



**Blood and Transplant**

**ANNUAL REPORT ON  
THE NATIONAL ORGAN RETRIEVAL SERVICE  
(NORS)**

**REPORT FOR 2021/2022  
(1 April 2021 - 31 March 2022)**

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## **EXECUTIVE SUMMARY**



## Executive Summary

The National Organ Retrieval Service (NORS) was introduced on 1 April 2010, comprised of 16 NORS teams; 10 abdominal and 6 cardiothoracic surgical teams available to retrieve organs for transplantation from deceased donors in the UK.

This report presents organ retrieval data from the most recent financial year, 1 April 2021 to 31 March 2022. Data were extracted from the UK Transplant Registry on 14 July 2022.

### Key findings:

- From 1 April 2021 to 31 March 2022, 1,633 potential organ donors were attended by a retrieval team. 1,395 (85%) of these proceeded to abdominal organ donation and 265 (56% of the 475 attended by a cardiothoracic team) proceeded to cardiothoracic organ donation.
- There was a 18% increase in the number of donors attended in this financial year compared to the previous year (from 1,381 to 1,633).
- On average, 4.5 potential donors were attended by a retrieval team per day, which is an increase from the previous year (3.9).
- On average, abdominal teams attended at least one donor on 48% of on-call days in the year (42% the previous year), while cardiothoracic teams attended at least one donor on 34% of on-call days (30% the previous year).
- There were statistically significant differences in the mean number of DBD abdominal organs retrieved and the mean number of DBD abdominal organs transplanted across teams.
- The transplantation rates for retrieved organs were variable across organs from 51.2% for DCD pancreases up to 99.3% for DBD hearts. Additionally, 48 DCD hearts were retrieved, 44 of which were transplanted in that period.
- There were 111 A-NRP attendances, with 86 proceeding to donation, with Cardiff and Royal Free performing their first cases.

Use of the contents of this report should be acknowledged as follows: *Annual Report on The National Organ Retrieval Service 2021/2022, NHS Blood and Transplant*

# INTRODUCTION



## Introduction

The National Organ Retrieval Service (NORS) was introduced on 1 April 2010, comprised of 16 NORS teams; 10 abdominal and 6 cardiothoracic surgical teams available to retrieve organs for transplantation from deceased donors in the UK.

This report presents organ retrieval activity from the latest full financial year, 1 April 2021 to 31 March 2022. Data were provided by retrieval teams and Specialist Nurses for Organ Donation (SN-ODs) via the Retrieval Team Information (RTI) and Organ Retrieval Information (ORI) forms. A small proportion (0% and 0.1% for RTI and ORI, respectively) of forms were missing at time of data extraction, 14 July 2022.

The abdominal service is made up of four full-time teams (52 weeks on-call per annum) and six part-time teams (varying between 15 and 38 weeks on-call per annum). Since 6 January 2020, there have been eight abdominal teams on-call at any time, previously this was seven. Since April 2016, following the NORS Review, all six teams in the cardiothoracic service are part-time (26 weeks on-call per annum) making three teams on-call at any time. Prior to the NORS Review all six cardiothoracic teams were on-call full-time.

Some potential donors are attended by both an abdominal retrieval team and a cardiothoracic retrieval team, but many are only attended by an abdominal retrieval team. Statistics in this report are often presented separately for abdominal and cardiothoracic organ retrieval teams, as well as for donors after brain death (DBD) and donors after circulatory death (DCD).

Some potential donors are attended by a retrieval team but do not proceed to donation, i.e. no organs are retrieved. Non-proceeding donors are more common in the pool of potential DCD donors as prolonged time to circulatory arrest and death after treatment withdrawal can cause unsuitability of organs for transplantation. Note that a donor may be a non-proceeding cardiothoracic donor but proceed to abdominal organ donation, or vice-versa. Some of the information presented in this report is not relevant for non-proceeding donors and related only to actual donors. We cannot be sure that we have full reporting on all non-proceeding donors attended by retrieval teams as it is only possible to identify these through receipt of an RTI or ORI form.

Since February 2019, NORS teams have been mobilised using a sequence, the first and second teams in the sequence are defined for each UK hospital (largely based on travel times but adjusted to give a more even workload across NORS teams), while subsequent teams in the sequence are ordered based on travel time and availability, known as 'closest available'.

If a team is first in sequence for a particular donor hospital, they are required to attend possible donors at that hospital within an agreed timescale if at least one organ has

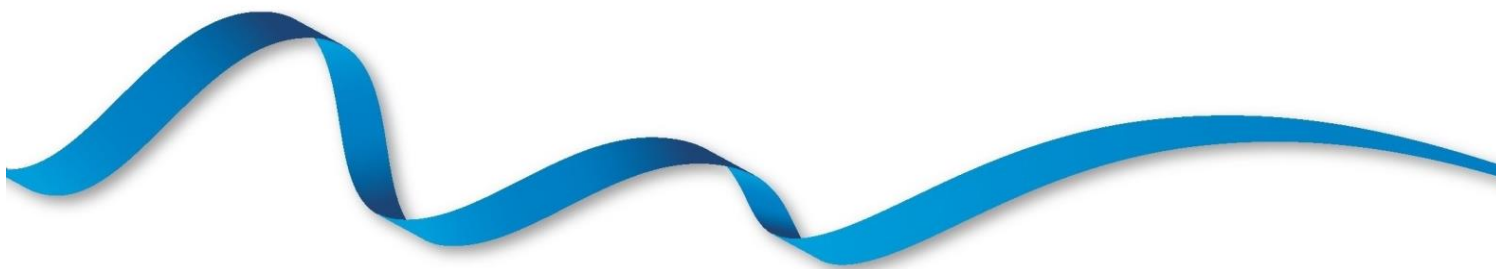
been accepted for transplantation. If the team is already retrieving when they are called to attend, then a second team is called in to retrieve and so on.

From April 2016 to February 2019, teams were mobilised entirely based on the 'closest available' system. The move to the defined sequence model resulted from a Demand and Capacity review in 2018.

During 2021/22, Harefield and Papworth provided the majority of the rota cover for DCD heart retrieval. Throughout this report, attendances by the Harefield/Papworth DCD Heart hybrid retrieval team are classed as Harefield, apart from in the Novel Technologies section where hybrid activity is accounted for separate from the main NORS teams.



**ACTIVITY**



## Donor Attendances

The number of DBD and DCD donors that were attended by each retrieval team between 1 April 2021 and 31 March 2022 is shown in **Table 1a**. The number of donors attended varies due to the geographical distribution of donors and the on-call arrangements, where on-call arrangements for part-time NORS teams are always in a block of seven consecutive days (Monday to Monday), however, handover times vary.

<b>Table 1a Number of donor attendances (proceeding and non-proceeding) per retrieval team, 1 April 2021 - 31 March 2022, by donor type (DBD/DCD)</b>							
<b>Attending retrieval team (Weeks on-call per annum)</b>	<b>DBD</b>		<b>DCD</b>		<b>Total</b>	<b>% of all donors attended</b>	<b>(% attended in 2020/21)</b>
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>			
<b>Abdominal</b>							
Birmingham (38w)	90	50.0	90	50.0	180	11.0	(11.8)
Cambridge (52w)	88	40.9	127	59.1	215	13.2	(11.8)
Cardiff (15w)	31	55.4	25	44.6	56	3.4	(3.0)
Edinburgh (52w)	68	49.6	69	50.4	137	8.4	(10.2)
King's College (52w)	143	54.6	119	45.4	262	16.1	(15.7)
Leeds (38w)	89	50.9	86	49.1	175	10.7	(10.4)
Manchester (38w)	74	45.1	90	54.9	164	10.0	(10.5)
Newcastle (52w)	65	49.6	66	50.4	131	8.0	(8.8)
Oxford (38w)	67	41.4	95	58.6	162	9.9	(9.7)
Royal Free (38w)	85	56.7	65	43.3	150	9.2	(8.0)
<b>Abdominal total</b>	<b>800</b>	<b>49.0</b>	<b>832</b>	<b>51.0</b>	<b>1632</b>	<b>-</b>	<b>(-)</b>
<b>Cardiothoracic</b>							
Birmingham (26w)	66	86.8	10	13.2	76	16.0	(14.1)
Glasgow (26w)	42	89.4	5	10.6	47	9.9	(8.9)
Harefield (26w)	61	50.4	60	49.6	121	25.5	(28.1)
Manchester (26w)	64	80.0	16	20.0	80	16.8	(17.8)
Newcastle (26w)	37	92.5	3	7.5	40	8.4	(12.4)
Papworth (26w)	61	55.0	50	45.0	111	23.4	(18.7)
<b>Cardiothoracic total</b>	<b>331</b>	<b>69.7</b>	<b>144</b>	<b>30.3</b>	<b>475</b>	<b>-</b>	<b>(-)</b>
<b>Total no. attendances</b>	<b>1131</b>	<b>53.7</b>	<b>976</b>	<b>46.3</b>	<b>2107</b>	<b>100</b>	<b>(100)</b>
<b>Total no. donors attended</b>	<b>801</b>	<b>49.1</b>	<b>832</b>	<b>50.9</b>	<b>1633</b>	<b>100</b>	<b>(100)</b>
There were 3 potential donors attended by an off-duty abdominal NORS team (2 Birmingham, 1 Cardiff) and 16 by an off-duty cardiothoracic NORS team (14 Papworth, 1 Glasgow, 1 Birmingham).							

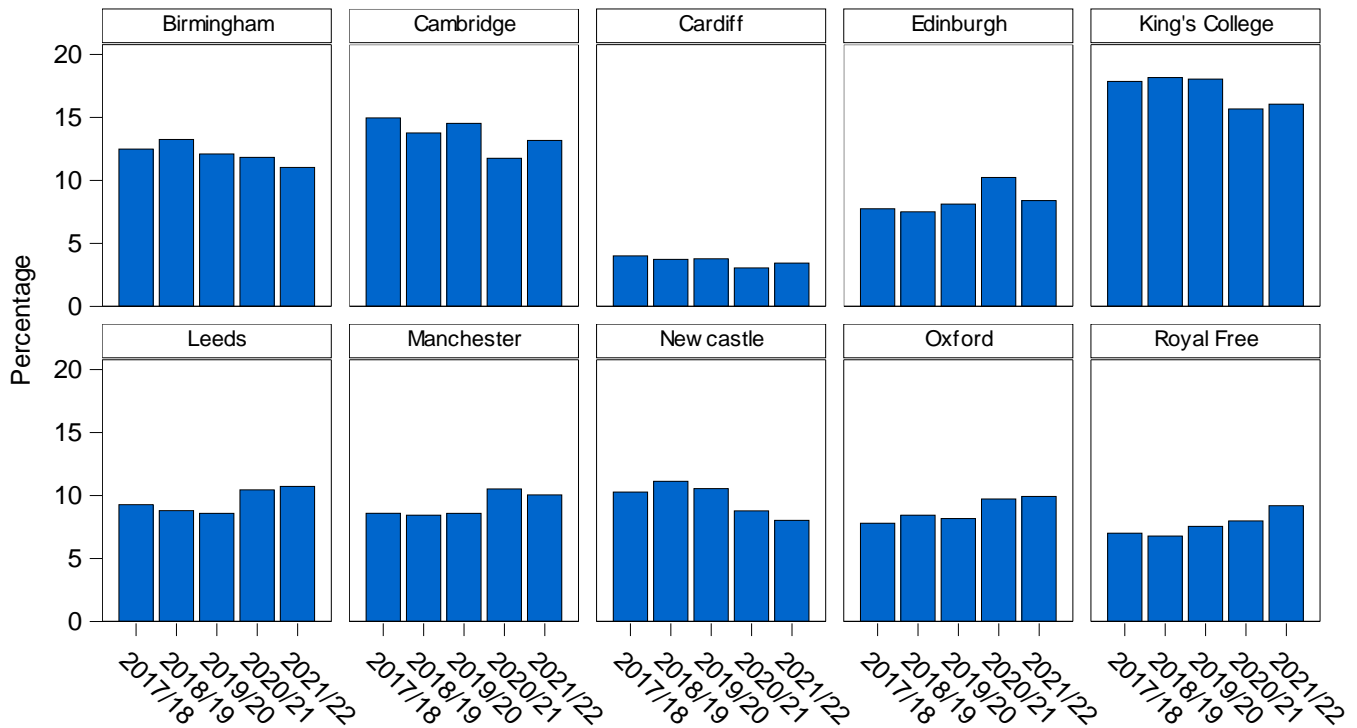
These figures are broken down by whether the donor proceeded to organ donation (actual donors) or not in **Table 1b**. In total in the last financial year there were 1,633 donors attended by a retrieval team. Of these 801 (49%) were potential DBD donors and 832 (51%) were potential DCD donors. 784 of the potential DBD donors attended by an abdominal retrieval team (98%) proceeded to abdominal organ donation, while 193 (58%) of the potential DBD donors attended by a cardiothoracic team proceeded to cardiothoracic donation. For potential DCD donors, 611 (73%) of those attended by an abdominal team proceeded to abdominal donation, while 72 (50%) of those attended by a cardiothoracic team proceeded to cardiothoracic organ donation.

<b>Table 1b Number of donor attendances per retrieval team, 1 April 2021 - 31 March 2022 by donor type (DBD/DCD) and proceeding/non-proceeding</b>						
<b>Attending retrieval team (Weeks on-call per annum)</b>	<b>DBD</b>			<b>DCD</b>		
	<b>Actual</b>	<b>Non-proceeding</b>	<b>% non-proc</b>	<b>Actual</b>	<b>Non-proceeding</b>	<b>% non-proc</b>
<b>Abdominal</b>						
Birmingham (38w)	90	0	0.0	69	21	23.3
Cambridge (52w)	86	2	2.3	99	28	22.0
Cardiff (15w)	30	1	3.2	20	5	20.0
Edinburgh (52w)	67	1	1.5	46	23	33.3
King's College (52w)	138	5	3.5	89	30	25.2
Leeds (38w)	88	1	1.1	57	29	33.7
Manchester (38w)	73	1	1.4	58	32	35.6
Newcastle (52w)	64	1	1.5	48	18	27.3
Oxford (38w)	65	2	3.0	74	21	22.1
Royal Free (38w)	83	2	2.4	51	14	21.5
<b>Abdominal total</b>	<b>784</b>	<b>16</b>	<b>2.0</b>	<b>611</b>	<b>221</b>	<b>26.6</b>
<b>Cardiothoracic</b>						
Birmingham (26w)	44	22	33.3	2	8	80.0
Glasgow (26w)	22	20	47.6	2	3	60.0
Harefield (26w)	33	28	45.9	31	29	48.3
Manchester (26w)	37	27	42.2	8	8	50.0
Newcastle (26w)	25	12	32.4	3	0	0.0
Papworth (26w)	32	29	47.5	26	24	48.0
<b>Cardiothoracic total</b>	<b>193</b>	<b>138</b>	<b>41.7</b>	<b>72</b>	<b>72</b>	<b>50.0</b>
<b>Total donors (abdominal and/or cardiothoracic)</b>	<b>785</b>	<b>16</b>	<b>2.0</b>	<b>612</b>	<b>220</b>	<b>26.4</b>

There were 3 potential donors attended by an off-duty abdominal NORS team (2 Birmingham, 1 Cardiff) and 16 by an off-duty cardiothoracic NORS team (14 Papworth, 1 Glasgow, 1 Birmingham).

