
D1	1000	700	350	0
D2	700	1000	350	0
D3	350	1000	350	0
D4	0	350	350	0

HLA and age comb



- Level 1 $1200 \cdot \cos(r\text{-age}/18) + 2300$
- Level 2 $750 \cdot \cos(r\text{-age}/18) + 1500$
- Level 3+4 $400 \cdot \sin(r\text{-age}/50)$

Waiting time points from dialysis
 1 point will be awarded for every day
 Location points

Median point score required for a transplant is:
 3743
 (IQR 3331 – 4190)

5000 points
 750 points
 250 points

$(\text{score} / 4.5)^{4.7}$
 s (HLA-A,B,Cw,DR,DQ)
 = 1-3 -100 points = 4-8 -200 points
 = 2-3 -150 points = 9-10 -300 points

Blood group points
 O donor to B patient -1000 points
 Age difference points
 $-\frac{1}{2} (\text{donor-recipient age difference})^2$

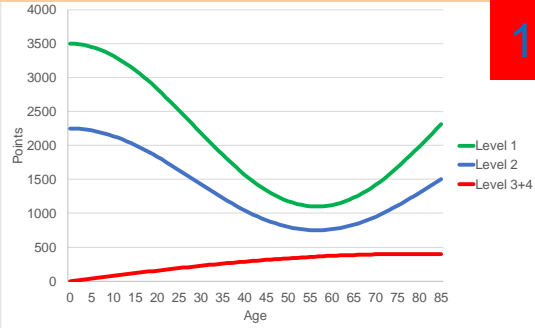
Points score - differences

Donor and recipient risk index match

Donor Risk group	Recipient Risk Group			
	R1	R2	R3	R4
D1	1000	700	350	0
D2	700	1000	500	350
D3	350	500	1000	
D4	0	350	700	

HLA-DR Homozygous
500 points
HLA-B Homozygous
100 points

HLA and age combined point



- Level 1 $1200 \cdot \cos(r\text{-age}/18) + 2300$
- Level 2 $750 \cdot \cos(r\text{-age}/18) + 1500$
- Level 3+4 $400 \cdot \sin(r\text{-age}/50)$

Waiting time points from dialysis
1 point will be awarded for every day

Location points
DCD within region 5000 points
DD within region 750 points
DD within centre 250 points

Compatibility points
 $(\text{matchability score} / 4.5)^{4.7}$

Total mismatch points (HLA-A,B,Cw,DR,DQ)

