NHS
Blood and Transplant

ANNUAL REPORT ON THE NATIONAL ORGAN RETRIEVAL SERVICE (NORS)

REPORT FOR 2022/23
(1 April 2022 - 31 March 2023)

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CONTENTS

Contents

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 2022 to 31 March 2023. Data were extracted from the UK Transplant Registry on 07 July 2023.

Key findings:

- From 1 April 2022 to 31 March 2023, 1,688 potential organ donors were attended by a retrieval team. 1,424 (84%) of these proceeded to abdominal organ donation and 278 (54% of the 511 attended by a cardiothoracic team) proceeded to cardiothoracic organ donation.

- There was a 0.3% increase in the number of donors attended in this financial year compared to the previous year (from 1,633 to 1,688).

- On average, 4.7 potential donors were attended by a retrieval team per day, which is an increase from the previous year (4.5).

- On average, abdominal teams attended at least one donor on 49% of on-call days in the year (48% the previous year), while cardiothoracic teams attended at least one donor on 35% of on-call days (34% the previous year).

- There were statistically significant differences in the mean number of DBD cardiothoracic organs retrieved and subsequently transplanted across cardiothoracic NORS teams.

- The transplantation rates for retrieved organs were variable across organs, from 47.5% for DCD pancreases, up to 100% for DBD hearts. Additionally, 58 DCD hearts were retrieved, 55 of which were transplanted in that period.

- There were 168 A-NRP attendances, with 129 proceeding to donation, with Birmingham and Newcastle performing their first cases.

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 2022 to 31 March 2023. 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 (1% and 0% for RTI and ORI, respectively) of forms were missing at time of data extraction, 07 July 2023.

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 37 weeks on-call per annum), making eight abdominal teams on-call at any time. 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 and also 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 2022/23, 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 2022 and 31 March 2023 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.

Table 1a **Number of donor attendances (proceeding and non-proceeding) per retrieval team, 1 April 2022 - 31 March 2023, by donor type (DBD/DCD)**

Attending retrieval team (Weeks on-call per annum)	DBD N	DBD %	DCD N	DCD %	Total	% of all donors attended	(% attended in 2021/22)
Abdominal							
Birmingham (38w)	95	48.5	101	51.5	196	11.7	(11)
Cambridge (52w)	82	35	152	65	234	13.9	(13.2)
Cardiff (15w)	22	36.7	38	63.3	60	3.6	(3.4)
Edinburgh (52w)	62	40.5	91	59.5	153	9.1	(8.4)
King's College (52w)	139	56.5	107	43.5	246	14.6	(16.1)
Leeds (38w)	68	42.2	93	57.8	161	9.6	(10.7)
Manchester (38w)	80	48.5	85	51.5	165	9.8	(10)
Newcastle (52w)	74	50.7	72	49.3	146	8.7	(8)
Oxford (38w)	83	50.9	80	49.1	163	9.7	(9.9)
Royal Free (38w)	81	51.3	77	48.7	158	9.4	(9.2)
Abdominal total	**786**	**46.7**	**896**	**53.3**	**1682**	**-**	**(-)**
Cardiothoracic							
Birmingham (26w)	76	81.7	17	18.3	93	18.2	(16.1)
Glasgow (26w)	30	61.2	19	38.8	49	9.6	(9.9)
Harefield (26w)	71	58.7	50	41.3	121	23.7	(25.6)
Manchester (26w)	56	83.6	11	16.4	67	13.1	(16.9)
Newcastle (26w)	47	81	11	19	58	11.4	(8.5)
Papworth (26w)	55	44.7	68	55.3	123	24.1	(23)
Cardiothoracic total	**335**	**65.6**	**176**	**34.4**	**511**	**-**	**(-)**
Total no. attendances	**1121**	**51.1**	**1072**	**48.9**	**2193**	**100**	**(100)**
Total no. donors attended	**789**	**46.7**	**899**	**53.3**	**1688**	**100**	**(100)**

There were 3 potential donors attended by an off-duty abdominal NORS team (Oxford, Birmingham, and Leeds) and 24 by an off-duty cardiothoracic NORS team (11 Papworth, 1 Newcastle, 2 Manchester, and 10 Harefield).

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 1688 donors attended by a retrieval team. Of these 789 (47%) were potential DBD donors and 899 (53%) were potential DCD donors.768 Of the potential DBD donors attended by an abdominal retrieval team (97%) proceeded to abdominal organ donation, while 191 (57%) of the potential DBD donors attended by a cardiothoracic team proceeded to cardiothoracic donation. For potential DCD donors, 656 (73%) of those attended by an abdominal team proceeded to abdominal donation, while 87 (49%) of those attended by a cardiothoracic team proceeded to cardiothoracic organ donation.

Table 1b **Number of donor attendances per retrieval team, 1 April 2022 - 31 March 2023 by donor type (DBD/DCD) and proceeding/non-proceeding**

Attending retrieval team (Weeks on-call per annum)	DBD			DCD		
	Actual	Non-proceeding	% non-proc	Actual	Non-proceeding	% non-proc
Abdominal						
Birmingham (38w)	92	3	3.2	79	22	21.8
Cambridge (52w)	78	4	4.9	107	45	29.6
Cardiff (15w)	22	0	0	32	6	15.8
Edinburgh (52w)	60	2	3.2	70	21	23.1
King's College (52w)	136	3	2.2	82	25	23.4
Leeds (38w)	68	0	0	64	29	31.2
Manchester (38w)	79	1	1.3	58	27	31.8
Newcastle (52w)	73	1	1.4	48	24	33.3
Oxford (38w)	80	3	3.6	56	24	30
Royal Free (38w)	80	1	1.2	60	17	22.1
Abdominal total	**768**	**18**	**2.3**	**656**	**240**	**26.8**
Cardiothoracic						
Birmingham (26w)	42	34	44.7	7	10	58.8
Glasgow (26w)	20	10	33.3	11	8	42.1
Harefield (26w)	43	28	39.4	26	24	48
Manchester (26w)	30	26	46.4	5	6	54.5
Newcastle (26w)	27	20	42.6	2	9	81.8
Papworth (26w)	29	26	47.3	36	32	47.1
Cardiothoracic total	**191**	**144**	**43**	**87**	**89**	**50.6**
Total donors (abdominal and/or cardiothoracic)	**771**	**18**	**2.3**	**657**	**242**	**26.9**

There were 3 potential donors attended by an off-duty abdominal NORS team (Oxford, Birmingham, and Leeds) and 24 by an off-duty cardiothoracic NORS team (11 Papworth, 1 Newcastle, 2 Manchester, and 10 Harefield).

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 (15%) and Cardiff attended the lowest proportion (4%), 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 2018 - 31 March 2023**