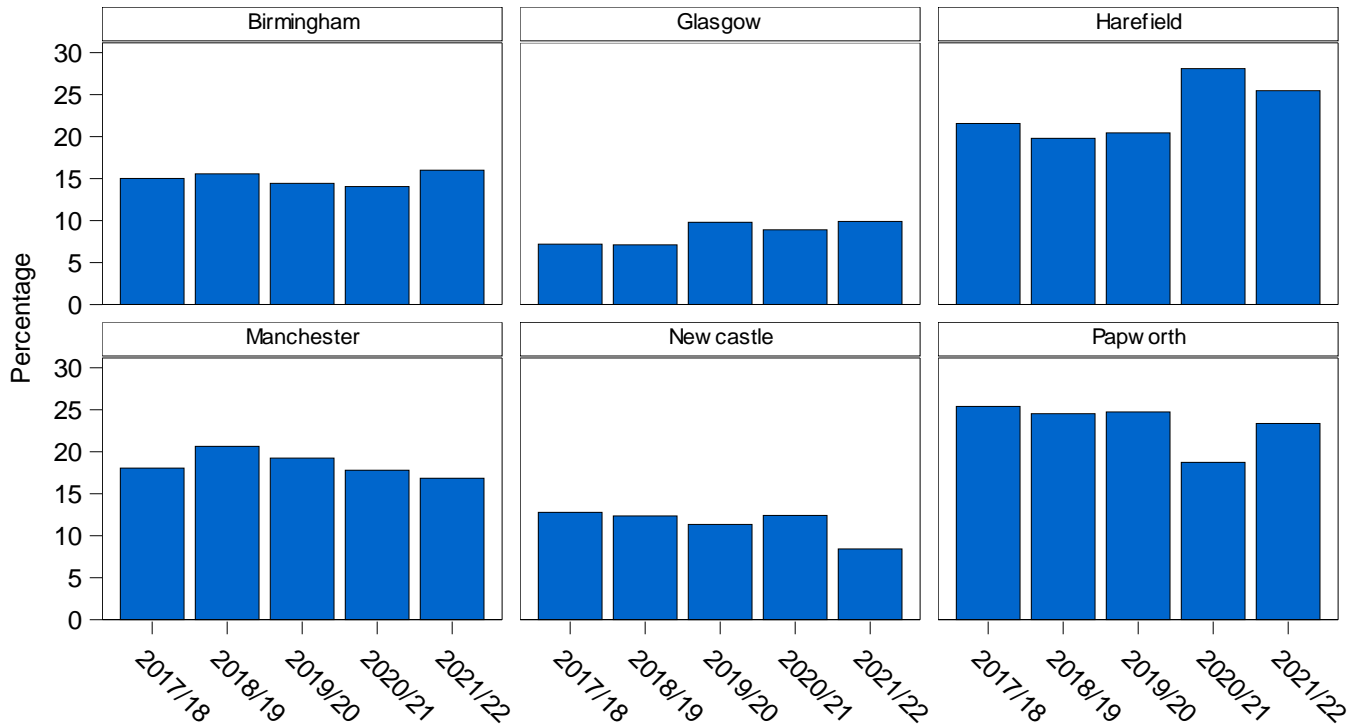
**Figure 1a** shows the proportion of donors attended by any abdominal retrieval team. In the last financial year, King's College attended the highest proportion of abdominal donors (16%) and Cardiff attended the lowest proportion (3%), as teams on call for less than 52 weeks a year will naturally attend fewer donors. **Figure 3b** reflects donors per day when on call, which gives a more balanced metric.

**Figure 1a** Proportion of donors attended by an abdominal team between 1 April 2017 - 31 March 2022



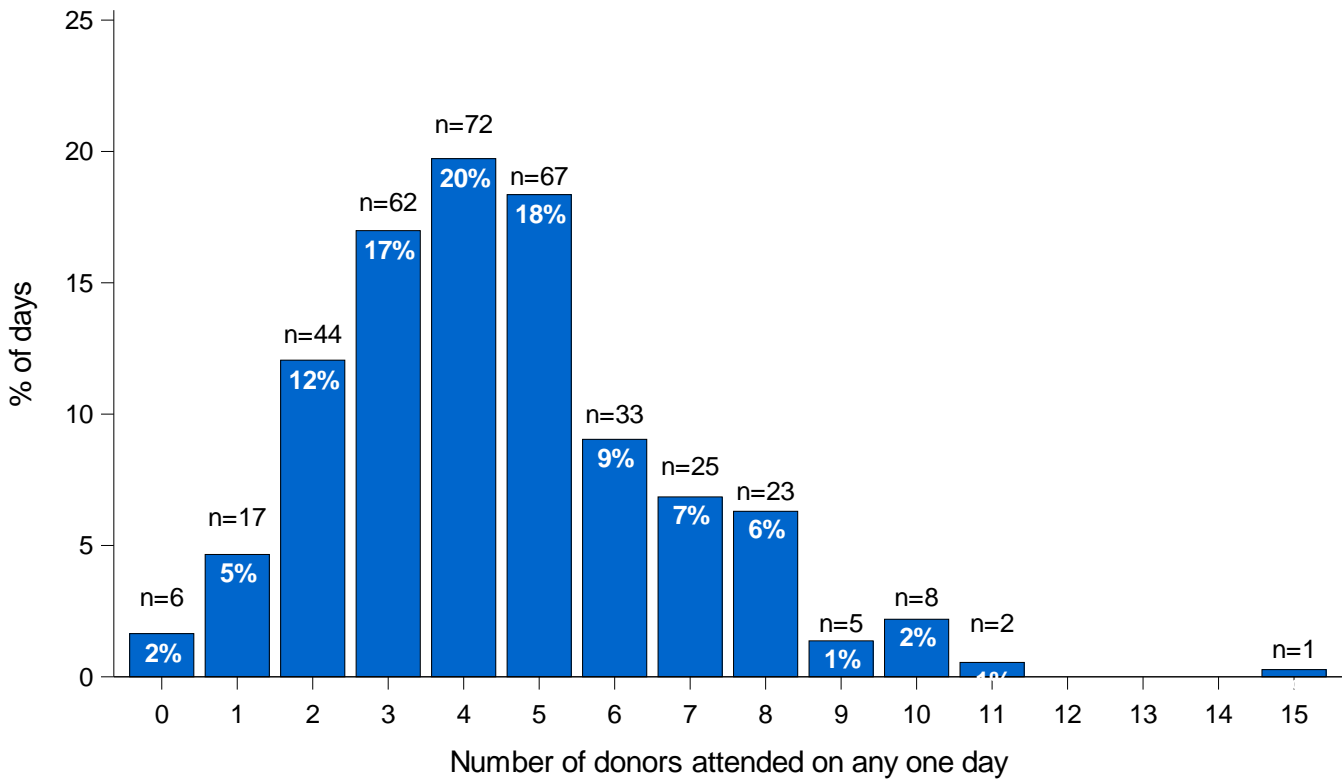
**Figure 1b** shows the proportion of donors attended by any cardiothoracic retrieval team. In the last financial year, Harefield attended the largest proportion of cardiothoracic donors (25%) and Newcastle attended the lowest proportion (8%).

**Figure 1b** Proportion of donors attended by a cardiothoracic team between 1 April 2017 - 31 March 2022



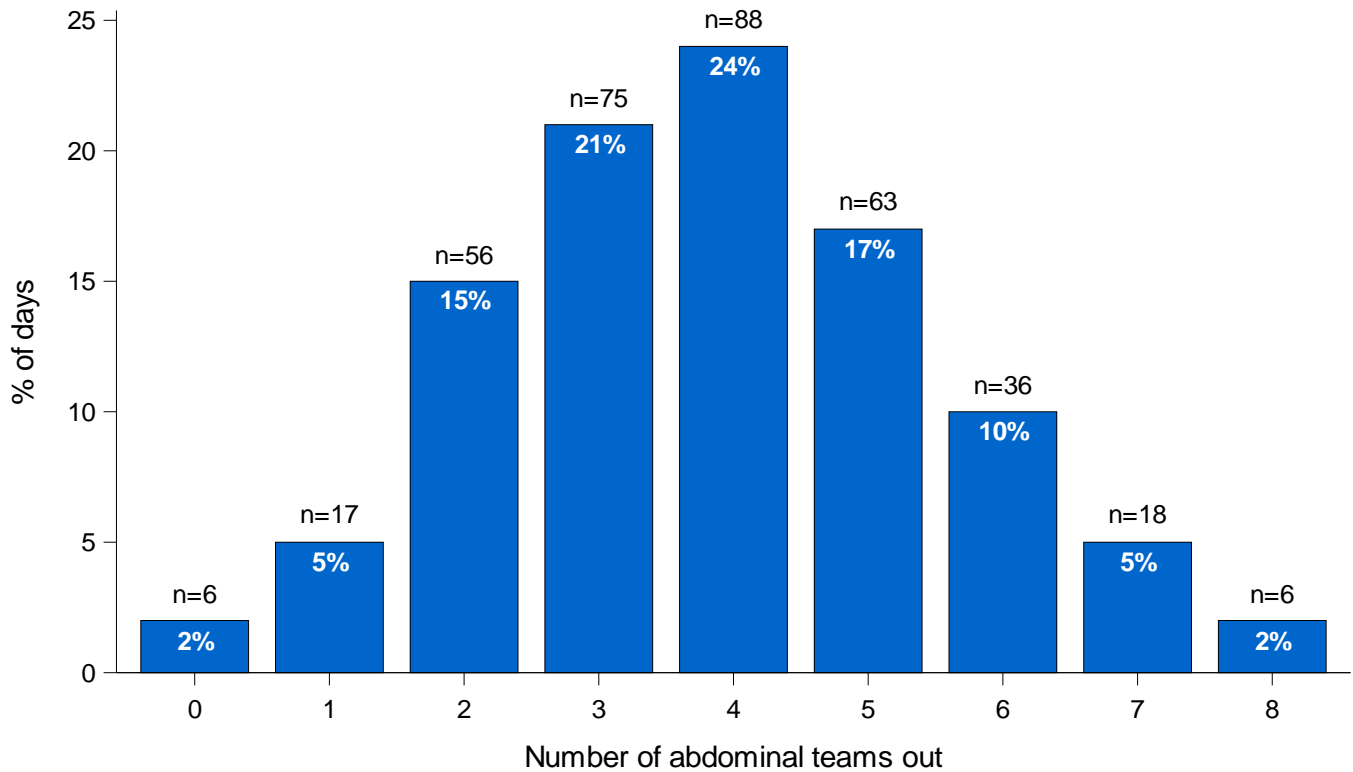
**Figure 2** shows the distribution of the number of actual and non-proceeding donors attended by at least one retrieval team (abdominal and cardiothoracic), per day in 2021/22. For example, there were 72 days in the 12-month period (20% of days) where four potential donors were attended by at least one team. The number of donors per day ranged from 0 (6 days) to 15 (1 day). The mean number of donors per day was 4.5.

**Figure 2** Distribution of the number of actual and non-proceeding donors attended by at least one retrieval team on any one day during 1 April 2021 - 31 March 2022



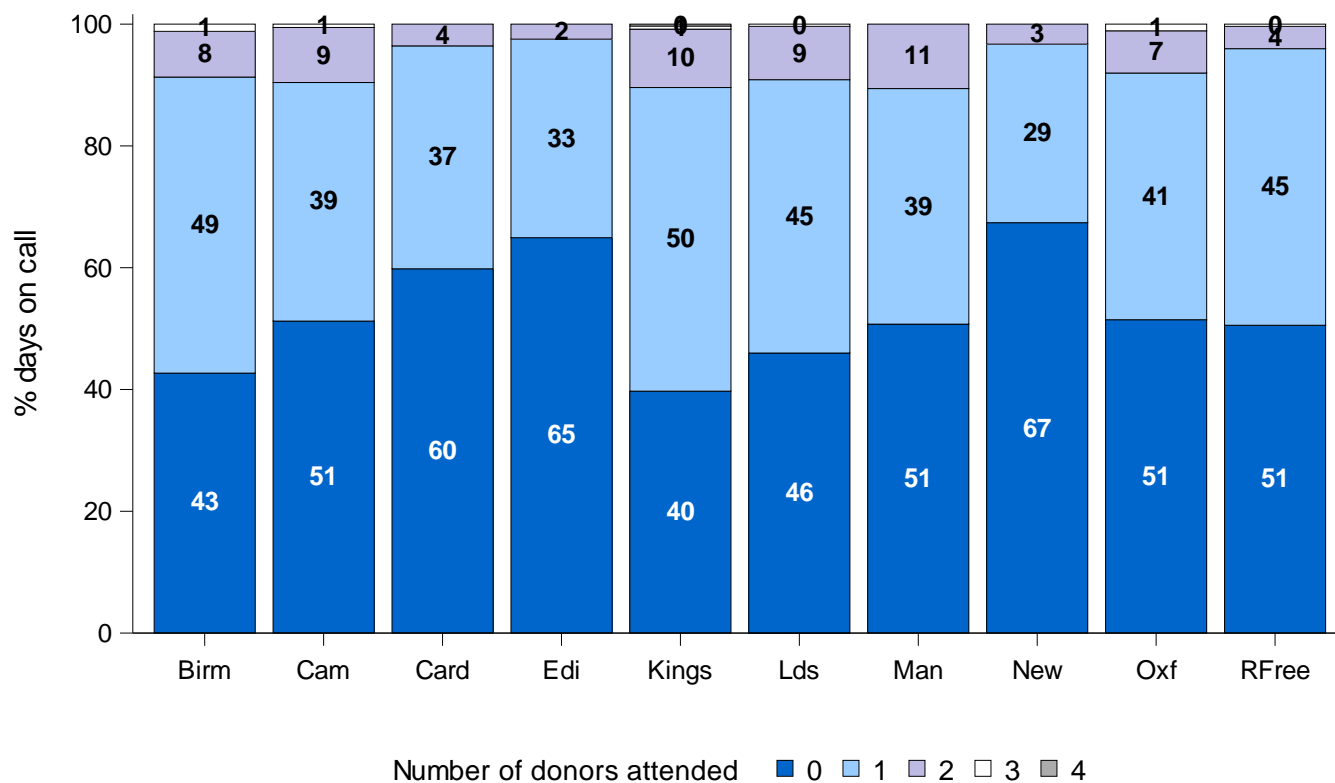
**Figure 3a** shows the distribution of the number of abdominal teams out on any one day during 2021/22. For example, there were 56 days in the 12-month period (15% of days) where two abdominal teams were out attending donors.