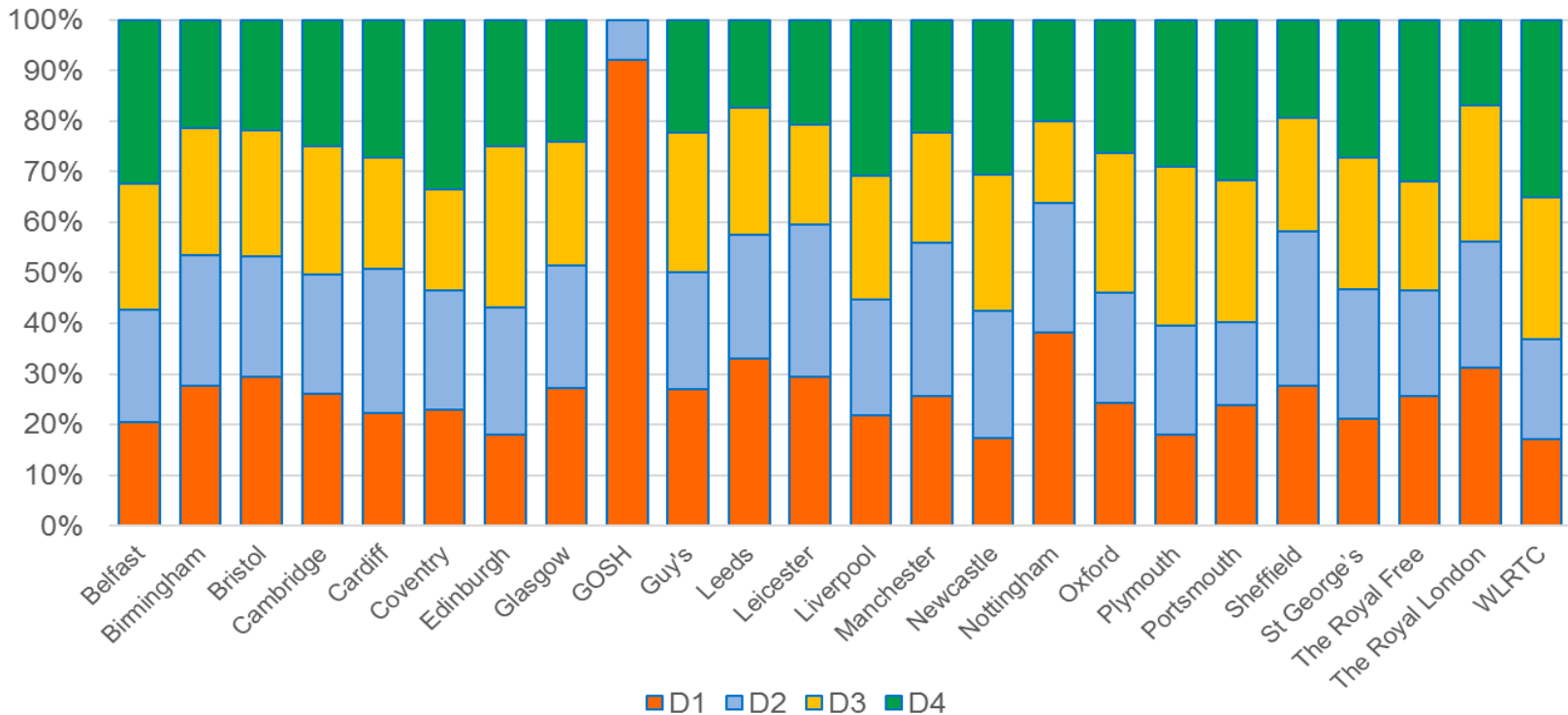
=1	-100 points	= 4-8	-200 points
=2-3	-150 points	= 9-10	-300 points

Blood group points
O donor to B patient -1000 points
Age difference points
 $-\frac{1}{2} (\text{donor-recipient age difference})^2$

