

**NHS BLOOD AND TRANSPLANT  
CTAG HEART ADVISORY GROUP  
BLOOD GROUP ACTIVITY  
SUMMARY**

**BACKGROUND**

- 1 Following previously presented analysis, on 1 April 2010 changes were made to the offering sequence of blood group O donor hearts for non-urgent adult patients. These changes mean that blood group O and B patients should initially be offered blood group O donor hearts prior to them being offered to blood group A and AB patients. This paper reports on access to heart transplant by recipient blood group over the last two years.

**DATA ANALYSIS**

- 2 Data on 233 new non-urgent adult active heart only registrations made in the UK between 1 January 2013 and 31 December 2014 were analysed. For the subset of 175 registrations that had six-month follow-up, there was no evidence of a statistically significant difference between the blood groups in the proportion of patients that died within six-months of registration (Fisher's exact  $p=0.11$ ). However, there was strong evidence of a difference between the blood groups in the proportion of patients transplanted at six-months (Fisher's exact  $p=0.0006$ ). Only 8% of blood group O patients had been transplanted compared with over 28% of blood group A, B and AB patients.
- 3 Analysis of waiting time to transplant for the whole cohort showed significant differences between the blood groups ( $p<0.0001$ ), with blood group O patients having a longer time to transplant than the other three blood groups.
- 4 In order to examine the donor to recipient ABO match distribution, data on 68 UK adult non-urgent heart only transplants performed during the same time period were also analysed. Of the 68 heart transplants performed, 14 were hearts from a blood group O donor and 12 of these 14 (86%) were transplanted into blood group O patients. 89% of adult blood group O hearts donated during the time period were transplanted into urgent patients, compared with less than 63% of all A, B and AB donor hearts. This may explain the longer time to transplant for blood group O patients.

**RECOMMENDATIONS**

- 5 Although blood group O patients continue to wait longer than others for non-urgent heart transplant and six month transplant rates differ significantly between the blood groups, it appears that little else can be done to direct blood group O donor hearts without affecting the urgent scheme.

**NHS BLOOD AND TRANSPLANT**  
**CARDIOTHORACIC ADVISORY GROUP**  
**BLOOD GROUP ACTIVITY**

**BACKGROUND**

- 1 From 1 April 2010, offers of blood group O donor hearts for non-urgent adult patients must be made to blood group O and B patients, first within-zone then to other centres rotationally. If there are no suitable O and B patients, the heart may then be offered to blood group A and AB patients, again first within-zone and then to other centres.
- 2 This paper reports on access to heart transplantation by recipient blood group over the last two years.