**Figure 3a** Distribution of the number of abdominal retrieval teams out on any one day, between 1 April 2021 - 31 March 2022



**Figure 3b** shows the distribution of the number of donors (actual and non-proceeding) attended by each abdominal team on any one day (that they were on call) during the year. On average abdominal teams did not attend any donors on 52% of the days in the year, attended one donor 41% of days, attended two donors 7% of days, attended three donors 1% of days and attended four donors on 0% of days. The 'busiest' team in 2021/22 in terms of days active was King's College (when on call).

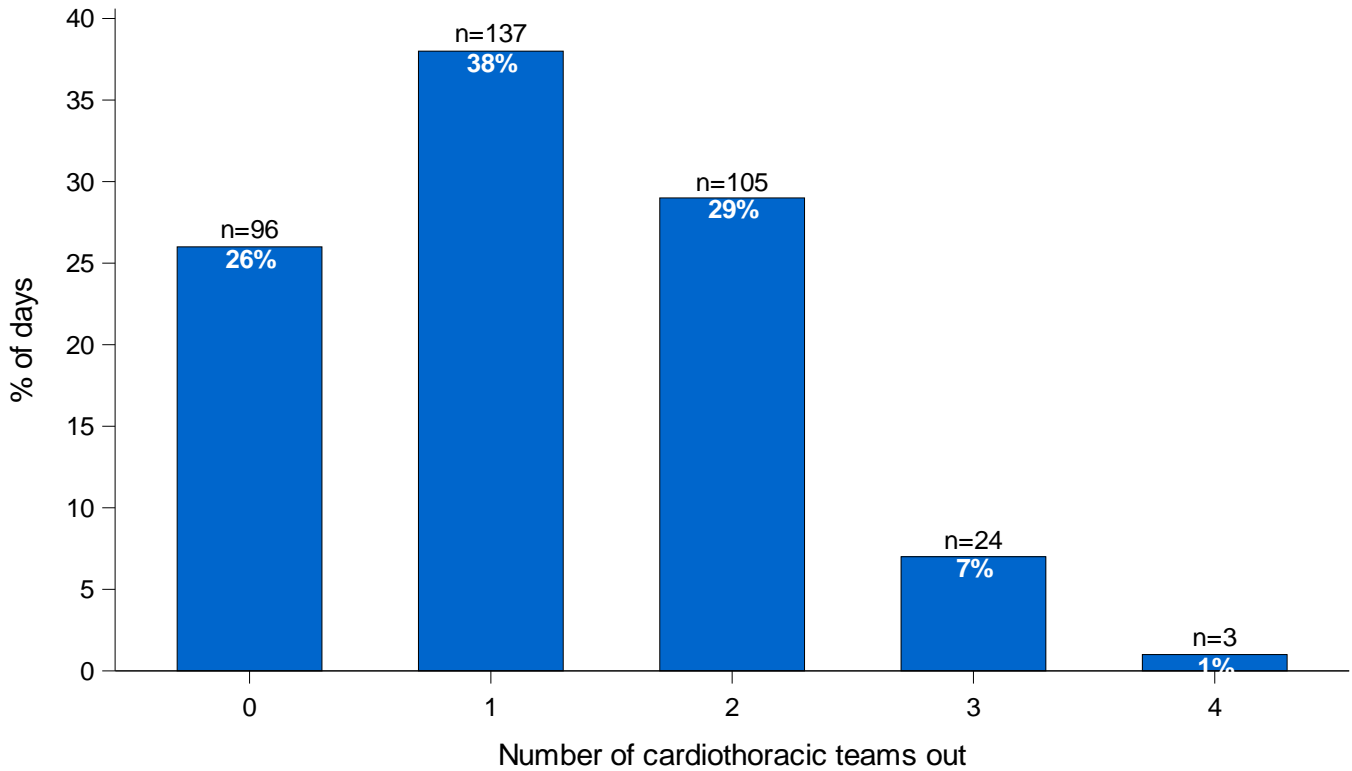
**Figure 3b** Distribution of the number of actual and non-proceeding donors attended by each abdominal team on any one day, between 1 April 2021 - 31 March 2022





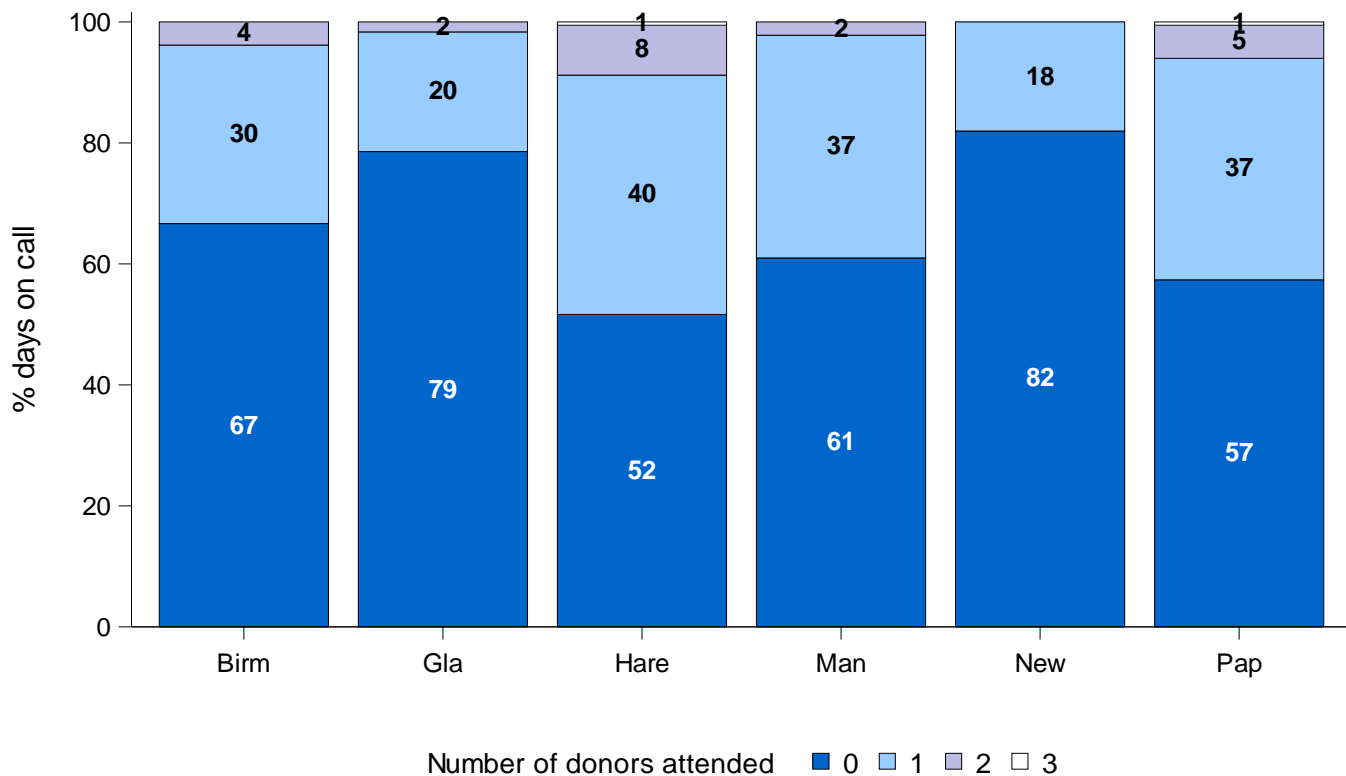
**Figure 4a** shows the distribution of the number of cardiothoracic teams out on any one day during 2021/22. It is most common for one cardiothoracic team to be out on any given day.

**Figure 4a** Distribution of the number of cardiothoracic retrieval teams out on any one day, between 1 April 2021 - 31 March 2022



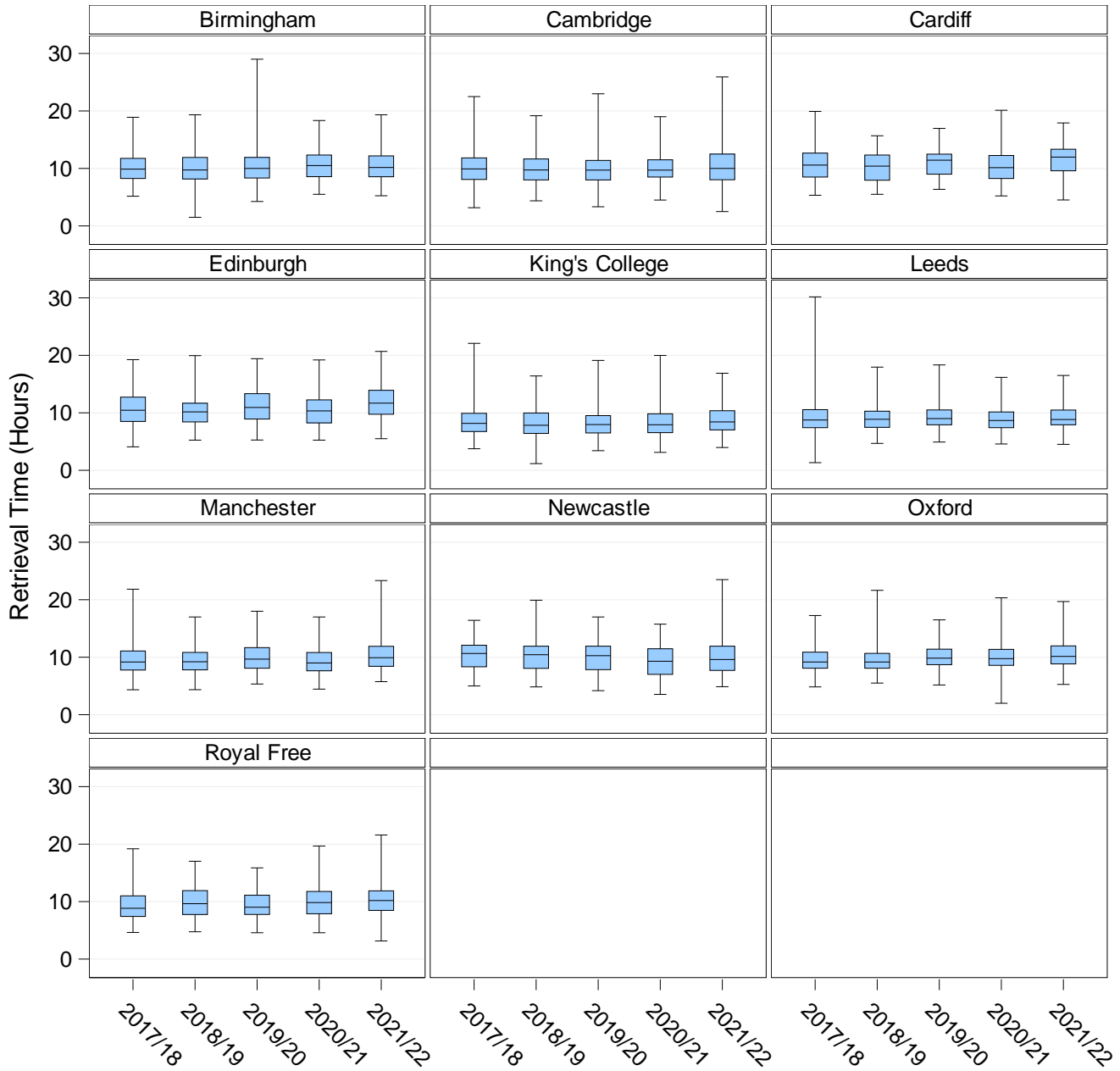
**Figure 4b** shows the distribution of the number of donors (actual and non-proceeding) attended by each cardiothoracic team on any one day (that they were on call) during the year. On average cardiothoracic teams did not attend any donors on 66% of the days in the year, attended one donor 30% of days, attended two donors 4% of days, and attended three donors 1% of days. The 'busiest' team in 2021/22 in terms of days active was Harefield (when on call).