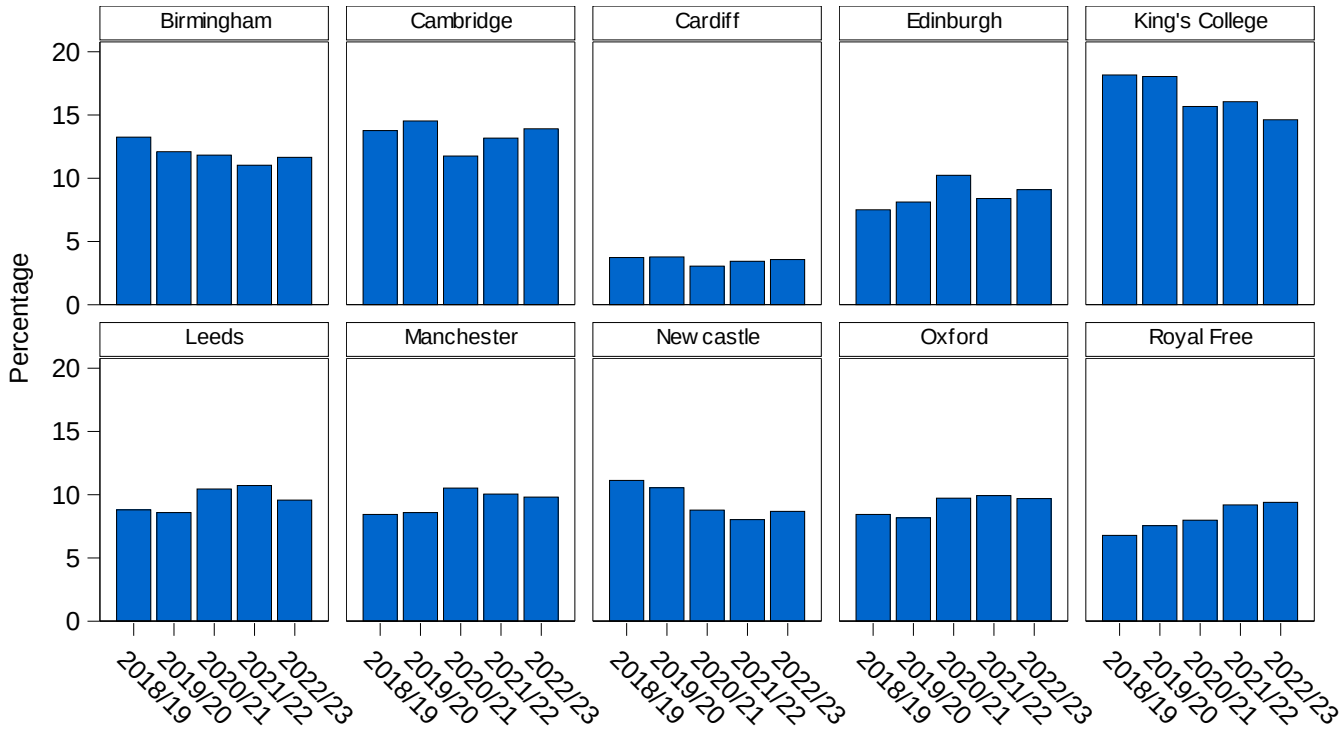


Figure 1b shows the proportion of donors attended by any cardiothoracic retrieval team. In the last financial year, Papworth attended the largest proportion of cardiothoracic donors (24%) and Glasgow attended the lowest proportion (10%).

Figure 1b **Proportion of donors attended by a cardiothoracic team between 1 April 2018 - 31 March 2023**

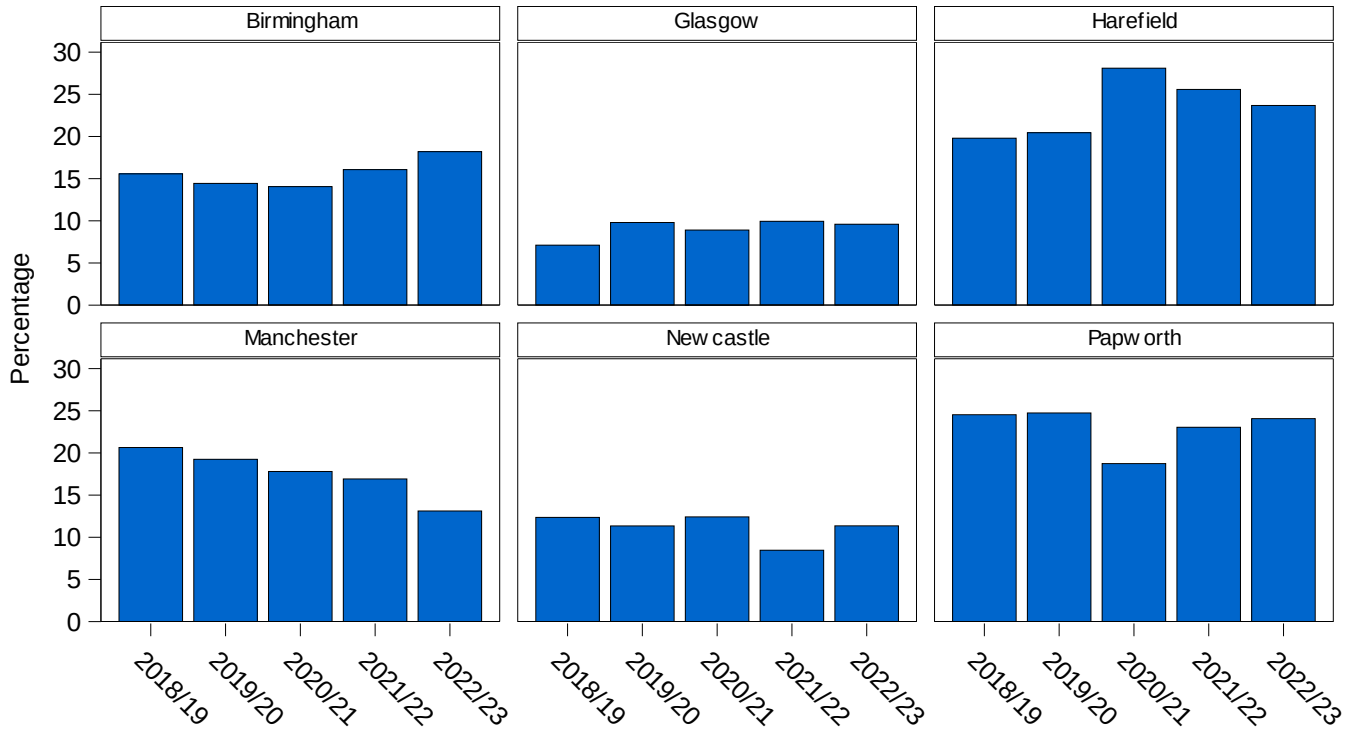


Figure 2 shows the distribution of the number of actual and non-proceeding donors attended by at least on retrieval team, per day in 2022/23. For example, there were 77 days in the 12-month period (21% of days) where five potential donors were attended by at least one team. The number of donors per day ranged from 0 (5 days) to 13 (2 days). The mean number of donors per day was 4.7.

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 2022 - 31 March 2023**

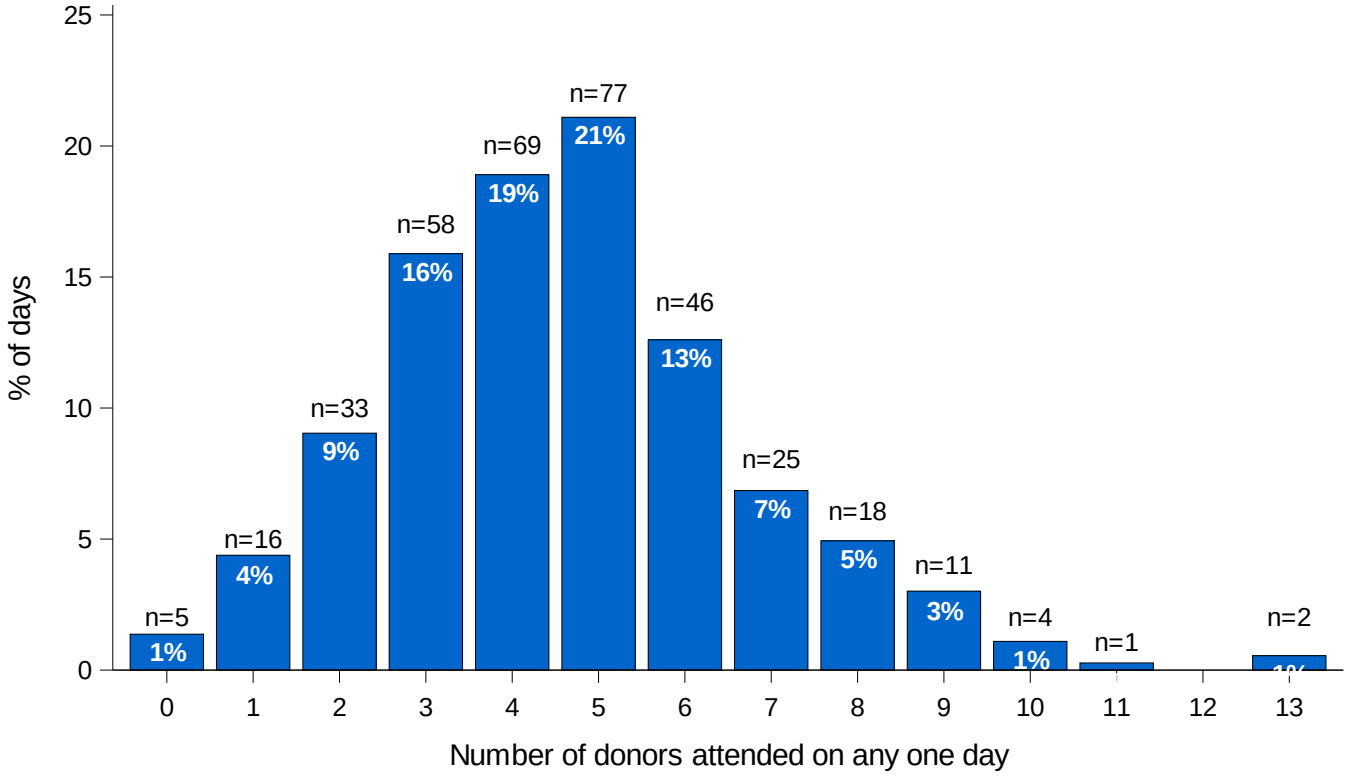


Figure 3a shows the distribution of the number of abdominal teams out on any one day during 2022/23. For example, there were 39 days in the 12-month period (11% of days) where two abdominal teams were out attending donors.