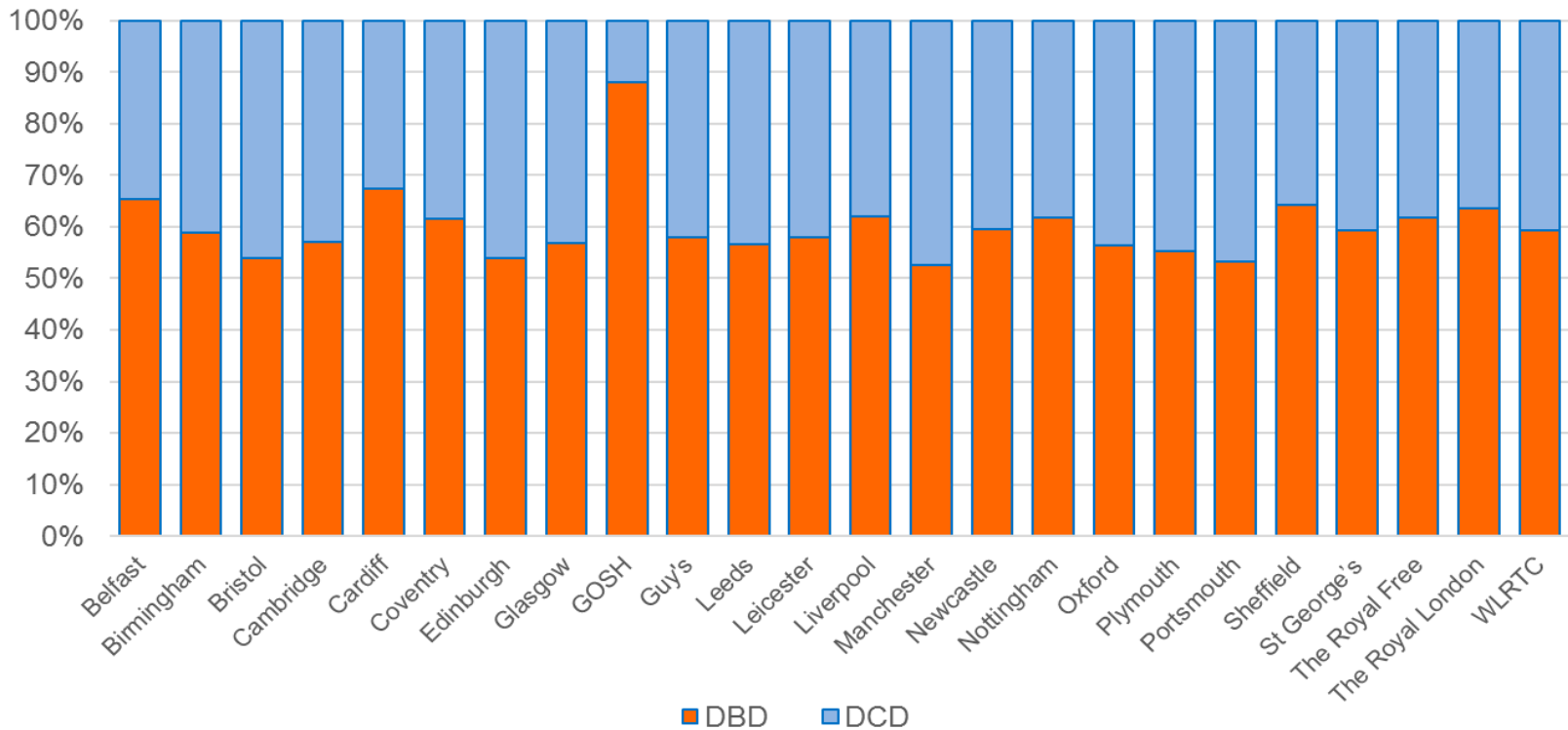
Simulated transplants – proportion

	2018 Actual No.	Current Scheme
Belfast	2.4	2.1
Birmingham	5.9	8.5
Bristol	4.7	4.8
Cambridge	6.1	4.0
Cardiff	3.2	3.2
Coventry	1.8	1.6
Edinburgh	3.1	3.1
Glasgow	4.5	5.4
GOSH	0.3	0.4
Guy's	6.6	6.4
Leeds	6.4	6.2
Leicester	3.8	4.7
Liverpool	3.5	3.9
Manchester	8.3	8.1
Newcastle	2.8	3.7
Nottingham	3.5	3.0
Oxford	6.3	3.8
Plymouth	2.2	1.7
Portsmouth	3.0	2.9
Sheffield	2.4	2.9
St George's	4.6	4.9
The Royal Free	3.5	3.8
The Royal London	5.2	4.5
WLRTC	5.8	6.7
Total	2406	2050