**Figure 4b** Distribution of the number of actual and non-proceeding donors attended by each cardiothoracic team on any one day, between 1 April 2021 - 31 March 2022

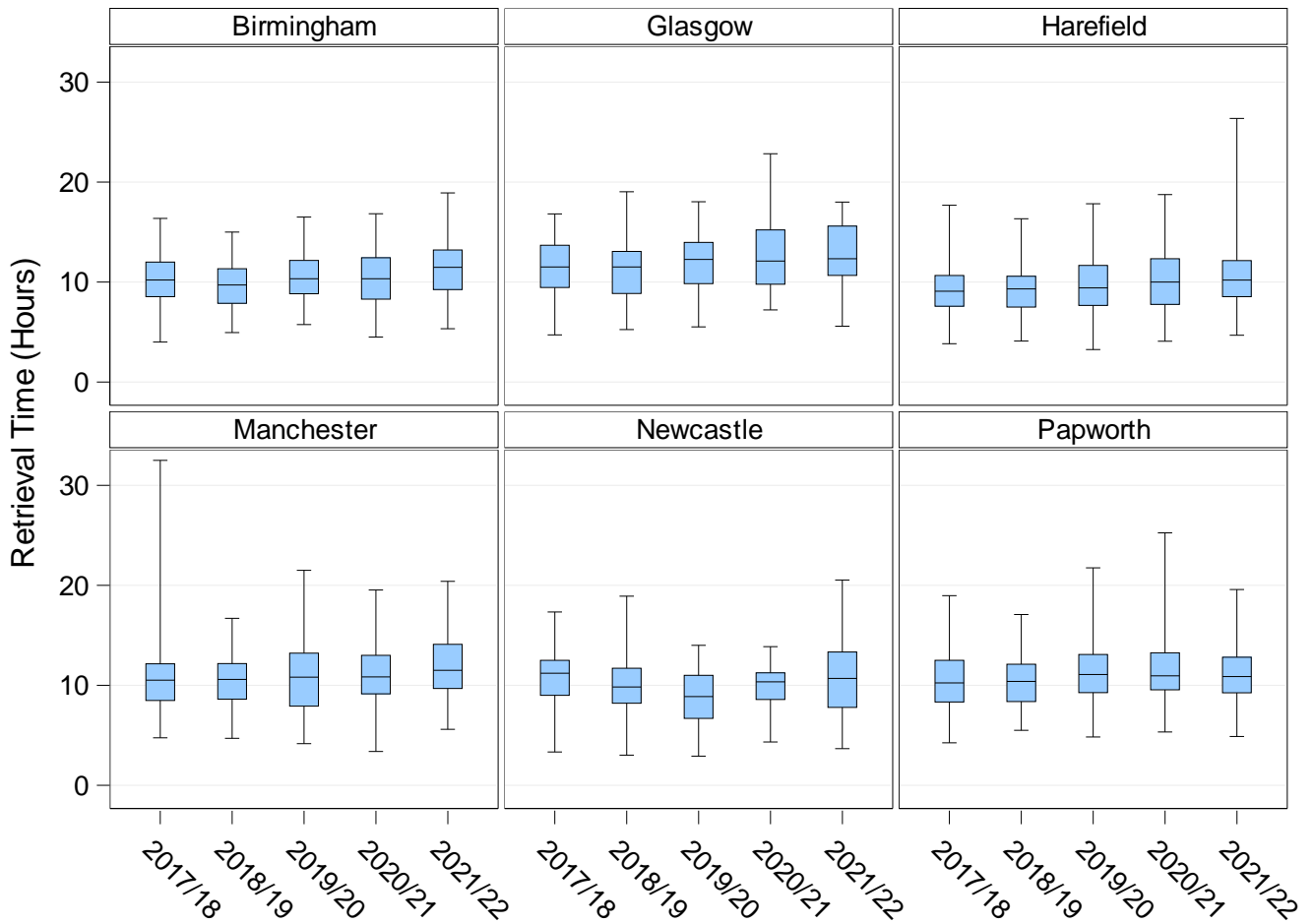


The time taken for teams to attend a donor is shown by team for the most recent five financial years in **Figures 5a and 5b**. The time shown is the time from the beginning of muster time (one hour prior to departure from base) to return to base, which is estimated from theatre departure times and travel times. The median is the horizontal line in the box, and the box shows the interquartile range, with the whiskers showing the range of the data. Cases where retrieval took more than 48 hours have been removed along with cases where not all date/time points required were reported.

**Figure 5a** Median (IQR) time an abdominal team is out attending a donor from departure to return to base, between 1 April 2017 - 31 March 2022



**Figure 5b** Median (IQR) time a cardiothoracic team is out attending a donor from departure to return to base, between 1 April 2017 - 31 March 2022



The day of week and time of day at which mobilisation of NORS teams occurred throughout the year, and for the previous year are presented as heat maps in **Figures 6a and 6b**, for abdominal and cardiothoracic teams, respectively. Mobilisation time is the time that the team actually departed from their base. Note that time of departure from base is not available for all cases. Heat maps are used here to indicate the level of activity, darker shades are used to indicate higher activity.

**Figure 6a Mobilisation time of abdominal teams  
1 April 2020 - 31 March 2022**

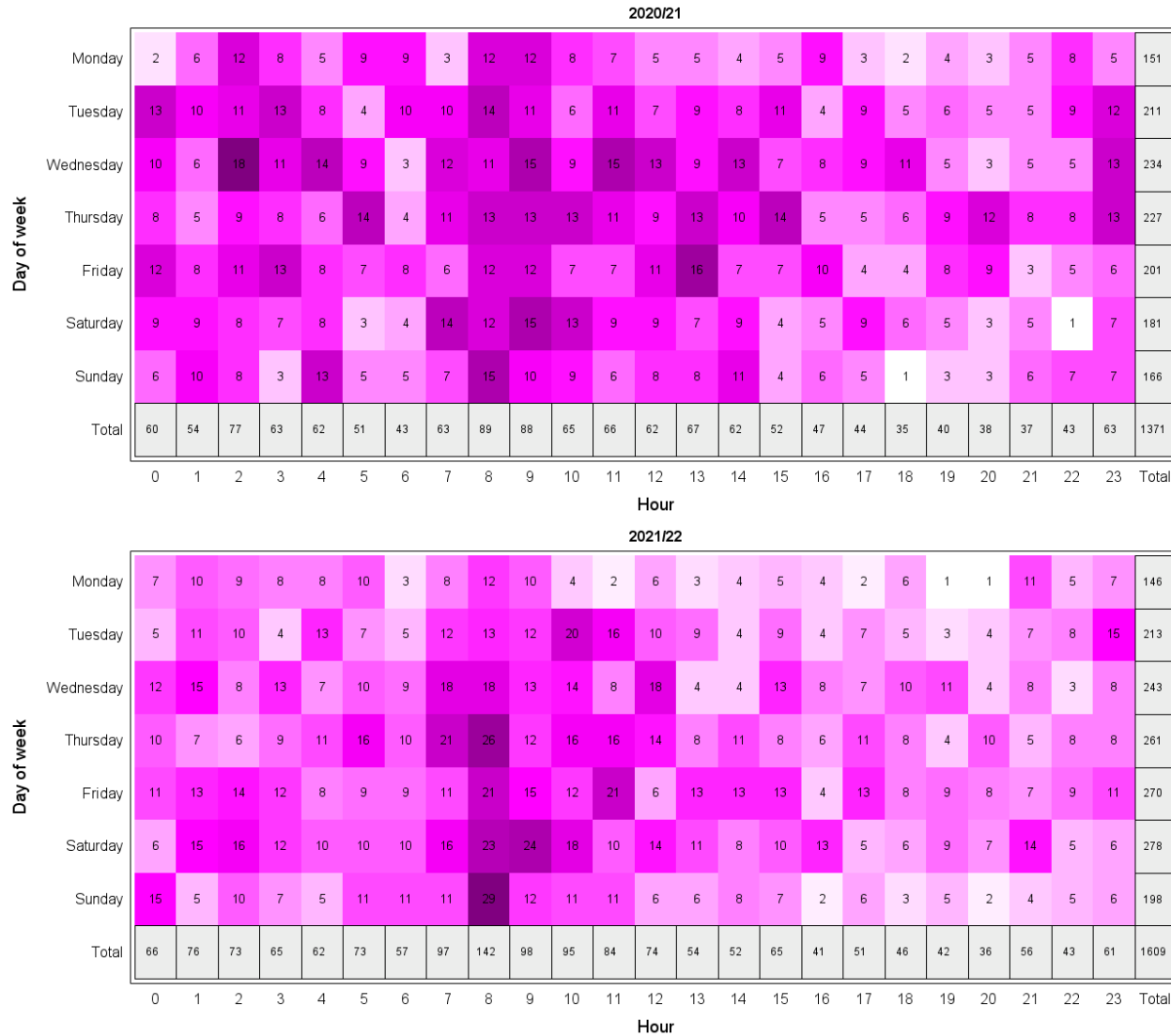
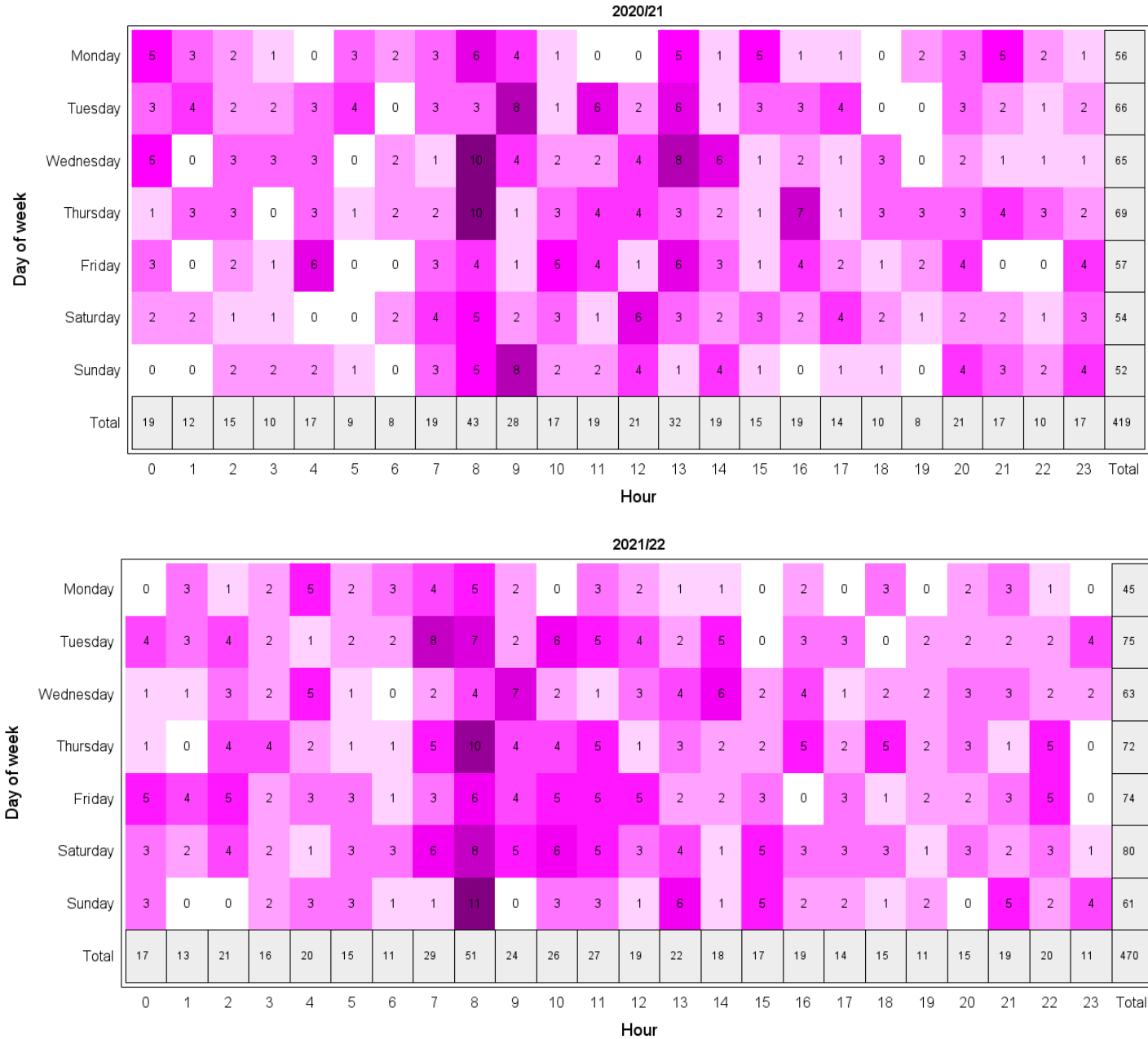


Figure 6b

Mobilisation time of cardiothoracic teams  
1 April 2020 - 31 March 2022



The day of week and time of day at which donor cross-clamp occurred throughout the year, and for the previous year are presented as heat maps in **Figures 7a and 7b**, for abdominal only and joint abdominal and cardiothoracic donors, respectively. Note that time of cross-clamp is not available for all cases. Heat maps are used here to indicate the level of activity, darker shades are used to indicate higher activity.