Figure 3a **Distribution of the number of abdominal retrieval teams out on any one day, between 1 April 2022 - 31 March 2023**

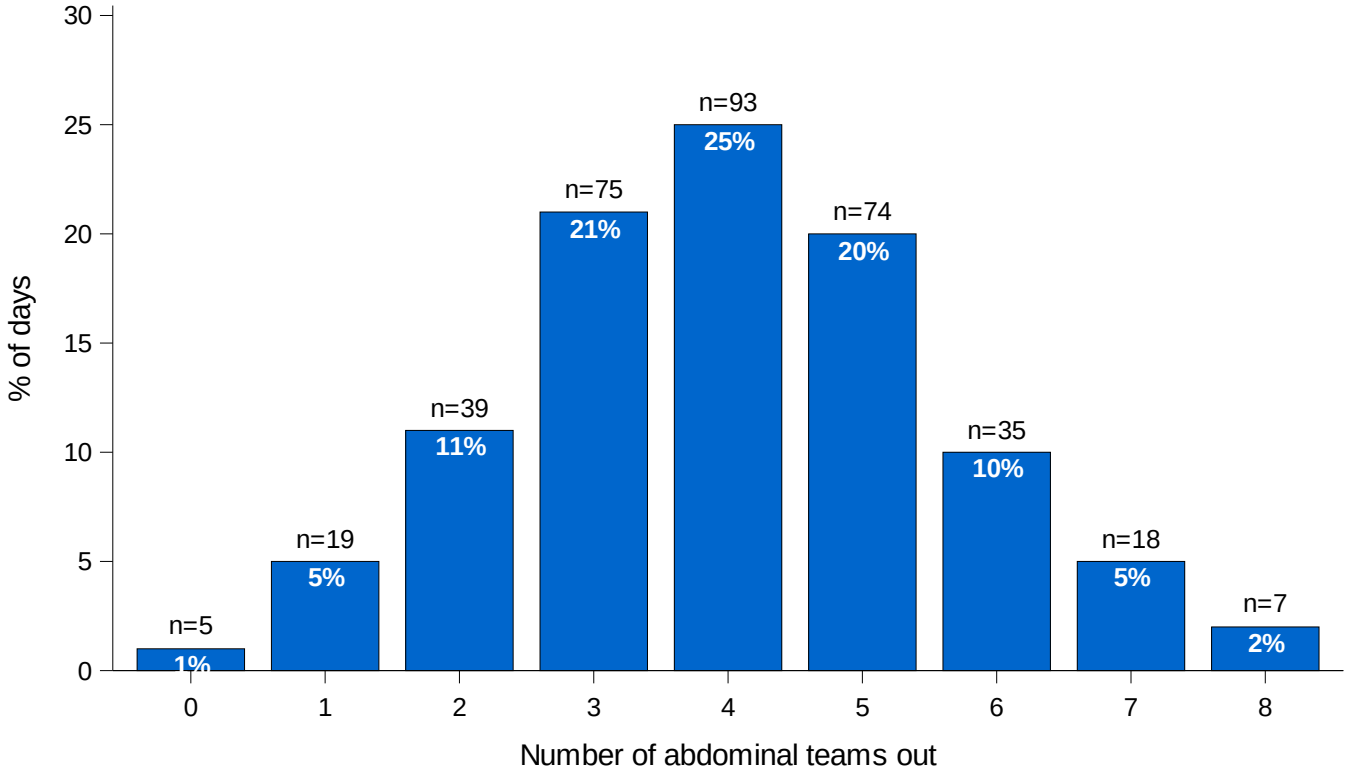


Figure 3b shows the distribution of the number of donors (actual and non-proceeding) attended by each abdominal team on any one day (that they were on call) during the year. On average abdominal teams did not attend any donors on 51% of the days in the year, attended one donor 42% of days, attended two donors 7% of days, attended three donors 1% of days and attended four donors on 1% of days. The 'busiest' team in 2022/23 in terms of days active was Birmingham (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 2022 - 31 March 2023**

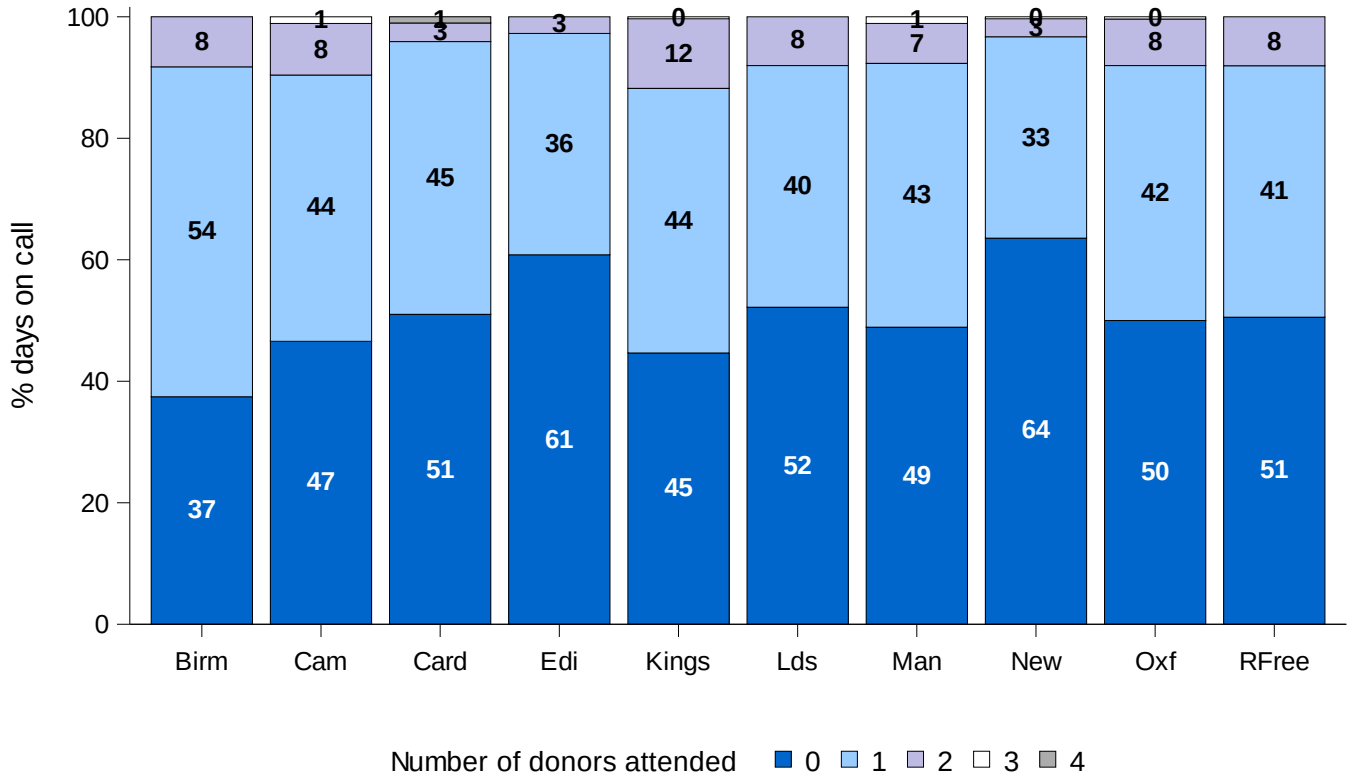


Figure 4a shows the distribution of the number of cardiothoracic teams out on any one day during 2022/23. It is most common for one cardiothoracic team to be out on any given day.