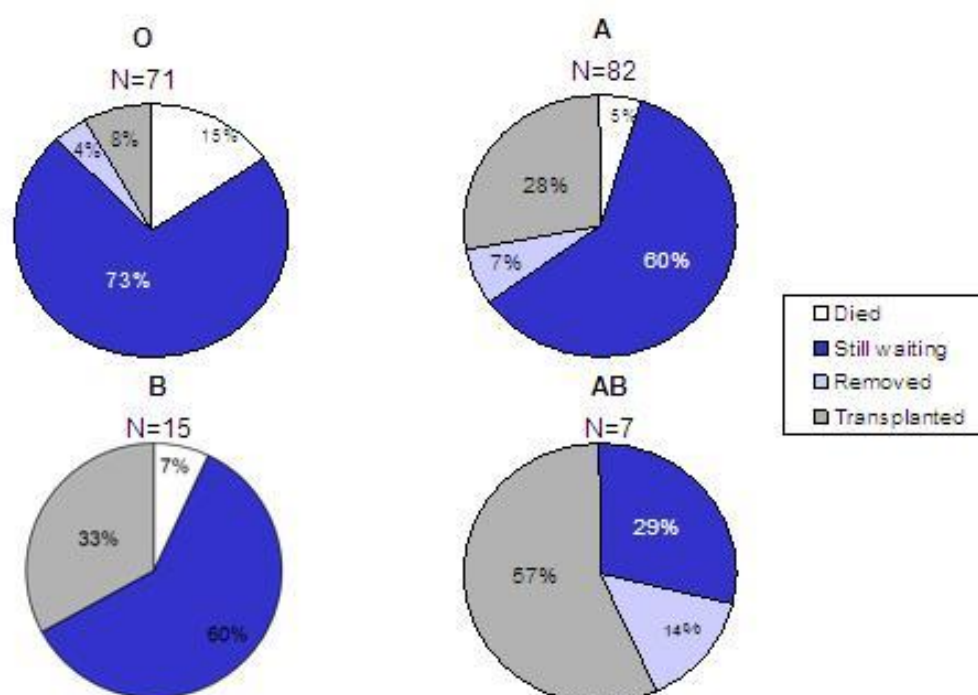
**DATA AND METHODS**

- 3 Data on 233 new non-urgent adult active heart only registrations made in the UK between 1 January 2013 and 31 December 2014 were obtained from the UK Transplant Registry (UKTR) to examine waiting time to transplant. Six-month post-registration outcomes for the subset of patients (175 patients) with six month follow-up were also analysed to examine the proportion of deaths and transplants.
- 4 To examine the donor to recipient ABO match distribution, data on 68 adult non-urgent heart only transplants performed in the UK from donors after brain death (DBD) during the same time period were also obtained from the UK Transplant Registry. Data were also obtained on all 316 DBD heart transplants performed during the time period.

**RESULTS****Registration outcome**

- 5 Registration outcomes (death, transplant, removal, still waiting) within six months of registration are shown in **Figure 1** by blood group. There is no evidence of a statistically significant difference between blood groups in the proportion of patients that died within six months of registration (Fisher's exact test  $p=0.11$ ). However, there is strong evidence of a difference between blood groups in the proportion of patients transplanted at six months post-registration (Fisher's exact test  $p=0.0006$ ). Only 8% of blood group O patients had been transplanted compared with 28% or over for blood group A, B and AB patients.

**Figure 1 Six-month post-registration outcome by recipient blood group, 1 January 2013 to 30 June 2014**



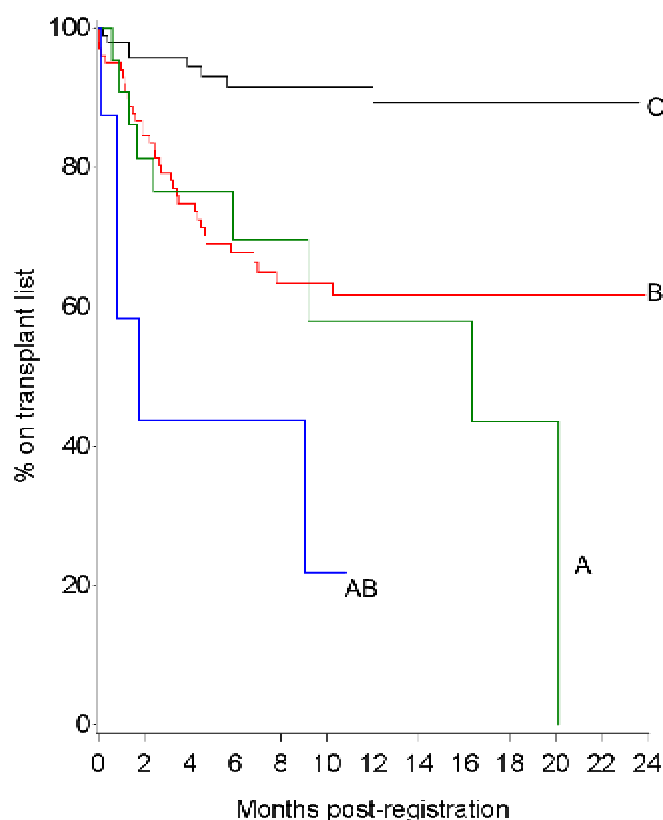
Ten patients were removed from the transplant list within six months of registration and **Table 1** shows the reasons for removal. Of the 10 patients removed, one blood group O patient was removed due to VAD implant and four patients have been reported as dying after being removed.

**Table 1 Reasons for removal from transplant list within six months of registration, by blood group, 1 January 2013 to 31 December 2014**

Reason for removal from transplant list	Blood group				Total
	O	A	B	AB	
Condition improved	1 (33%)	2 (67%)	0 (0%)	0 (0%)	3 (30%)
Condition deteriorated	0 (0%)	3 (75%)	0 (0%)	1 (25%)	4 (40%)
VAD implant and other complications	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1 (10%)
Patient received alternative surgery	1 (100%)	0 (0%)	0 (0%)	0 (0%)	1 (10%)
Patient wishes	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1 (10%)
<b>Total</b>	<b>3 (30%)</b>	<b>6 (60%)</b>	<b>0 (0%)</b>	<b>1 (10%)</b>	<b>10 (100%)</b>

- 6 **Figure 2** shows the Kaplan-Meier time to transplant curves by blood group for the 233 patients registered on the non-urgent transplant list between 1 January 2013 and 31 December 2014 and indicates there are statistically significant differences in waiting time to transplant between the four blood groups ( $p\text{-value} < 0.0001$ ). Blood group O patients had a longer time to transplant than the other three blood groups. Blood group AB had a far shorter waiting time however this was only based on 8 observations.