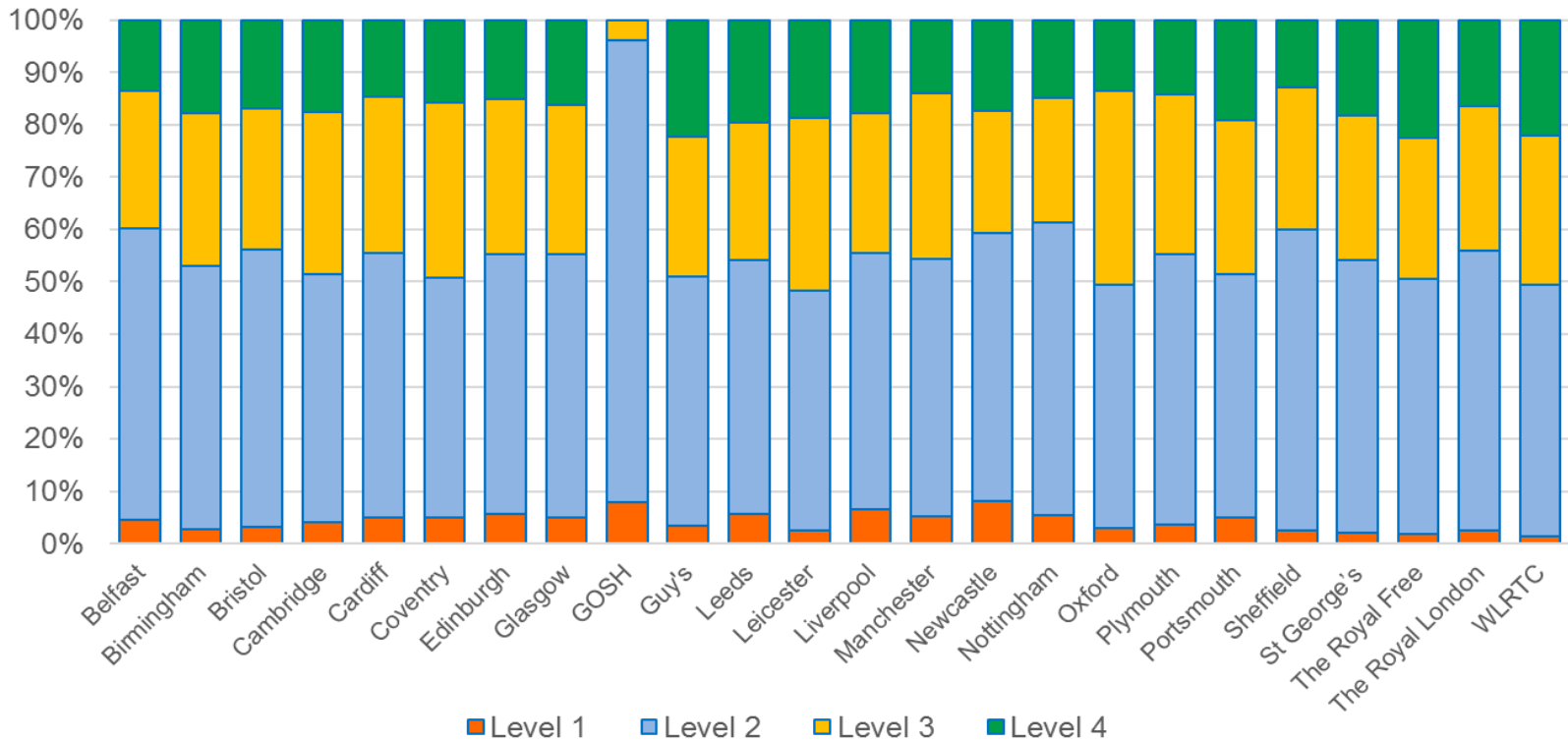
Simulated transplants – Donor Risk Index



Simulated transplants – Donor Type



Simulated transplants – HLA Level



HLA-DP unacceptable antigens

- Currently included in calculation of Matchability / Calculated Reaction Frequency
- HLA-DP reported for the majority of donors but not used in deceased donor matching
- Centres will be contacted to check correct HLA-DP unacceptable antigens are reported for each active kidney recipient
- Due to be included on go-live of new Kidney Offering Scheme

Local allocation of kidneys

Kidneys will still be available through the scheme for centres to use in a patient of their choice:

- Kidneys from donors aged between 2 and 5 will be offered to centres en-bloc
- Kidneys from D4 donors aged over 70 will be offered to centres to use as dual or individually
- Kidneys dispatched but reallocated because the patient for whom the kidney has been accepted cannot subsequently receive the transplant, assuming no Tier A recipients are identified
- Kidneys offered through the Fast Track Scheme

Updated tools

- Relative chance of transplant
 - Tools updated using simulated data for adult and paediatric patients
- Matchability and Calculated Reaction Frequency
 - Update to include HLA Level 1 and Level 2
 - Update to 10,000 donor pool
- Donor Risk Index – New tool available online
- Recipient Risk Index – Included in renal patient list via ODT Online

Summary

- A new Kidney Offering Scheme has been produced in line with key objectives
- UK Kidney Advisory Group have approved proposed scheme
- Transplant activity not due to change dramatically for transplant centres
- Scheme to be implemented summer 2019

Acknowledgements

Kidney Offering Scheme Working Group



Blood and Transplant

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