Figure 4a **Distribution of the number of cardiothoracic retrieval teams out on any one day, between 1 April 2022 - 31 March 2023**

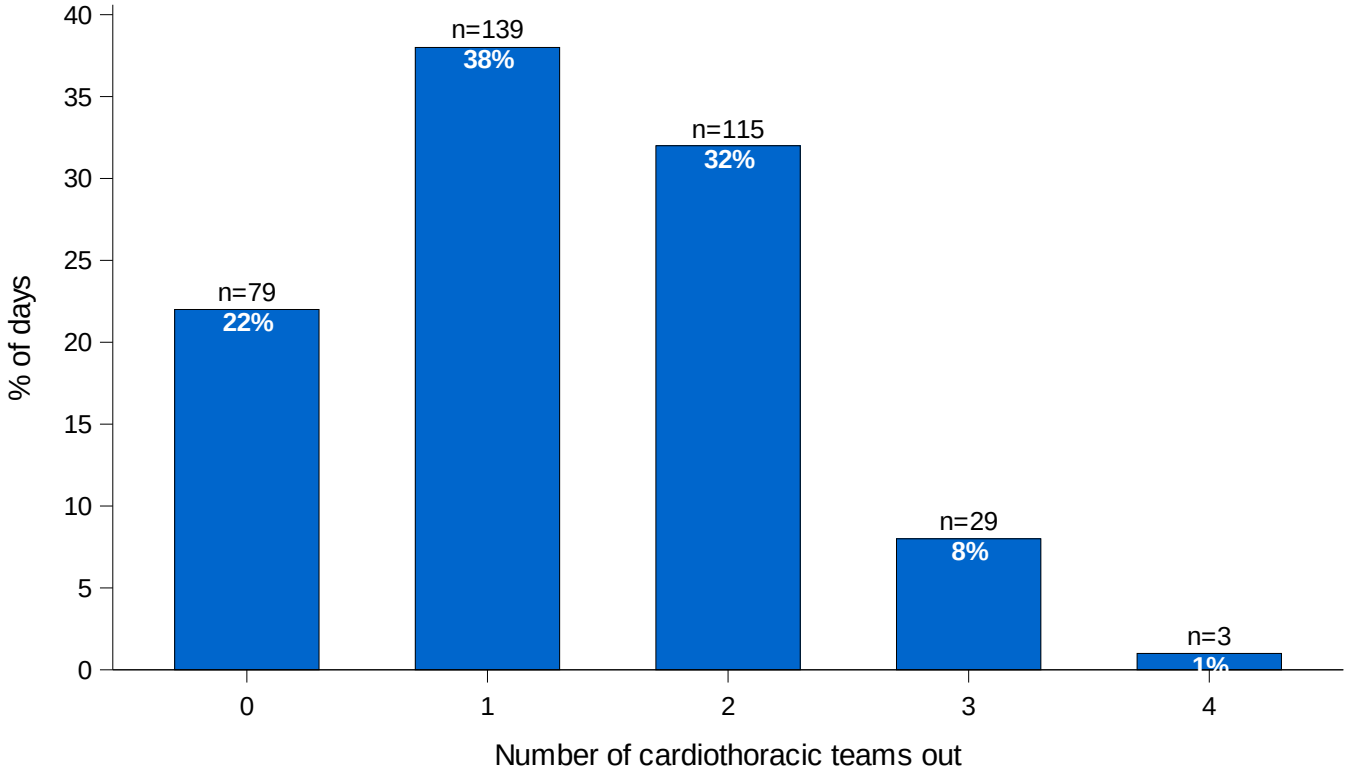
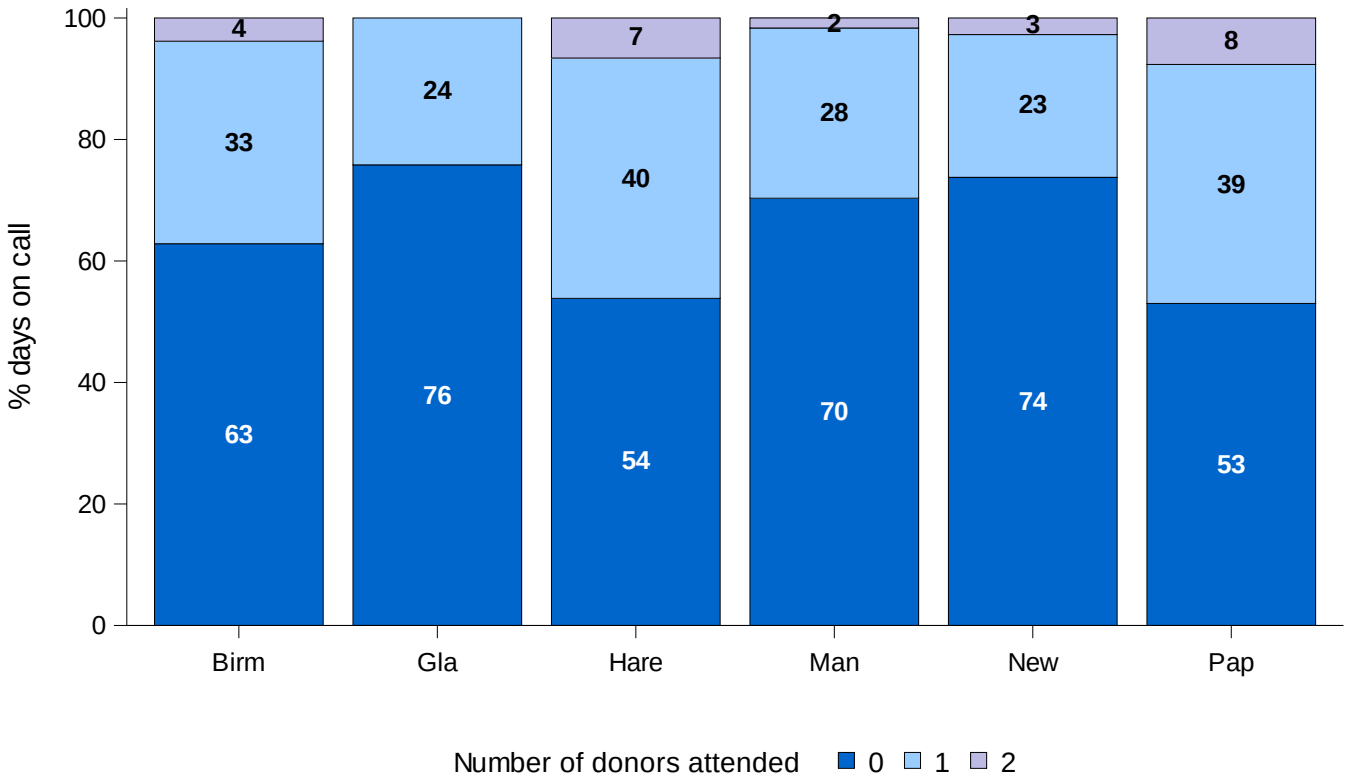


Figure 4b shows the distribution of the number of donors (actual and non-proceeding) attended by each cardiothoracic team on any one day (that they were on call) during the year. On average cardiothoracic teams did not attend any donors on 65% of the days in the year, attended one donor 31% of days, and attended two donors 4% of days. The 'busiest' team in 2022/23 in terms of days active was Papworth (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 2022 - 31 March 2023**



The time taken for teams to attend a donor is shown by team for the most recent four financial years in **Figures 5a and 5b.** The time shown is the time from the beginning of muster time (90 minutes 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. 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 2018 - 31 March 2023**