**Figure 7a** Cross-clamp time of abdominal only donors  
1 April 2020 - 31 March 2022

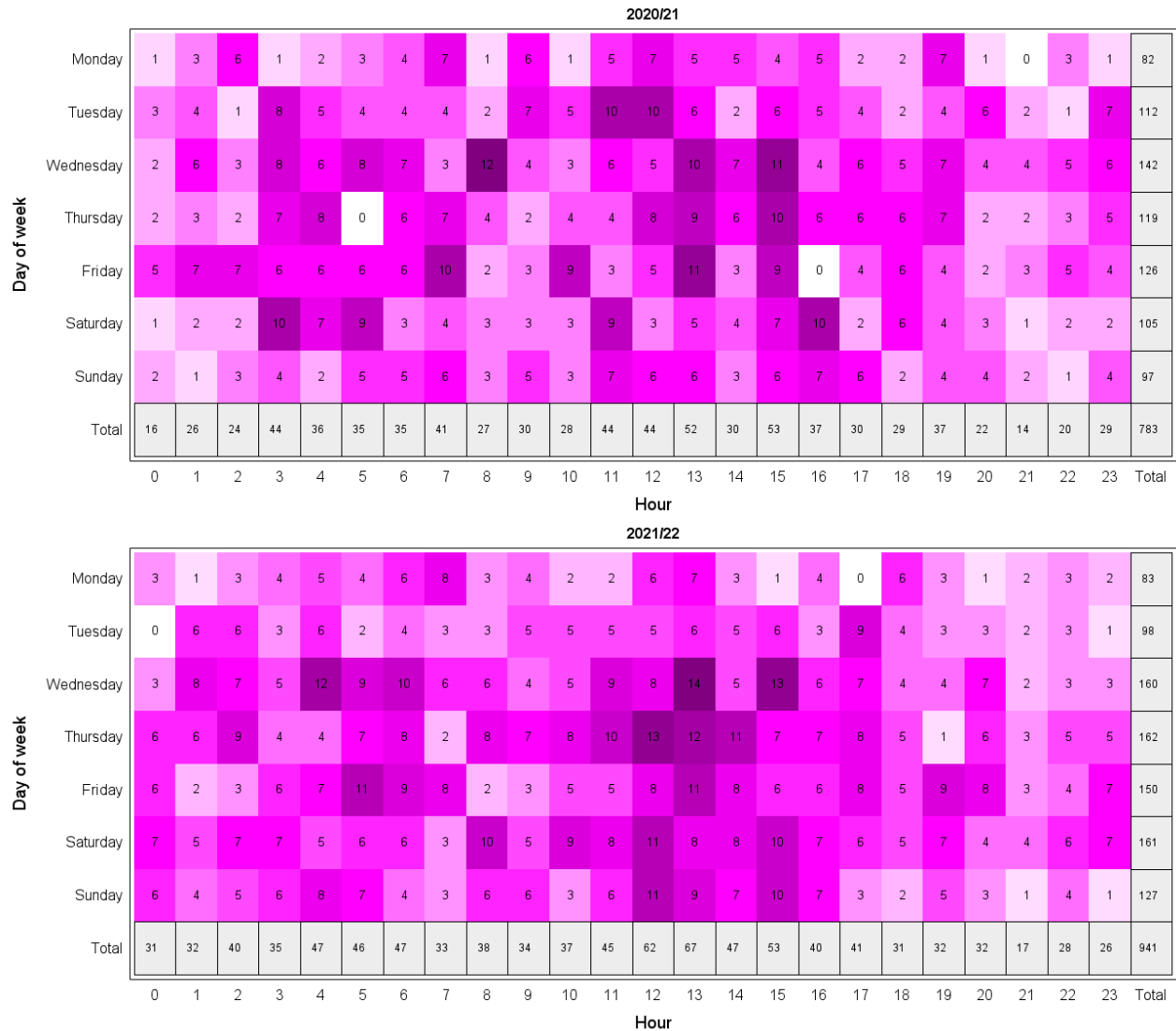
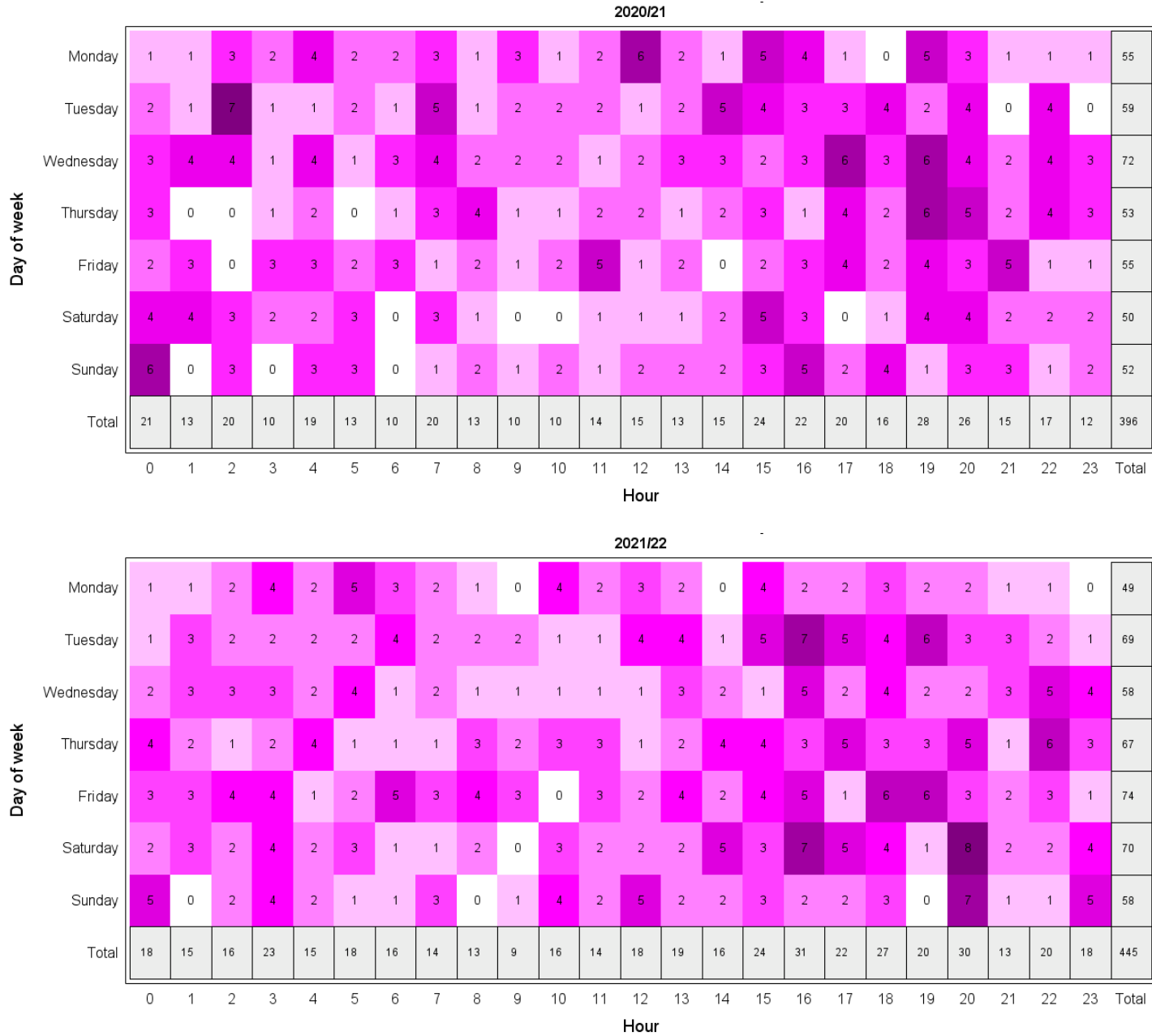


Figure 7b

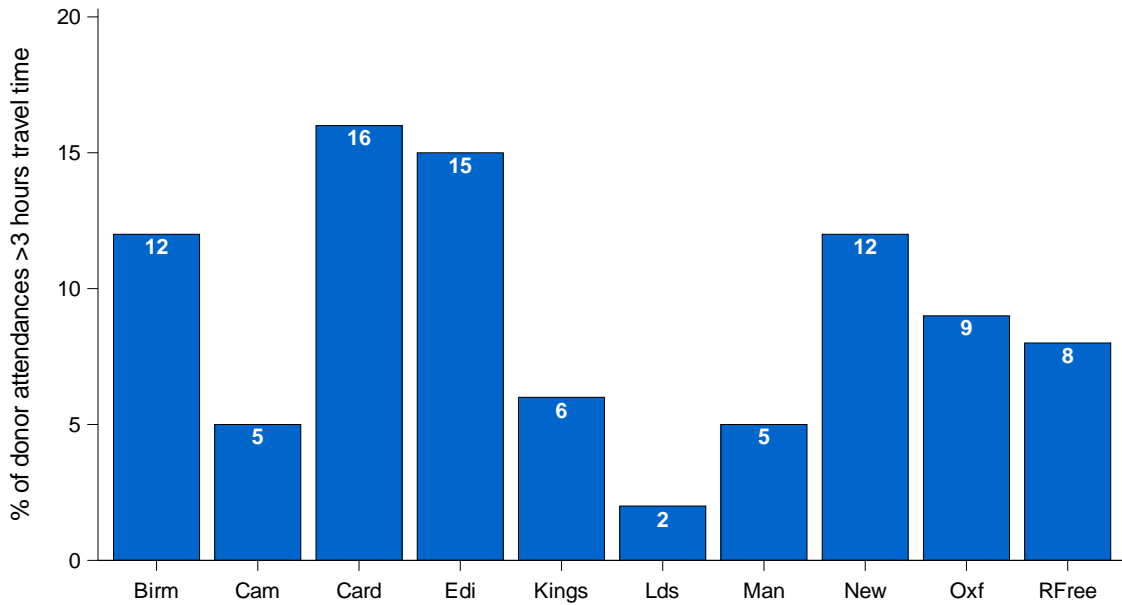
**Cross-clamp time of abdominal and cardiothoracic donors  
1 April 2020 - 31 March 2022**



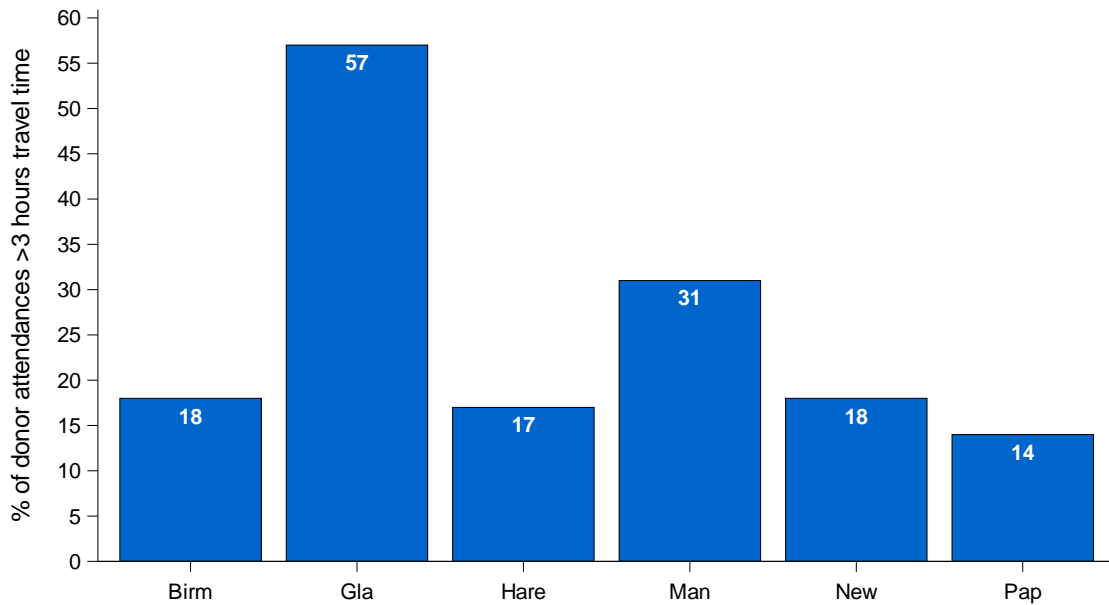


The proportion of occasions where the travel time to a donor hospital is greater than three hours is shown in **Figures 8a and 8b**, for abdominal and cardiothoracic teams, respectively. Both figures include donor attendances where flights were used.

**Figure 8a** Proportion of donor attendances (actual and non-proceeding) outside of 3 hours travel time for each abdominal team, between 1 April 2021 - 31 March 2022

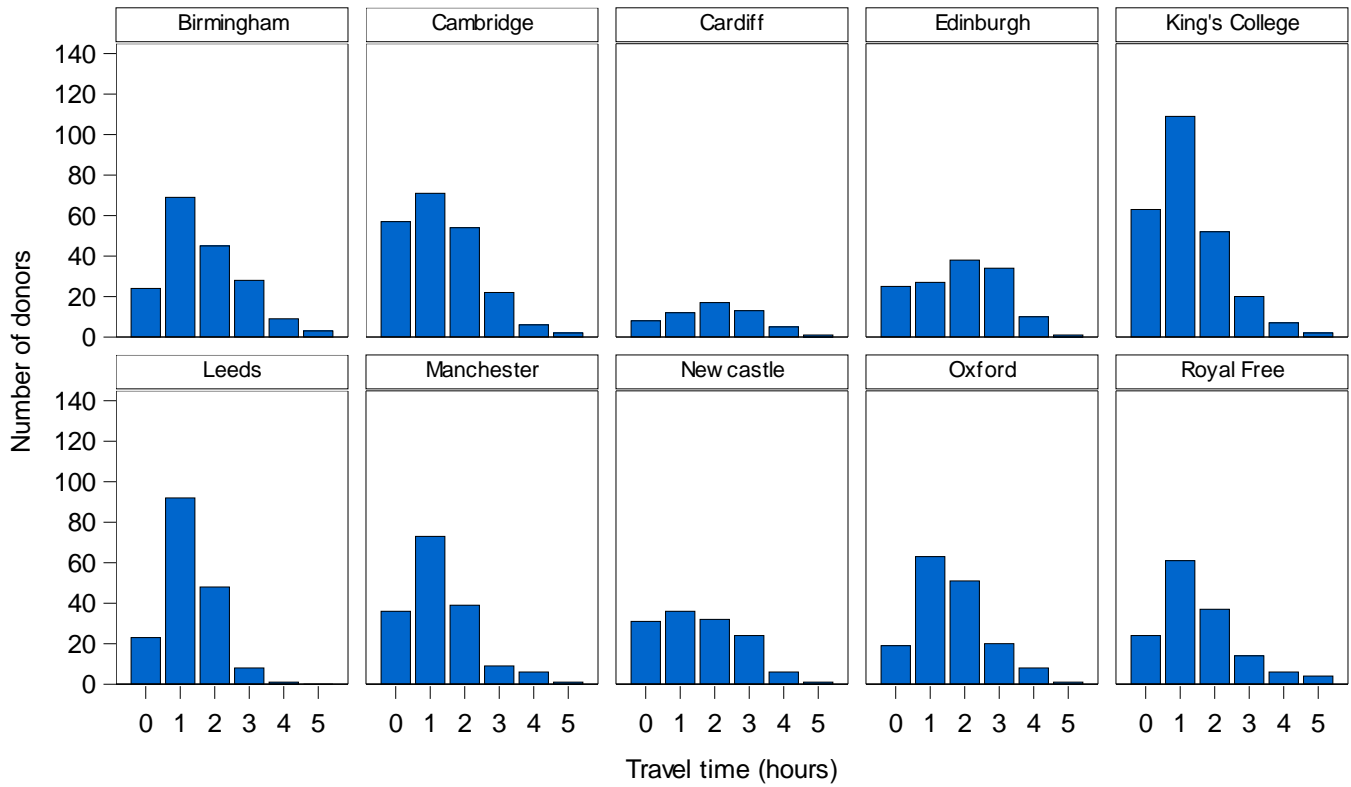


**Figure 8b** Proportion of donor attendances (actual and non-proceeding) outside of 3 hours travel time for each cardiothoracic team, between 1 April 2021 - 31 March 2022