**Figure 2 Time to transplant, by blood group, for non-urgent adult registration on the UK heart only transplant list, 1 January 2013 to 31 December 2014**



### Non-urgent transplants

- 7 **Table 2** shows the donor to recipient ABO blood group match for adult non-urgent heart only transplants. 86% of blood group O donor hearts were used in blood group O patients, and overall 91% of patients received a blood group identical transplant. **Table 3** shows that 89% of adult blood group O hearts transplanted during the time period were transplanted into urgent patients, comparing with less than 63% of blood group A and B donor hearts. This may explain with longer time to transplant for blood group O patients.
- 8 There were two cases between 1 January 2013 and 31 December 2014 where a blood group O donor heart was transplanted into a non-urgent blood group A patient. This would be non-compliance if there was a suitable blood group O or B patient registered at the centre at time of offer, and these two cases are being investigated.

<b>Table 2</b>		<b>ABO blood group match for adult non-urgent heart only transplants, 1 January 2013 – 31 December 2014</b>							
	<b>Donor blood group</b>	<b>Recipient blood group</b>							
		<b>O</b>		<b>A</b>		<b>B</b>		<b>AB</b>	
		<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>
<b>Zonal</b>	<b>O</b>	6	(86)	1	(14)	0	(0)	0	(0)
	<b>A</b>	-	(-)	22	(92)	-	(-)	2	(8)
	<b>B</b>	-	(-)	-	(-)	3	(75)	1	(25)
	<b>AB</b>	-	(-)	-	(-)	-	(-)	0	(0)
	<b>Total</b>	<b>6</b>	<b>(17)</b>	<b>23</b>	<b>(65)</b>	<b>3</b>	<b>(9)</b>	<b>3</b>	<b>(9)</b>
<b>Non-zonal</b>	<b>O</b>	6	(86)	1	(14)	0	(0)	0	(0)
	<b>A</b>	-	(-)	19	(95)	-	(-)	1	(5)
	<b>B</b>	-	(-)	-	(-)	4	(100)	0	(0)
	<b>AB</b>	-	(-)	-	(-)	-	(-)	2	(100)
	<b>Total</b>	<b>6</b>	<b>(18)</b>	<b>20</b>	<b>(61)</b>	<b>4</b>	<b>(12)</b>	<b>3</b>	<b>(9)</b>
<b>Overall</b>	<b>O</b>	<b>12</b>	<b>(86)</b>	<b>2</b>	<b>(14)</b>	<b>0</b>	<b>(0)</b>	<b>0</b>	<b>(0)</b>
	<b>A</b>	-	(-)	41	(93)	-	(-)	3	(7)
	<b>B</b>	-	(-)	-	(-)	7	(87)	1	(13)
	<b>AB</b>	-	(-)	-	(-)	-	(-)	2	(100)
	<b>Total</b>	<b>12</b>	<b>(18)</b>	<b>43</b>	<b>(63)</b>	<b>7</b>	<b>(10)</b>	<b>6</b>	<b>(9)</b>

- Blood group incompatible transplants

<b>Table 3</b>		<b>Adult heart transplants from UK adult DBD donors, 1 January 2013 – 31 December 2014</b>					
<b>Donor blood group</b>	<b>Urgent</b>		<b>Type of transplant Non-urgent</b>		<b>Other<sup>1</sup></b>		<b>Total N</b>
	<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	
O	136	(89)	14	(9)	3	(2)	153
A	85	(62)	44	(32)	9	(6)	138
B	13	(59)	8	(36)	1	(5)	22
AB	1	(33)	2	(67)	0	(0)	3
<b>Total</b>	<b>235</b>	<b>(74)</b>	<b>68</b>	<b>(22)</b>	<b>13</b>	<b>(4)</b>	<b>316</b>

<sup>1</sup> Includes heart/lung transplants (n=9), heart/kidney transplant (n=2), as well as transplants performed overseas (n=2)

## CONCLUSION

- 9 During the time period, 12 of the 14 blood group O hearts transplanted into non-urgent patients were blood group identical. Blood group O patients continue to wait longer than others for a non-urgent heart transplant and six month transplant rates differ significantly between the blood groups. It appears that little else can be done to direct blood group O donor hearts to O recipients without affecting the urgent scheme.

**Esther Wong**  
**Statistics and Clinical Studies**

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