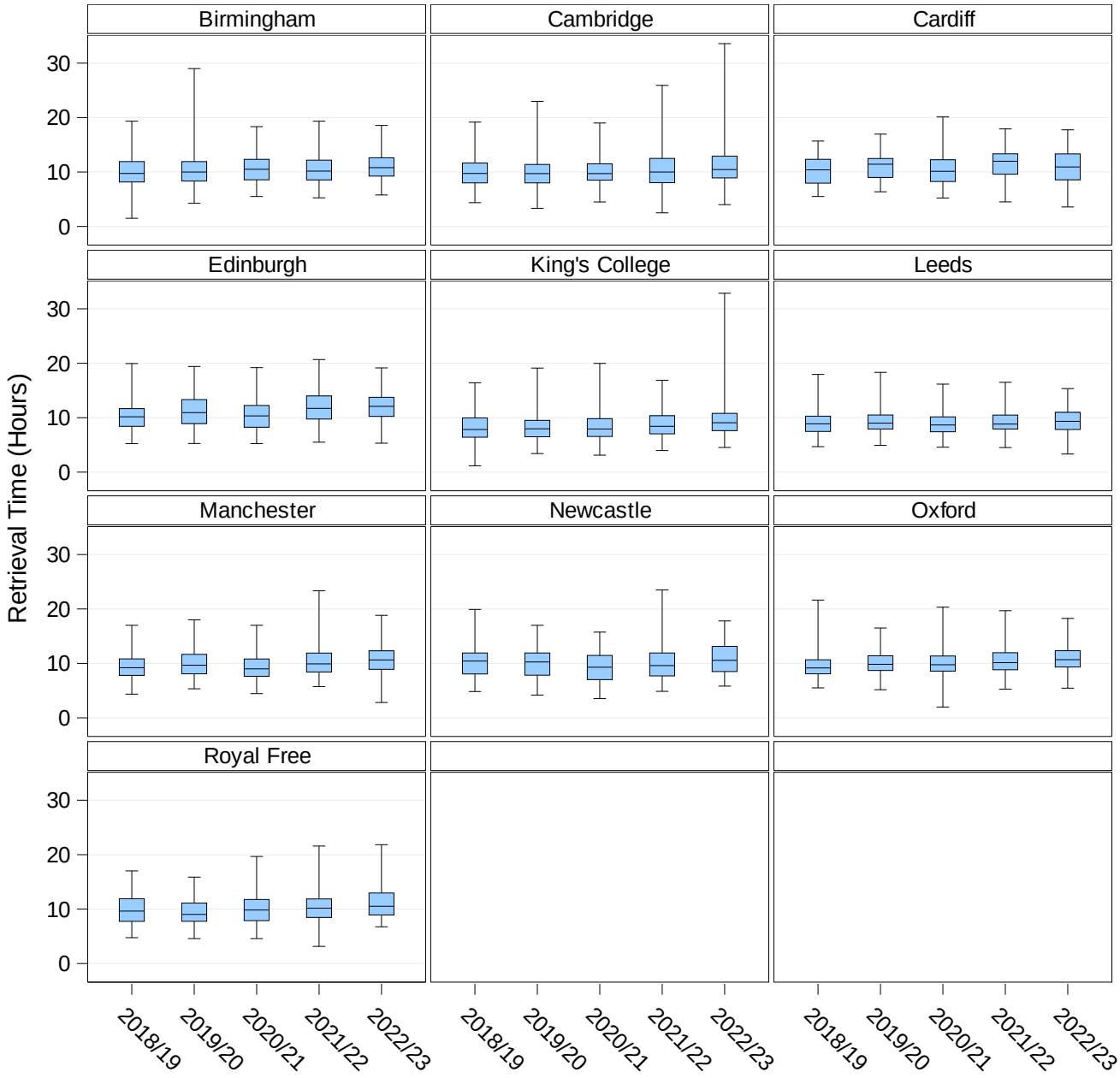
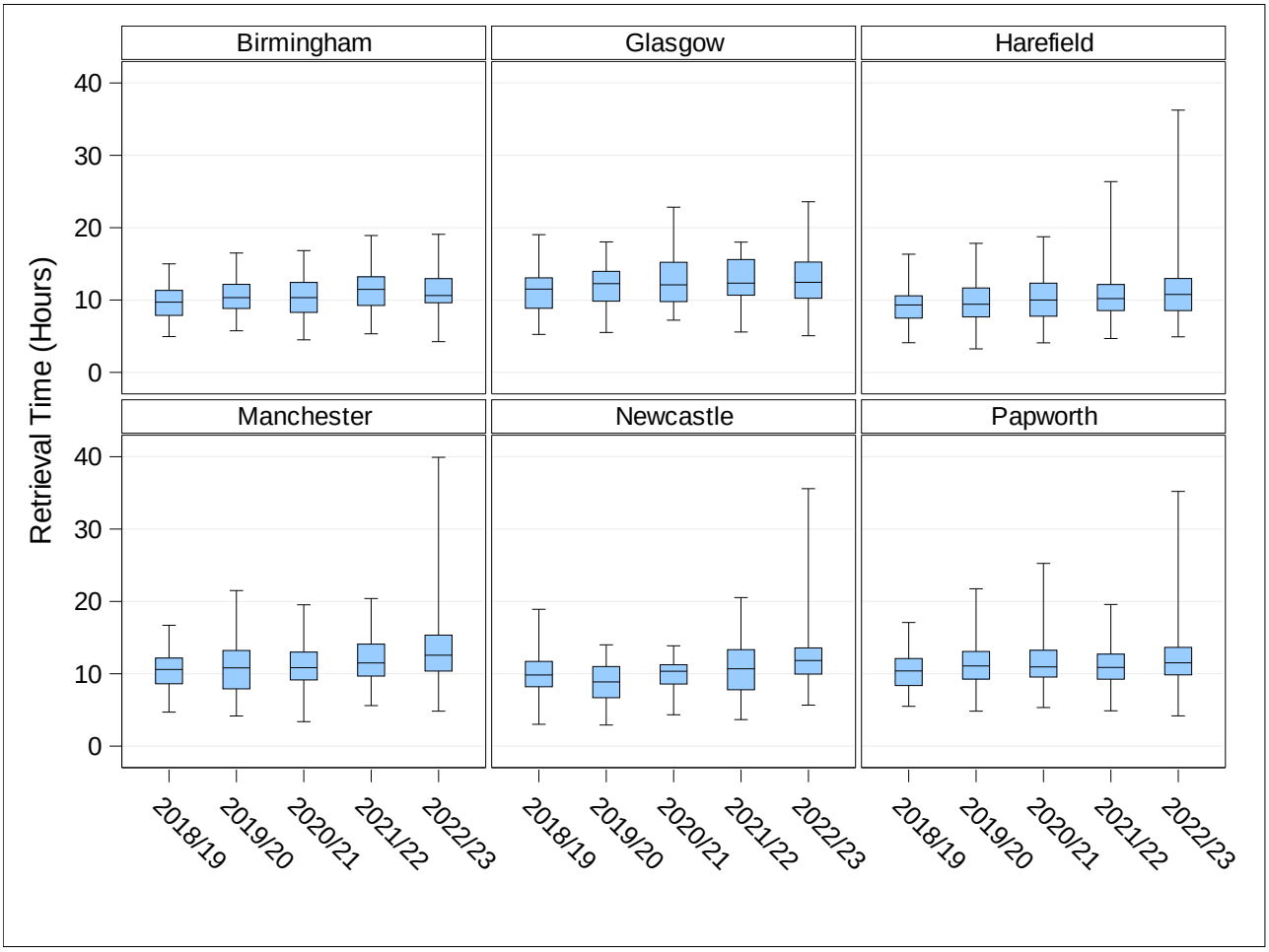


Figure 5b **Median (IQR) time a cardiothoracic team is out attending a donor from departure to return to base, between 1 April 2018 - 31 March 2023**



The day of week and time of day at which mobilisation of NORS teams occurred throughout the 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 high activity.