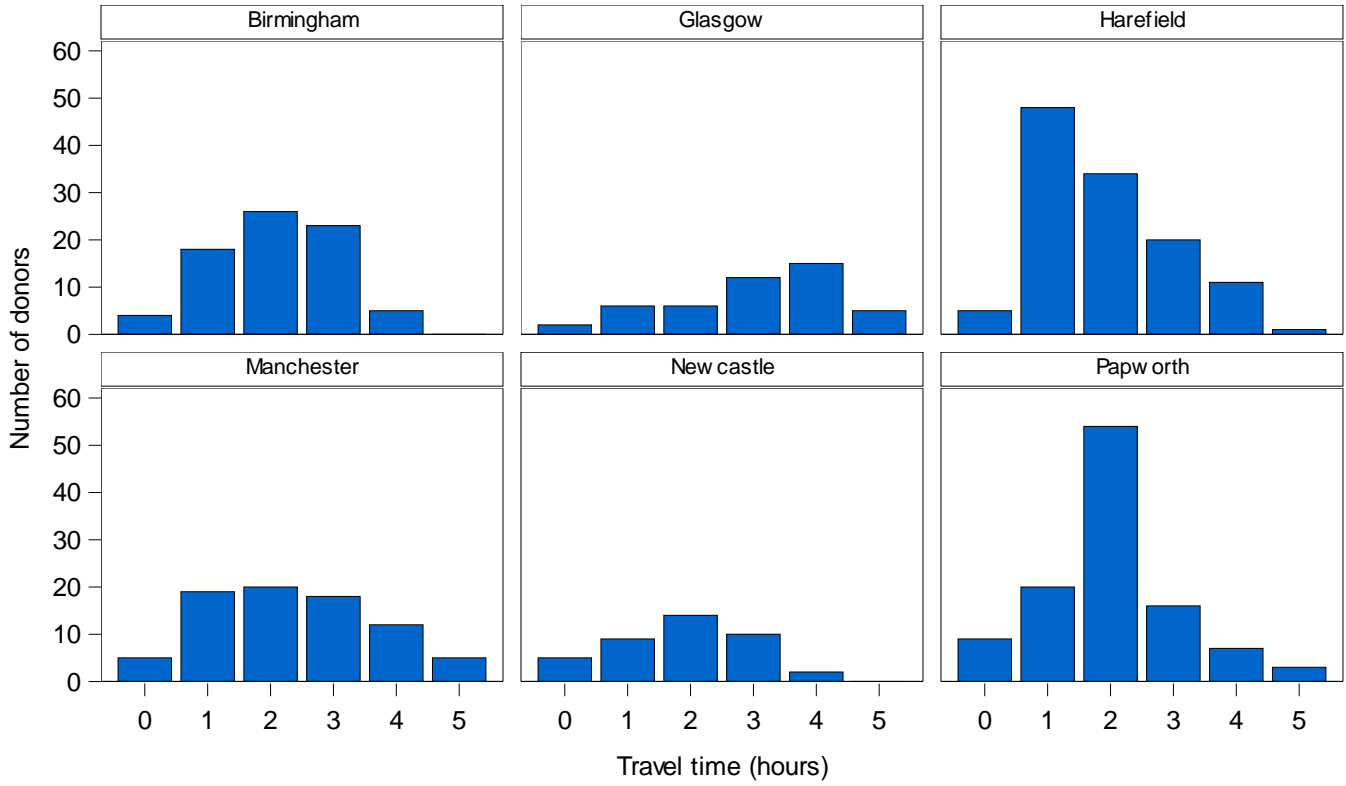


The travel time to a donor hospital, to the nearest hour, is shown in **Figures 9a and 9b**, for abdominal and cardiothoracic teams, respectively. Both figures include donor attendances where flights were used.

**Figure 9a** Travel time to donor hospital for each abdominal team, between 1 April 2021 - 31 March 2022



**Figure 9b** Travel time to donor hospital for each cardiothoracic team, between 1 April 2021 - 31 March 2022



## Organs Retrieved

**Table 2a** shows the percentage of actual abdominal donors donating their kidneys, livers, pancreases and bowels by the team that attended and the donor type. Overall, 93.5% of actual DBD donors (donating at least one abdominal organ) donated their kidneys, 90.2% donated their liver, 30.7% donated their pancreas and 3.6% donated their bowel. The overall donation rates for actual DCD donors are lower for livers and pancreases and higher for kidneys. DCD donors cannot donate their small bowel.

<b>Table 2a      Organs retrieved from actual abdominal donors, 1 April 2021 - 31 March 2022, by attending retrieval team</b>											
<b>% donors donating</b>											
<b>Attending retrieval team</b>	<b>No. of abdo. donors</b>		<b>Kidneys</b>		<b>Livers</b>		<b>Pancreases</b>		<b>Bowel</b>		
	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	
Birmingham	90	69	92.2	97.1	95.6	56.5	34.4	30.4	5.6	-	
Cambridge	86	99	91.9	98.0	89.5	61.6	39.5	15.2	17.4	-	
Cardiff	30	20	100	100	96.7	50.0	26.7	5.0	0.0	-	
Edinburgh	67	46	92.5	93.5	88.1	65.2	14.9	10.9	0.0	-	
King's College	138	89	93.5	97.8	91.3	49.4	29.7	19.1	2.2	-	
Leeds	88	57	93.2	100	85.2	43.9	25.0	12.3	0.0	-	
Manchester	73	58	97.3	98.3	90.4	39.7	32.9	10.3	0.0	-	
Newcastle	64	48	95.3	100	87.5	39.6	34.4	18.8	0.0	-	
Oxford	65	74	100	97.3	89.2	43.2	35.4	12.2	6.2	-	
Royal Free	83	51	85.5	98.0	90.4	52.9	31.3	5.9	1.2	-	
<b>Total</b>	<b>784</b>	<b>611</b>	<b>93.5</b>	<b>97.9</b>	<b>90.2</b>	<b>50.7</b>	<b>30.7</b>	<b>15.2</b>	<b>3.6</b>	<b>-</b>	

**Table 2b** shows the number of abdominal donors by what organs were donated, this is broken down by donor type and the attending retrieval team. This includes any donors who proceeded to cardiothoracic donation as well as abdominal donation.

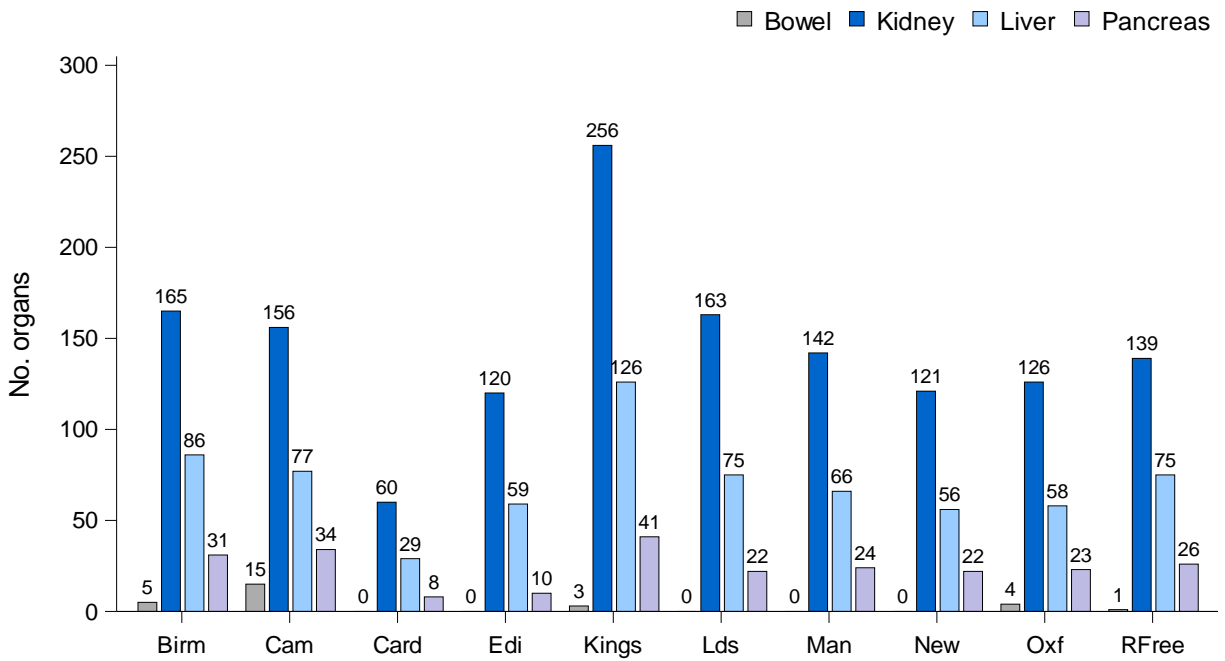
<b>Table 2b Abdominal organs retrieved, 1 April 2021 - 31 March 2022, by attending retrieval team</b>								
<b>Attending retrieval team</b>	<b>Total donors</b>		<b>Kidney only</b>		<b>Liver only</b>		<b>Abdominal multi-organ</b>	
	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>	<b>DBD</b>	<b>DCD</b>
Birmingham	90	69	3	27	7	2	80	40
Cambridge	86	99	9	38	7	1	70	60
Cardiff	30	20	1	10	0	0	29	10
Edinburgh	67	46	8	16	5	3	54	27
King's College	138	89	11	42	8	2	119	45
Leeds	88	57	12	32	6	0	70	25
Manchester	73	58	7	33	2	1	64	24
Newcastle	64	48	7	28	3	0	54	20
Oxford	65	74	7	39	0	2	58	33
Royal Free	83	51	8	24	12	1	63	26
<b>Total</b>	<b>784</b>	<b>611</b>	<b>73</b>	<b>289</b>	<b>50</b>	<b>12</b>	<b>661</b>	<b>310</b>

**Table 2c** shows the number of abdominal organs retrieved and the percentage that were transplanted, this is broken down by organ type and the attending retrieval team.

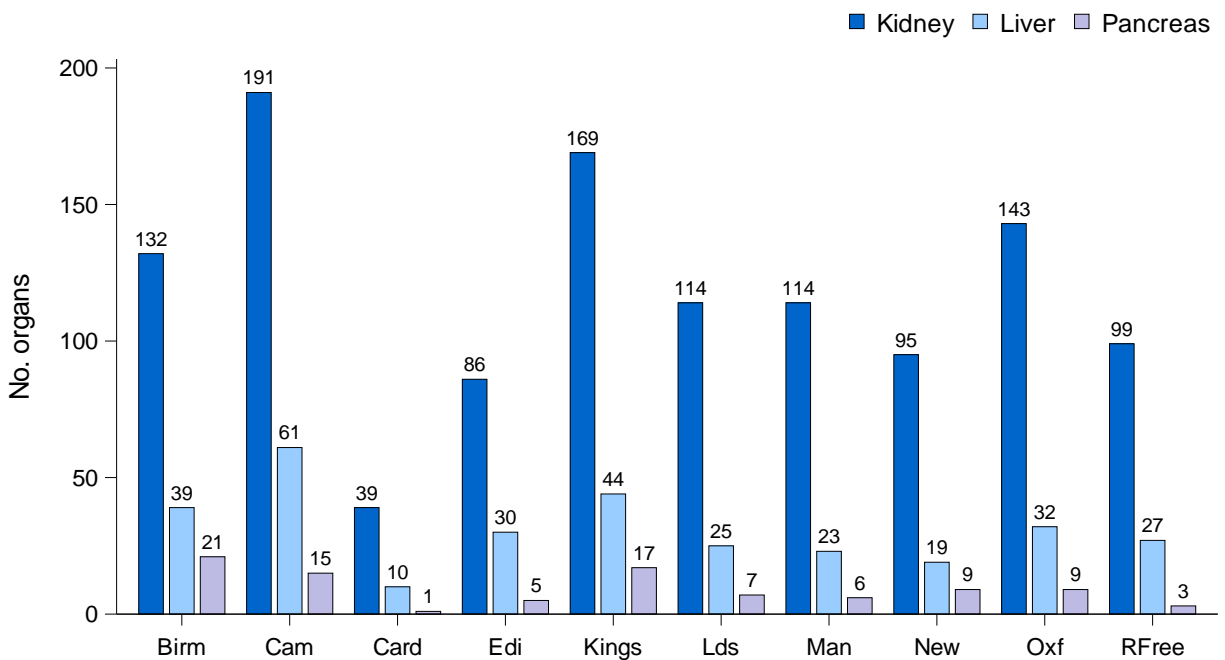
<b>Table 2c Abdominal organs retrieved and percentage that went on to be transplanted, 1 April 2021 - 31 March 2022, by attending retrieval team</b>								
<b>Attending retrieval team</b>	<b>Kidneys</b>		<b>Livers</b>		<b>Pancreases</b>		<b>Bowel</b>	
	<b>Retrieved</b>	<b>% txd</b>	<b>Retrieved</b>	<b>% txd</b>	<b>Retrieved</b>	<b>% txd</b>	<b>Retrieved</b>	<b>% txd</b>
<b>DBD</b>								
Birmingham	165	87.3	86	84.9	31	54.8	5	100
Cambridge	156	90.4	77	89.6	34	73.5	15	93.3
Cardiff	60	86.7	29	89.7	8	37.5	0	-
Edinburgh	120	95.0	59	89.8	10	30.0	0	-
King's College	256	90.2	126	89.7	41	51.2	3	100
Leeds	163	88.3	75	80.0	22	50.0	0	-
Manchester	142	95.8	66	81.8	24	54.2	0	-
Newcastle	121	86.8	56	78.6	22	63.6	0	-
Oxford	126	88.1	58	87.9	23	56.5	4	100
Royal Free	139	89.9	75	85.3	26	38.5	1	100
<b>Total</b>	<b>1448</b>	<b>90.0</b>	<b>707</b>	<b>85.9</b>	<b>241</b>	<b>53.9</b>	<b>28</b>	<b>96.4</b>
<b>DCD</b>								
Birmingham	132	85.6	39	76.9	21	57.1	-	-
Cambridge	191	79.6	61	73.8	15	46.7	-	-
Cardiff	39	89.7	10	50.0	1	100	-	-
Edinburgh	86	80.2	30	63.3	5	0.0	-	-
King's College	169	87.6	44	54.5	17	41.2	-	-
Leeds	114	78.9	25	52.0	7	28.6	-	-
Manchester	114	85.1	23	52.2	6	0.0	-	-
Newcastle	95	81.1	19	73.7	9	55.6	-	-
Oxford	143	87.4	32	59.4	9	66.7	-	-
Royal Free	99	84.8	27	48.1	3	33.3	-	-
<b>Total</b>	<b>1182</b>	<b>83.8</b>	<b>310</b>	<b>62.6</b>	<b>93</b>	<b>44.1</b>	<b>-</b>	<b>-</b>
<b>Total</b>	<b>2630</b>	<b>87.2</b>	<b>1017</b>	<b>78.8</b>	<b>334</b>	<b>51.2</b>	<b>28</b>	<b>96.4</b>

Figures 10a and 10b show the number of organs retrieved, by attending retrieval team, for DBD and DCD donors, respectively.