Figure 6a Mobilisation time of abdominal teams
1 April 2022 - 31 March 2023

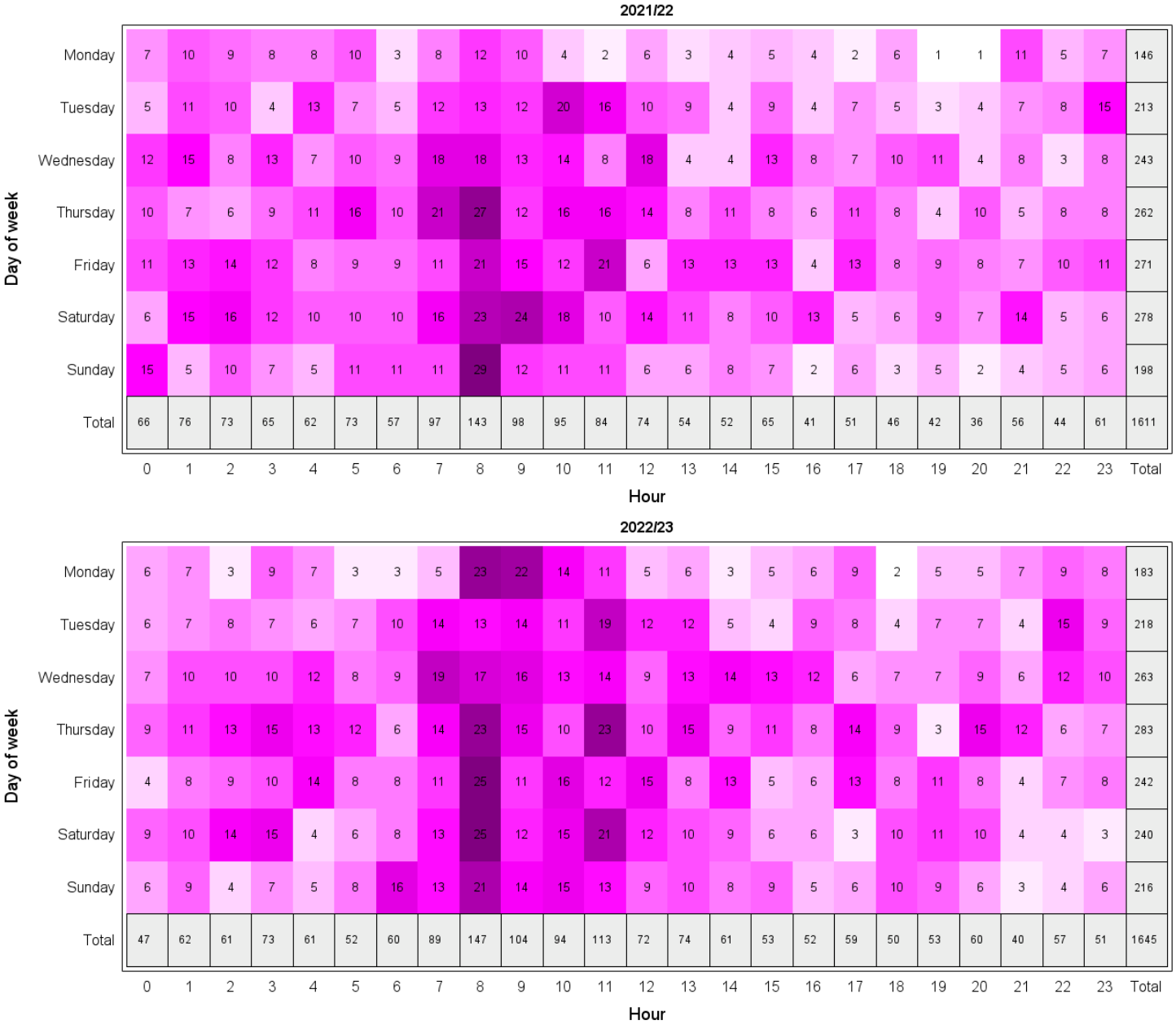
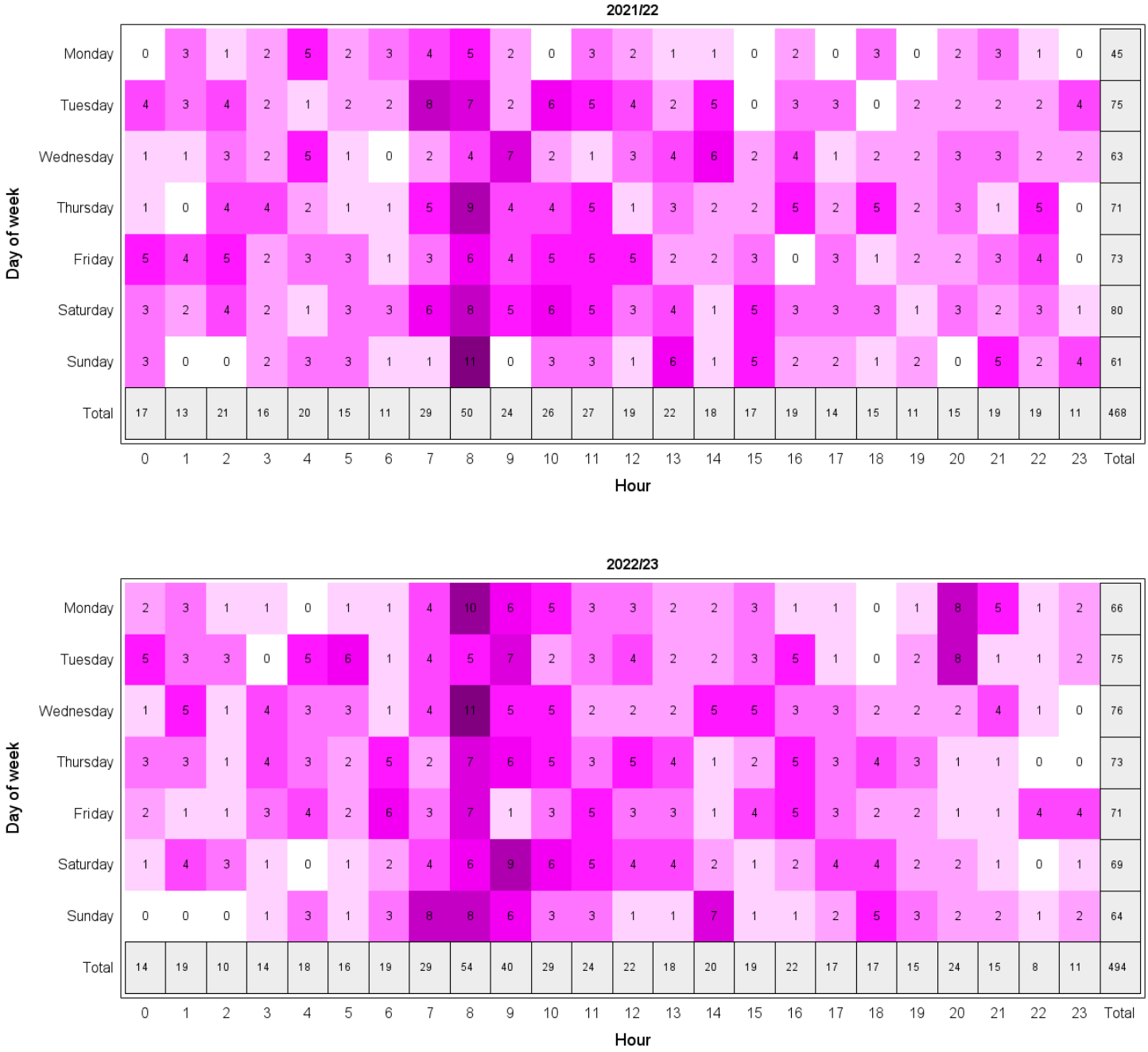
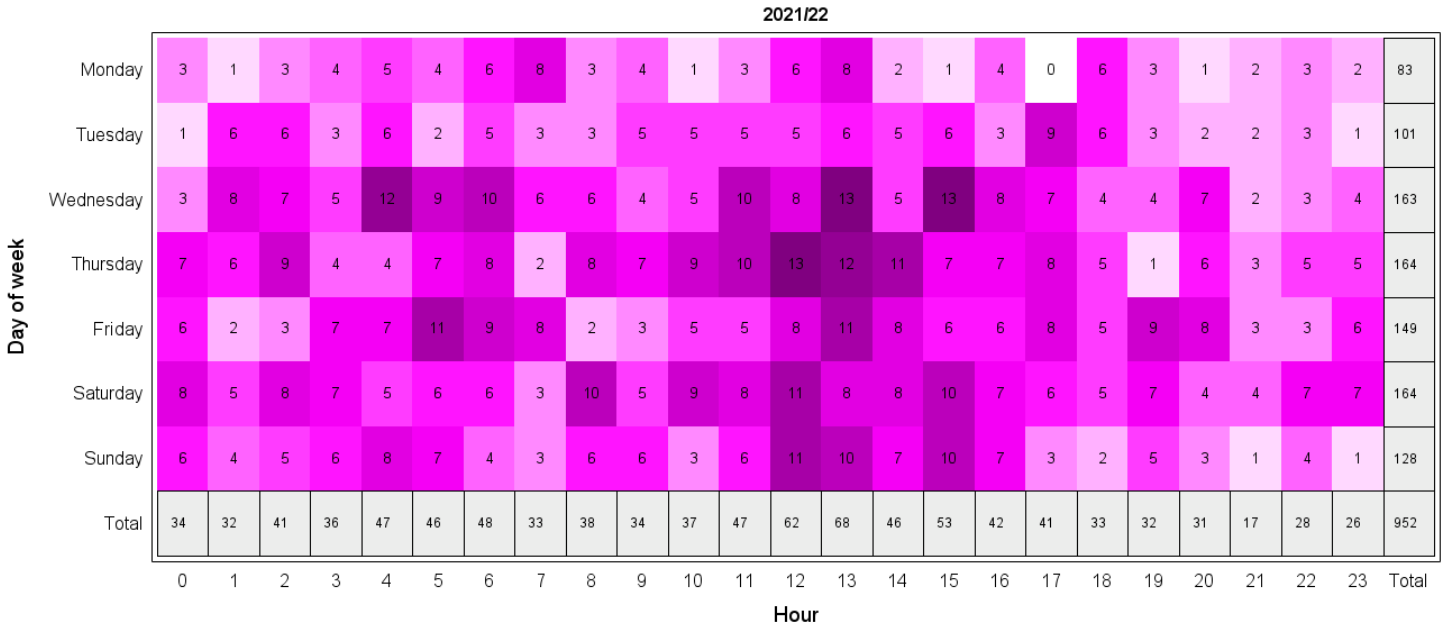


Figure 6b **Mobilisation time of cardiothoracic teams**
1 April 2022 - 31 March 2023



The day of week and time of day at which cross-clamp in donors occurred throughout the 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 high activity.