**Figure 10a DBD abdominal organs retrieved, 1 April 2021 - 31 March 2022 by attending retrieval team**



**Figure 10b DCD abdominal organs retrieved, 1 April 2021 - 31 March 2022 by attending retrieval team**



**Table 2d** shows the mean number of abdominal organs retrieved and transplanted for each proceeding abdominal donor, by attending retrieval team and donor type. Mean donor age is also reported.

- The mean number of organs retrieved per DBD donor ranged from 2.8 to 3.4 across teams, analysis of variance indicated that the differences were statistically significant ( $p=0.007$ ).
- The mean number of organs transplanted per DBD donor ranged from 2.4 to 2.9 across teams, analysis of variance indicated that the differences were statistically significant ( $p=0.05$ ).
- The mean number of organs retrieved per DCD donor ranged from 2.5 to 2.8 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.34$ ).
- The mean number of organs transplanted per DCD donor ranged from 1.8 to 2.2 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.51$ ).

<b>Table 2d Mean donor age, organs retrieved, and organs transplanted, per proceeding abdominal donor, 1 April 2021 - 31 March 2022, by attending retrieval team</b>														
Attending retrieval team	Actual abdo. donors	DBD						DCD						
		Donor age		Orgs. retrieved		Orgs. txd		Donor age		Orgs. retrieved		Orgs. txd		
		Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Actual abdo. donors	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)
Birmingham	90	49.0	(16.9)	3.2	(0.9)	2.7	(1.1)	69	49.2	(17.5)	2.8	(0.9)	2.2	(1.1)
Cambridge	86	45.9	(17.3)	3.3	(1.1)	2.9	(1.3)	99	53.5	(14.8)	2.7	(0.8)	2.1	(1.0)
Cardiff	30	51.5	(17.0)	3.2	(0.5)	2.7	(0.7)	20	57.8	(8.0)	2.5	(0.7)	2.1	(0.7)
Edinburgh	67	50.9	(15.2)	2.8	(0.8)	2.5	(0.9)	46	53.3	(14.8)	2.6	(0.8)	1.9	(0.9)
King's College	138	51.1	(17.6)	3.1	(0.8)	2.7	(1.0)	89	52.8	(17.3)	2.6	(0.8)	2.0	(0.9)
Leeds	88	53.0	(13.8)	3.0	(0.8)	2.4	(1.0)	57	53.4	(13.6)	2.6	(0.7)	1.8	(1.0)
Manchester	73	48.6	(16.0)	3.2	(0.7)	2.8	(0.9)	58	55.7	(12.9)	2.5	(0.7)	1.9	(0.8)
Newcastle	64	51.3	(15.7)	3.1	(0.8)	2.5	(1.2)	48	52.4	(17.7)	2.6	(0.8)	2.0	(1.1)
Oxford	65	51.3	(16.6)	3.4	(1.4)	2.9	(1.6)	74	54.5	(16.5)	2.5	(0.7)	2.0	(1.0)
Royal Free	83	53.3	(16.0)	2.9	(1.0)	2.4	(1.0)	51	52.4	(15.5)	2.5	(0.7)	1.9	(0.8)
<b>Total</b>	<b>784</b>	<b>50.5</b>	<b>(16.4)</b>	<b>3.1</b>	<b>(0.9)</b>	<b>2.6</b>	<b>(1.1)</b>	<b>611</b>	<b>53.2</b>	<b>(15.6)</b>	<b>2.6</b>	<b>(0.8)</b>	<b>2.0</b>	<b>(1.0)</b>



**Table 3a** shows the number of cardiothoracic organs retrieved and the percentage that were transplanted, this is broken down by organ type and the attending retrieval team. Overall, 50.8% of DBD donors (donating at least one cardiothoracic organ) donated their heart only, 29% donated their lung(s) only, and 20.2% donated their heart and lung(s).

DCD donors in the UK have, until recent years, been able only to donate lungs for transplant. DCD heart retrieval is a highly complex procedure which was developed in the UK, with activity increasing over the past few years due to a focused pilot. The retrieval of DCD hearts is undertaken by highly experienced staff within specific NORS teams, funded in 2021/22 by the Joint Innovation Fund. Although DCD heart retrieval will continue to be funded for 2022/23, longer term funding to support commissioning has not yet been secured. Despite this, 58.3% of actual DCD donors donated their heart only, 33.3% donated their lung(s) only, and 8.3% donated their heart and lung(s). DCD heart retrieval contributed to 25% of all heart transplant in the UK in 2021/22. The Novel Technologies section of this report contains more information on DCD heart activity.

<b>Table 3a      Organs retrieved from actual cardiothoracic donors, 1 April 2021 - 31 March 2022, by attending retrieval team</b>								
<b>Attending retrieval team</b>	<b>N</b>	<b>DBD donors donating</b>			<b>N</b>	<b>DCD donors donating</b>		
		<b>Heart only %</b>	<b>Lung only %</b>	<b>Heart &amp; lung %</b>		<b>Heart only %</b>	<b>Lung only %</b>	<b>Heart &amp; lung %</b>
Birmingham	44	43.2	38.6	18.2	2	0.0	100	0.0
Glasgow	22	40.9	27.3	31.8	2	50.0	50.0	0.0
Harefield	33	51.5	30.3	18.2	31	71.0	19.4	9.7
Manchester	37	62.2	27.0	10.8	8	12.5	87.5	0.0
Newcastle	25	56.0	24.0	20.0	3	0.0	100	0.0
Papworth	32	50.0	21.9	28.1	26	69.2	19.2	11.5
<b>Total</b>	<b>193</b>	<b>50.8</b>	<b>29.0</b>	<b>20.2</b>	<b>72</b>	<b>58.3</b>	<b>33.3</b>	<b>8.3</b>

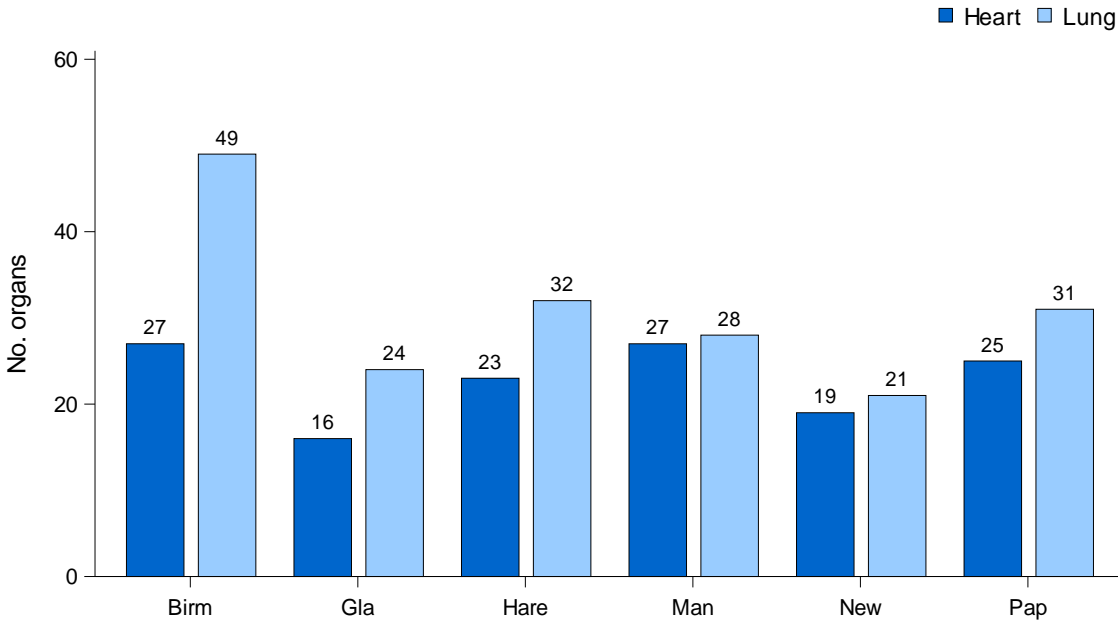
**Table 3b** shows the number of cardiothoracic organs retrieved and the percentage that were transplanted, this is broken down by organ type and the attending retrieval team. For example, there were 185 DBD lungs retrieved and of these 88.6% were transplanted.

<b>Table 3b Cardiothoracic organs retrieved and percentage that went on to be transplanted, 1 April 2021 - 31 March 2022, by attending retrieval team</b>				
<b>Attending retrieval team</b>	<b>Hearts</b>		<b>Lungs</b>	
	<b>Retrieved</b>	<b>% txd</b>	<b>Retrieved</b>	<b>% txd</b>
<b>DBD</b>				
Birmingham	27	100	49	95.9
Glasgow	16	93.8	24	91.7
Harefield	23	100	32	87.5
Manchester	27	100	28	85.7
Newcastle	19	100	21	71.4
Papworth	25	100	31	90.3
<b>Total</b>	<b>137</b>	<b>99.3</b>	<b>185</b>	<b>88.6</b>
<b>DCD<sup>1</sup></b>				
Birmingham	0	-	4	100
Glasgow	1	100	2	100
Harefield	25	96.0	18	66.7
Manchester	1	100	13	100
Newcastle	0	-	6	33.3
Papworth	21	85.7	16	81.3
<b>Total</b>	<b>48</b>	<b>91.7</b>	<b>59</b>	<b>78.0</b>
<b>Total</b>	<b>185</b>	<b>97.3</b>	<b>244</b>	<b>86.1</b>

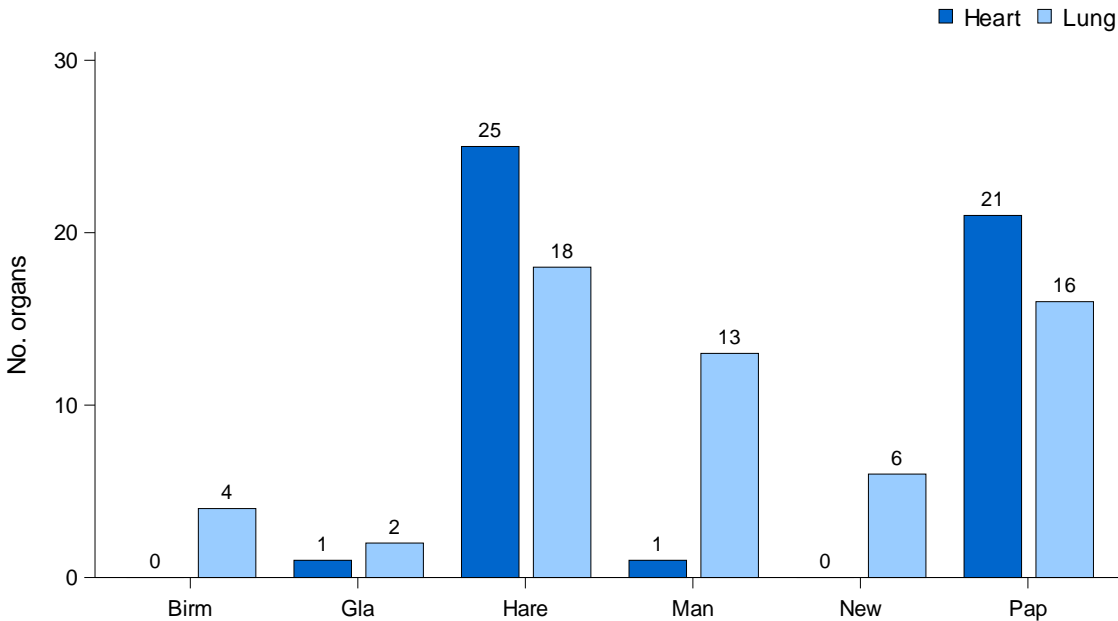
<sup>1</sup> DCD heart retrieval is a non-commissioned service and is only undertaken by select teams

**Figures 11a and 11b** show the number of organs retrieved, by attending retrieval team, for DBD and DCD donors, respectively.

**Figure 11a** DBD cardiothoracic organs retrieved, 1 April 2021 - 31 March 2022 by attending retrieval team



**Figure 11b** DCD cardiothoracic organs retrieved, 1 April 2021 - 31 March 2022 by attending retrieval team



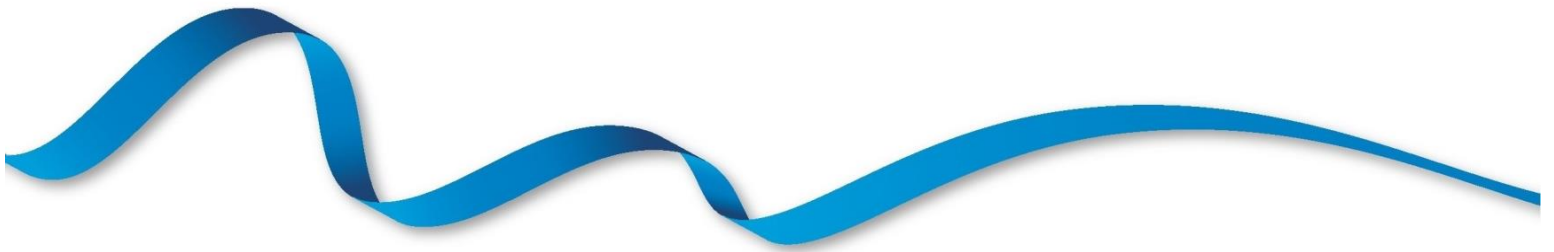
**Table 3c** shows the mean number of cardiothoracic organs retrieved and transplanted for each proceeding cardiothoracic donor, by attending retrieval team and donor type. Mean donor age is also reported.

- The mean number of organs retrieved per DBD donor ranged from 1.5 to 1.8 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.60$ ).
- The mean number of organs transplanted per DBD donor ranged from 1.4 to 1.7 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.35$ ).
- The mean number of organs retrieved per DCD donor ranged from 1.4 to 2.0 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.37$ ).
- The mean number of organs transplanted per DCD donor ranged from 0.7 to 2.0 across teams, analysis of variance indicated that the differences were not statistically significant ( $p=0.16$ ).

**Table 3c** Mean donor age, organs retrieved, and organs transplanted, per proceeding cardiothoracic donor, 1 April 2021 - 31 March 2022, by attending retrieval team

Attending retrieval team	Actual cardio. donors	DBD				DCD								
		Donor age		Orgs. retrieved		Orgs. txd		Donor age		Orgs. retrieved		Orgs. txd		
		Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	
Birmingham	44	40.3	(15.3)	1.7	(0.7)	1.7	(0.8)	2	55.5	(3.5)	2.0	(0.0)	2.0	(0.0)
Glasgow	22	41.5	(16.6)	1.8	(0.9)	1.7	(0.8)	2	43.5	(26.2)	1.5	(0.7)	1.5	(0.7)
Harefield	33	38.2	(15.2)	1.7	(0.8)	1.5	(0.9)	31	35.5	(14.6)	1.4	(0.7)	1.2	(0.8)
Manchester	37	35.9	(13.0)	1.5	(0.7)	1.4	(0.7)	8	39.9	(17.3)	1.8	(0.5)	1.8	(0.5)
Newcastle	25	35.6	(15.7)	1.6	(0.8)	1.4	(0.7)	3	61.7	(6.7)	2.0	(0.0)	0.7	(1.2)
Papworth	32	35.8	(16.5)	1.8	(0.9)	1.7	(0.9)	26	35.7	(14.2)	1.4	(0.7)	1.2	(0.7)
<b>Total</b>	<b>193</b>	<b>37.9</b>	<b>(15.3)</b>	<b>1.7</b>	<b>(0.8)</b>	<b>1.6</b>	<b>(0.8)</b>	<b>72</b>	<b>37.9</b>	<b>(15.5)</b>	<b>1.5</b>	<b>(0.6)</b>	<b>1.3</b>	<b>(0.8)</b>

## **NOVEL TECHNOLOGIES**



The term 'Novel Technologies' refers to the use of non-traditional techniques by which organ retrieval and organ quality is enhanced by novel means. Novel Technologies are still developing, but are already contributing to the successful expansion of clinical organ retrieval from deceased donors, in particular DCD donors. The resulting increase in the numbers of organs for transplant, and the enhanced safety and quality of these organs, contributes significantly to UK clinical transplantation.

Although Novel Technologies are highly successful, there is no sustainable funding yet identified for their longer term use as part of UK organ retrieval. Retrievals utilising novel technology are reported here as they are undertaken by commissioned NORS teams, with additional staff and equipment. For 2021/22, these were funded partially by some of the UK health departments, partially by NHSBT, and partially by the employing transplant centres. The DCD heart program was funded in 2021/22 by the Joint Innovation Fund (NHSBT/NHSE) which is described below.

### **Abdominal Normothermic Regional Perfusion**

Abdominal Normothermic Regional Perfusion (A-NRP) in DCD donors does not form part of the commissioned NORS service but has been in use in the UK since 2010. This has primarily been performed by Edinburgh and Cambridge teams on donors where they have accepted the liver but has recently expanded to include a wider range of donors. Since 2018/19, limited funding support has been provided by Scotland, Wales, and Northern Ireland Health Departments, along with NHSBT and some local funding to sustain the restricted use of A-NRP. A steering group was set up in November 2020 provide oversight and governance for A-NRP and to support new teams wishing to utilise the technology. In the last year, two additional NORS centres have begun to undertake NRP. Funding has been provided by the transplant centres on a limited basis in 2021/22, with no longer term funding secured.

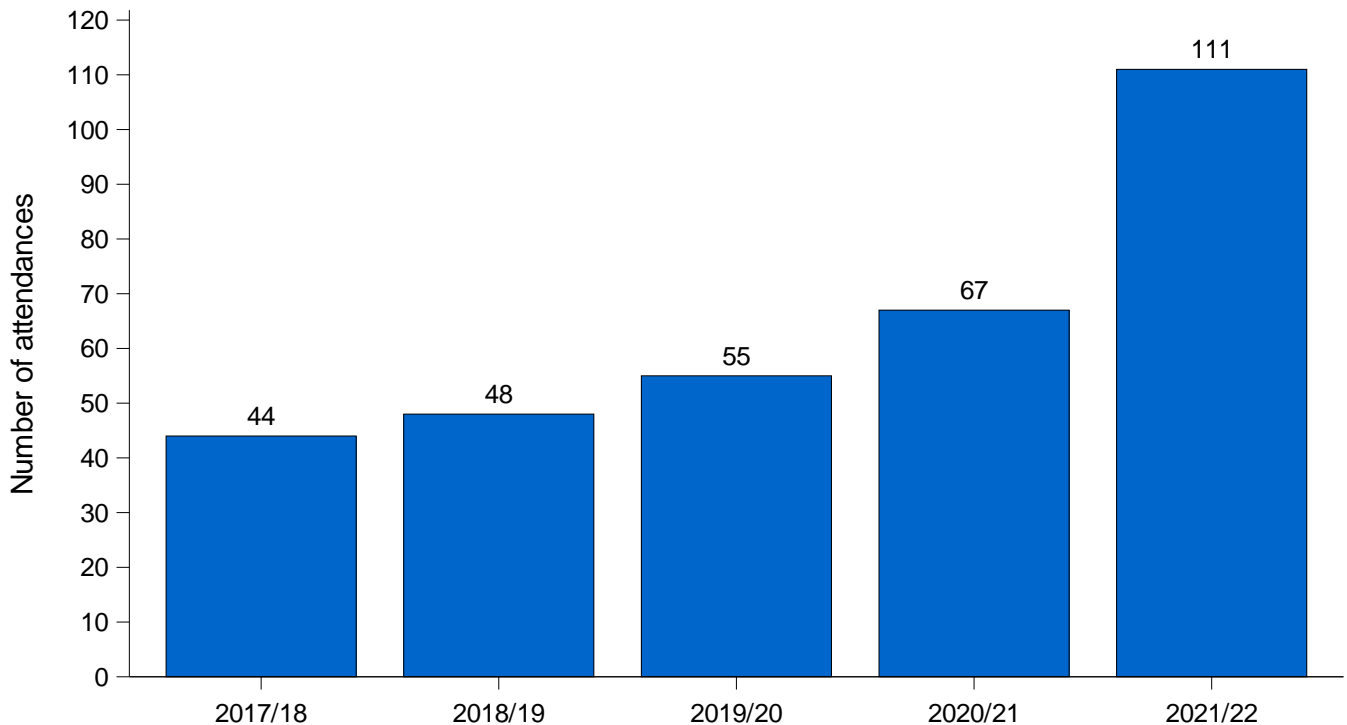
**Table 4** shows the number of DCD attendances for the four teams performing A-NRP in the last year, along with how many underwent NRP and the number of donors proceeding to donation. In total, there were 111 A-NRP attendances, with 86 (77%) proceeding to donate at least one organ. Cardiff and Royal Free teams performed their first A-NRP procedures in 2021/22. Note these numbers contain 5 DCD attendances where the NRP team below were not the main abdominal team in attendance, but did attend to perform NRP.

<b>Table 4 DCD and NRP attendances by A-NRP retrieval team, 1 April 2021 - 31 March 2022</b>				
<b>Retrieval team</b>	<b>All DCD attendances</b>	<b>Total proceeding<sup>1</sup></b>	<b>NRP attendances</b>	<b>NRP proceeding<sup>1</sup></b>
Cambridge	131	104	49	44
Cardiff	25	20	2	2
Edinburgh	70	46	56	37
Royal Free	65	51	4	3
<b>Total</b>	<b>291</b>	<b>221</b>	<b>111</b>	<b>86</b>

<sup>1</sup> Proceeded to donate at least one organ for the purpose of transplantation

**Figure 12** shows the number of A-NRP attendances for the most recent five financial years. Attendances have been increasing each year, with 2021/22 having a 66% increase in attendances compared to the previous year.

**Figure 12 A-NRP donor attendances between 1 April 2017 - 31 March 2022**



Organ utilisation rates for the 86 proceeding NRP donors between 1 April 2021 and 31 March 2022 is shown in **Table 5** compared to the general DCD donor population donating at least one organ. Transplantation rates for kidney and liver are higher in the NRP population when comparing to the general DCD population.

<b>Table 5 Organ offer outcomes from 86 NRP donors, 1 April 2021 - 31 March 2022</b>					
<b>Outcome</b>	<b>Kidney<sup>1</sup></b>	<b>Liver</b>	<b>Pancreas</b>	<b>Lung<sup>1</sup></b>	<b>Heart</b>
Offered	85	86	39	51	20
Accepted	84	80	19	15	13
Retrieved	82	73	14	3	4
Transplanted	76	56	4	2	4
% Transplanted of offered	89%	65%	10%	4%	20%
% Transplanted of retrieved	93%	77%	29%	67%	100%
National DCD organ % transplanted of offered*	88%	29%	19%	10%	36%
National DCD organ % transplanted of retrieved*	89%	58%	47%	81%	91%

<sup>1</sup> At least one  
\* Based on all UK proceeding DCD donors between 1 April 2021 and 31 March 2022 where A-NRP was not intended



## DCD Hearts

A service evaluation for DCD heart retrieval and transplantation began in February 2015, initially with two centres, Harefield and Papworth. Funding was limited to 20 transplants. Since then, other centres who acquired short term funding within their organisations were able to retrieve and transplant DCD hearts.

The Joint Innovation Fund (JIF) was established in 2019 to provide funding to enable a 12-month UK wide retrieval and transplantation DCD heart pilot. The pilot began on 7 September 2020 with three retrieval teams having responsibility for retrieving hearts from DCD donors for the whole of the UK. Harefield and Papworth are two of the teams, with third team support having been provided by Manchester, Glasgow, and a hybrid team consisting of Harefield surgeons and Papworth peri-operative staff. The JIF funding was fully utilised in 2021/22. Whilst there has been a commitment to maintain the service for 2022/23, longer term funding is still to be secured if this technology is to continue to be used.

**Table 6** shows DCD heart activity by team between 1 April 2021 and 31 March 2022. Overall, there were 75 attendances where DCD heart retrieval was planned, with 48 (64%) proceeding to DCD heart retrieval, resulting in 44 transplants. Attendances are identified through Retrieval Team Information forms as well as DCD Heart Passports. Information on recipient outcomes following DCD heart transplantation can be found in the NHSBT Annual Report on Cardiothoracic Organ Transplantation.

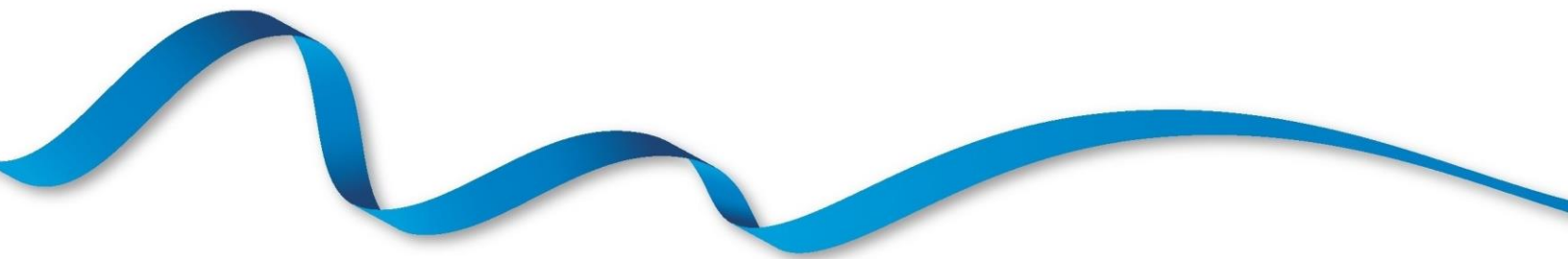
<b>Table 6 DCD heart activity by team, 1 April 2021 - 31 March 2022</b>			
<b>Retrieval Team</b>	<b>Attended<sup>1</sup></b>	<b>Retrieved</b>	<b>Transplanted<sup>2</sup></b>
Glasgow	1	1	1
Harefield	18	11	11
Hybrid – Harefield / Papworth	24	14	13
Manchester	1	1	1
Papworth	31	21	18
<b>Total</b>	<b>75</b>	<b>48</b>	<b>44</b>
<sup>1</sup> Includes cases where a DCD Heart Passport has not been returned but notes reported on the Retrieval Team Information form suggest that DCD heart retrieval was intended. <sup>2</sup> Transplanted at any UK transplant centre			

Organ utilisation rates for the 48 proceeding DCD heart donors between 1 April 2021 and 31 March 2022 is shown in **Table 7** compared to the general DCD donor population donating at least one organ. Transplantation rates for other organs are higher in the DCD heart population when comparing to the general DCD population.

<b>Table 7 Abdominal and lung offer outcomes from 48 DCD heart donors, 1 April 2021 - 31 March 2022</b>				
<b>Outcome</b>	<b>Lung<sup>1</sup></b>	<b>Kidney<sup>1</sup></b>	<b>Liver</b>	<b>Pancreas</b>
Offered	36	47	45	44
Accepted	18	47	38	29
Retrieved	6	46	37	26
Transplanted	6	44	22	12
% Transplanted of offered	17%	94%	49%	27%
% Transplanted of retrieved	100%	96%	59%	46%
National DCD organ % transplanted of offered*	8%	88%	33%	15%
National DCD organ % transplanted of retrieved*	75%	89%	63%	43%

<sup>1</sup> At least one  
\* Based on all UK proceeding DCD donors between 1 April 2021 and 31 March 2022 where the heart was not retrieved

# APPENDIX



**Appendix 1 Retrieval data missing form rates,  
1 April 2021 - 31 March 2022**

Attending retrieval team	Number of forms due	Retrieval team forms missing		SNOD forms missing	
		N	%	N	%
<b>Abdominal</b>					
Birmingham	180	0	0.0	1	0.6
Cambridge	215	0	0.0	0	0.0
Cardiff	56	0	0.0	0	0.0
Edinburgh	137	0	0.0	0	0.0
King's College	262	0	0.0	0	0.0
Leeds	175	0	0.0	1	0.6
Manchester	164	0	0.0	0	0.0
Newcastle	131	0	0.0	0	0.0
Oxford	162	0	0.0	0	0.0
Royal Free	150	0	0.0	1	0.7
<b>Cardiothoracic</b>					
Birmingham	76	0	0.0	0	0.0
Glasgow	47	0	0.0	0	0.0
Harefield	121	0	0.0	0	0.0
Manchester	80	0	0.0	0	0.0
Newcastle	40	0	0.0	0	0.0
Papworth	111	0	0.0	0	0.0
<b>Total</b>	<b>2107</b>	<b>0</b>	<b>0.0</b>	<b>3</b>	<b>0.1</b>

**Prepared by:**

**Statistics and Clinical Research, NHS Blood and Transplant**

**Rachel Hogg**