Figure 7a Cross-clamp time of abdominal only donors
1 April 2022 - 31 March 2023



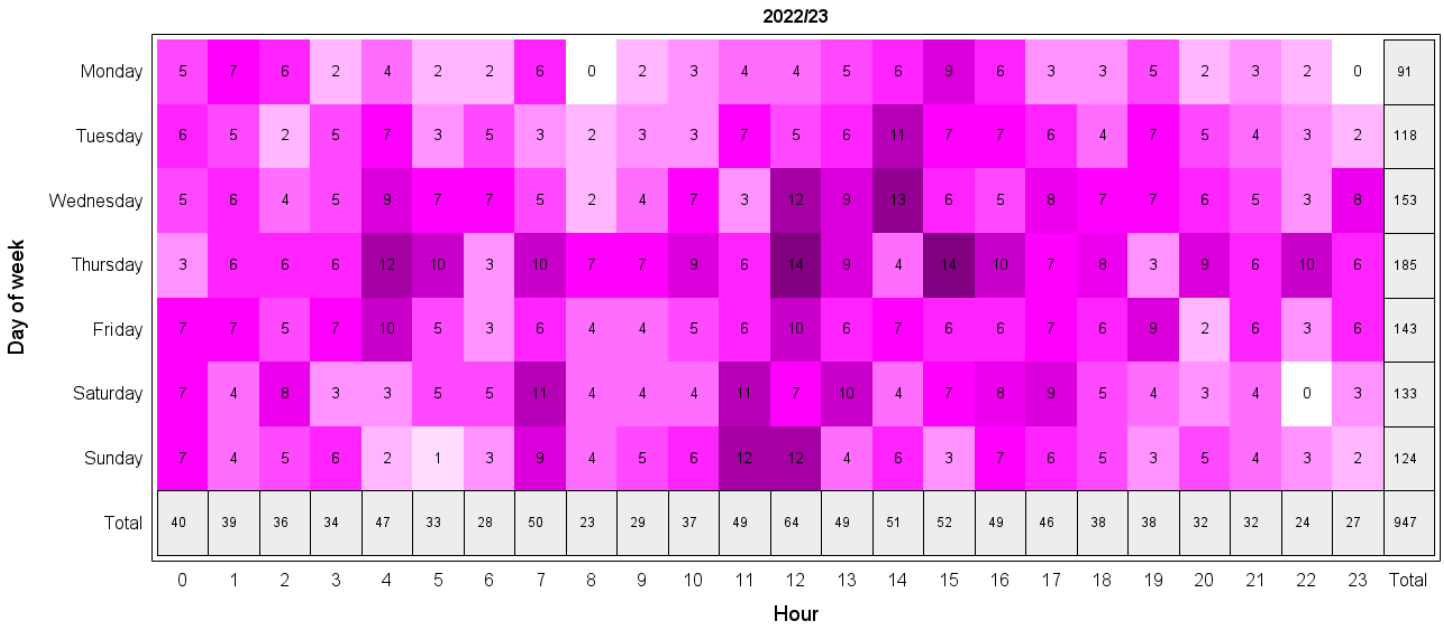
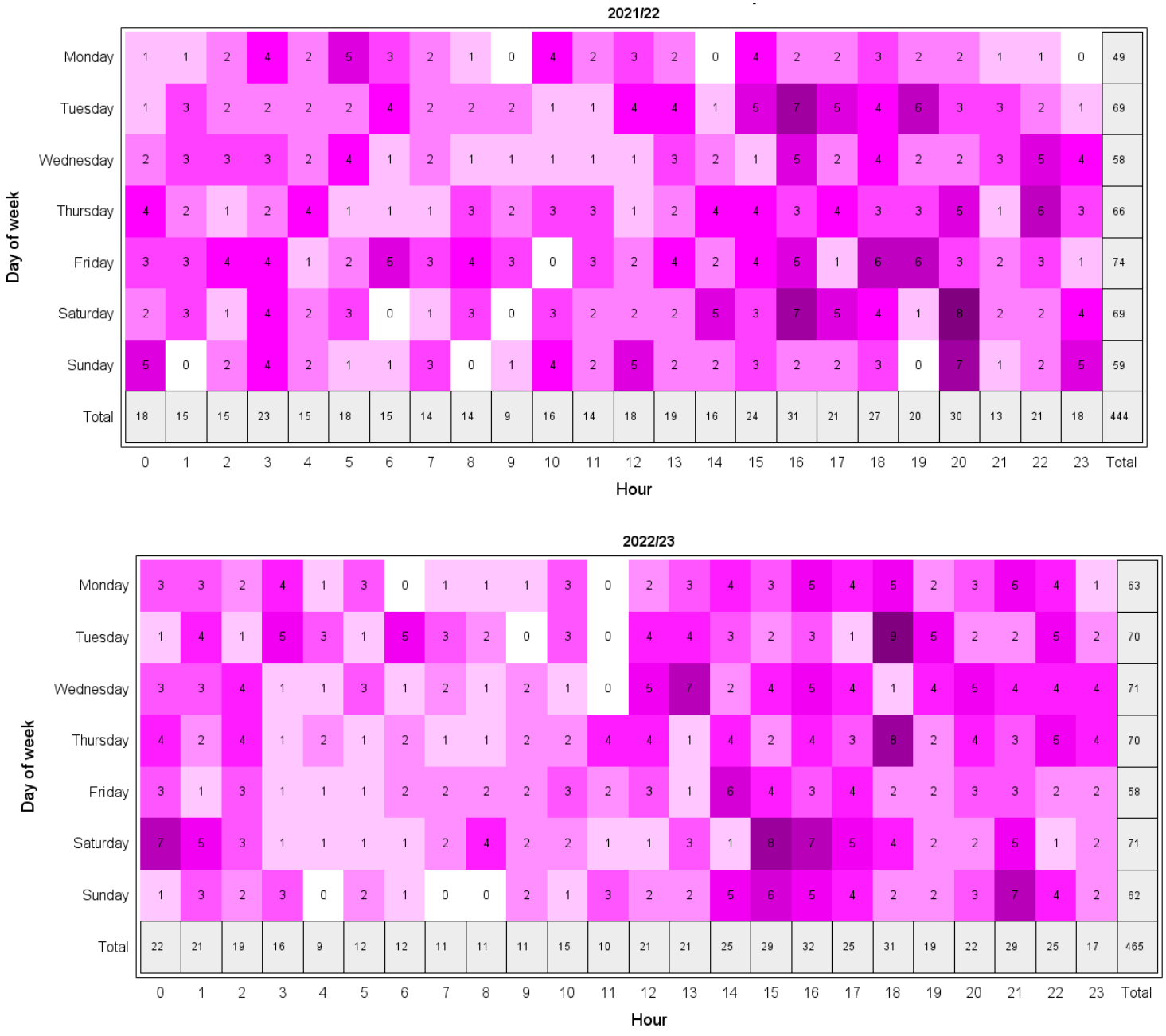


Figure 7b Cross-clamp time of abdominal and cardiothoracic donors 1 April 2022 - 31 March 2023



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 2022 - 31 March 2023**

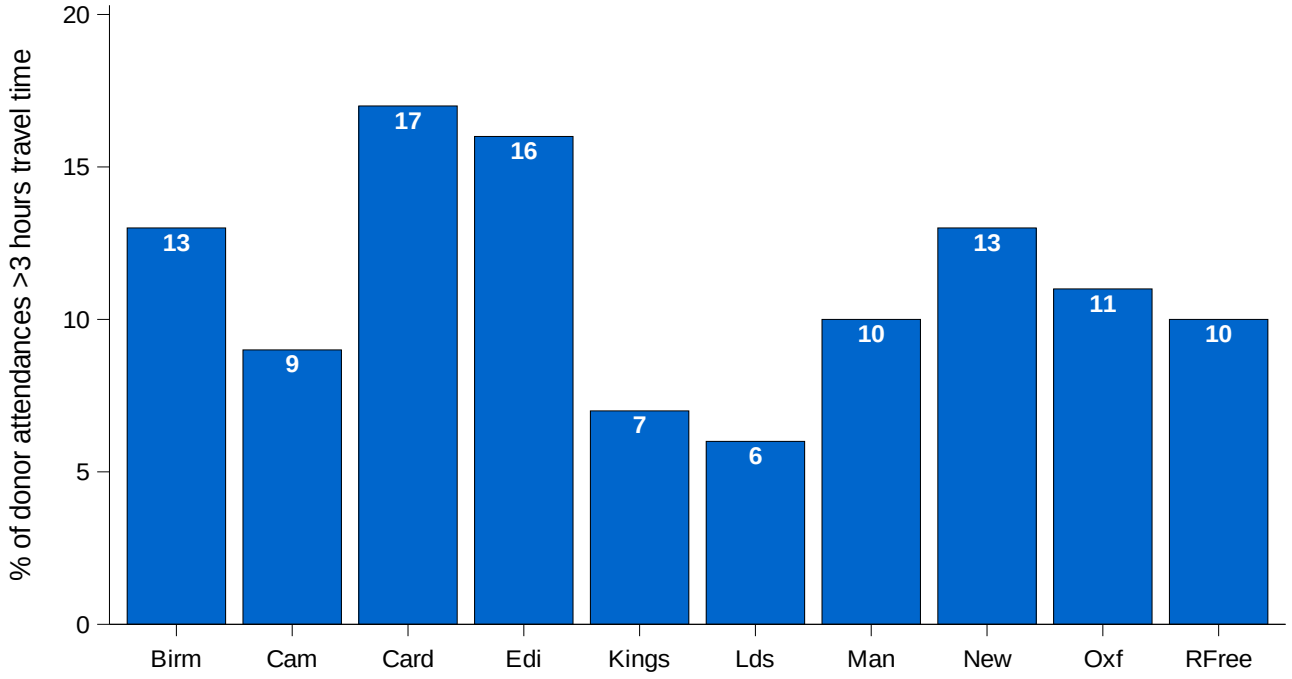
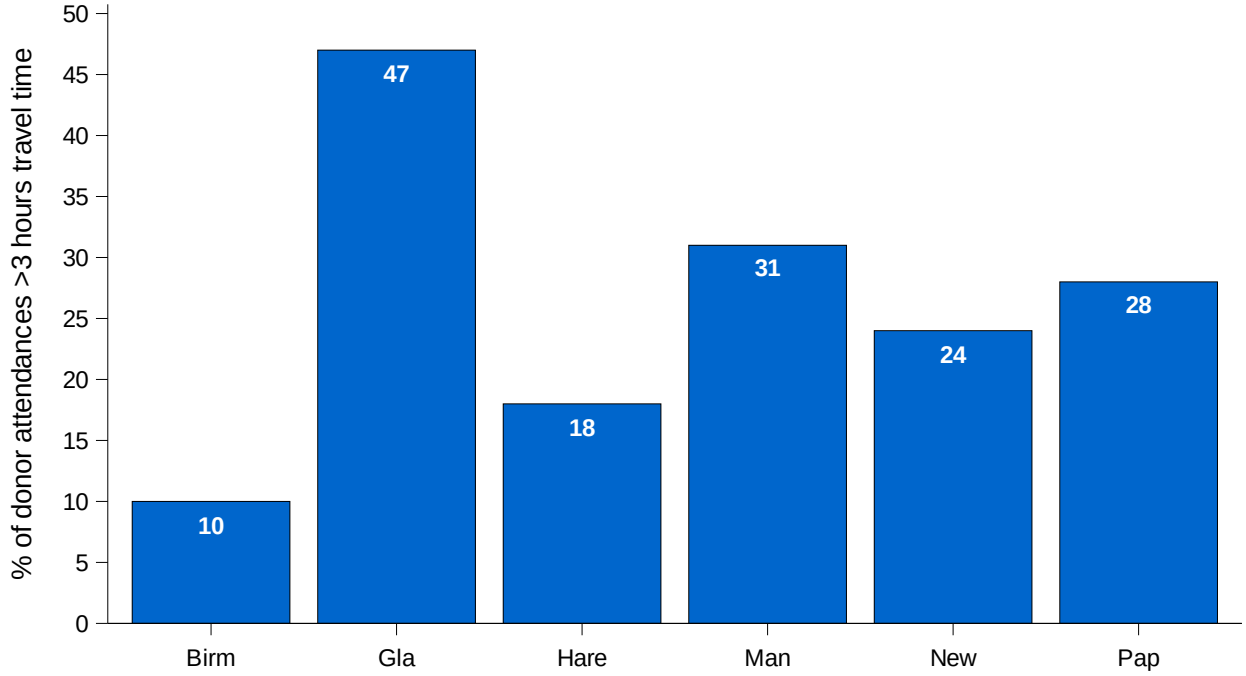


Figure 8b **Proportion of donor attendances (actual and non-proceeding) outside of 3 hours travel time for each cardiothoracic team, between 1 April 2022 - 31 March 2023**



The travel time to a donor hospital, to the nearest hour, is shown in **Figures 8a and 8b**, for abdominal and cardiothoracic teams, respectively. Both figures include donor attendances where flights were used and are to the nearest hour.

Figure 9a **Travel time to donor hospital for each abdominal team, between 1 April 2022 - 31 March 2023**

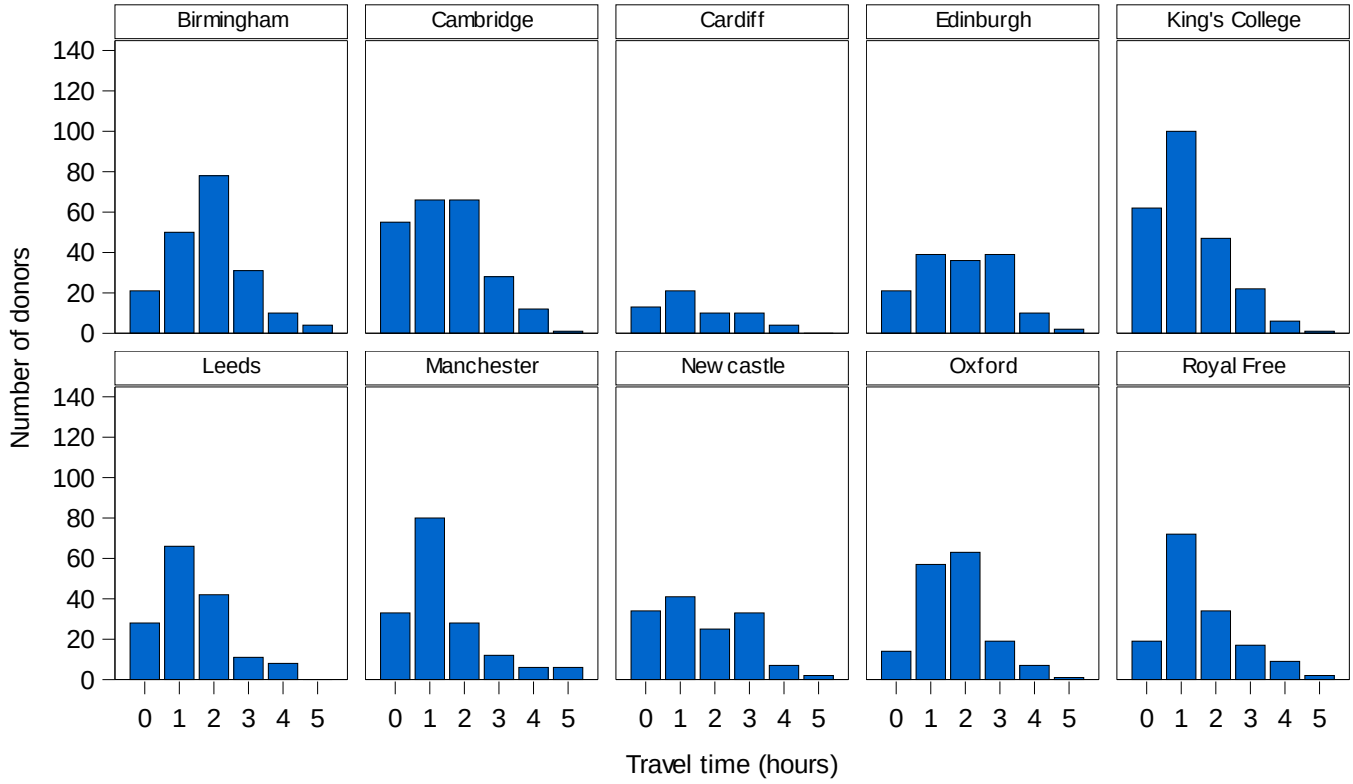
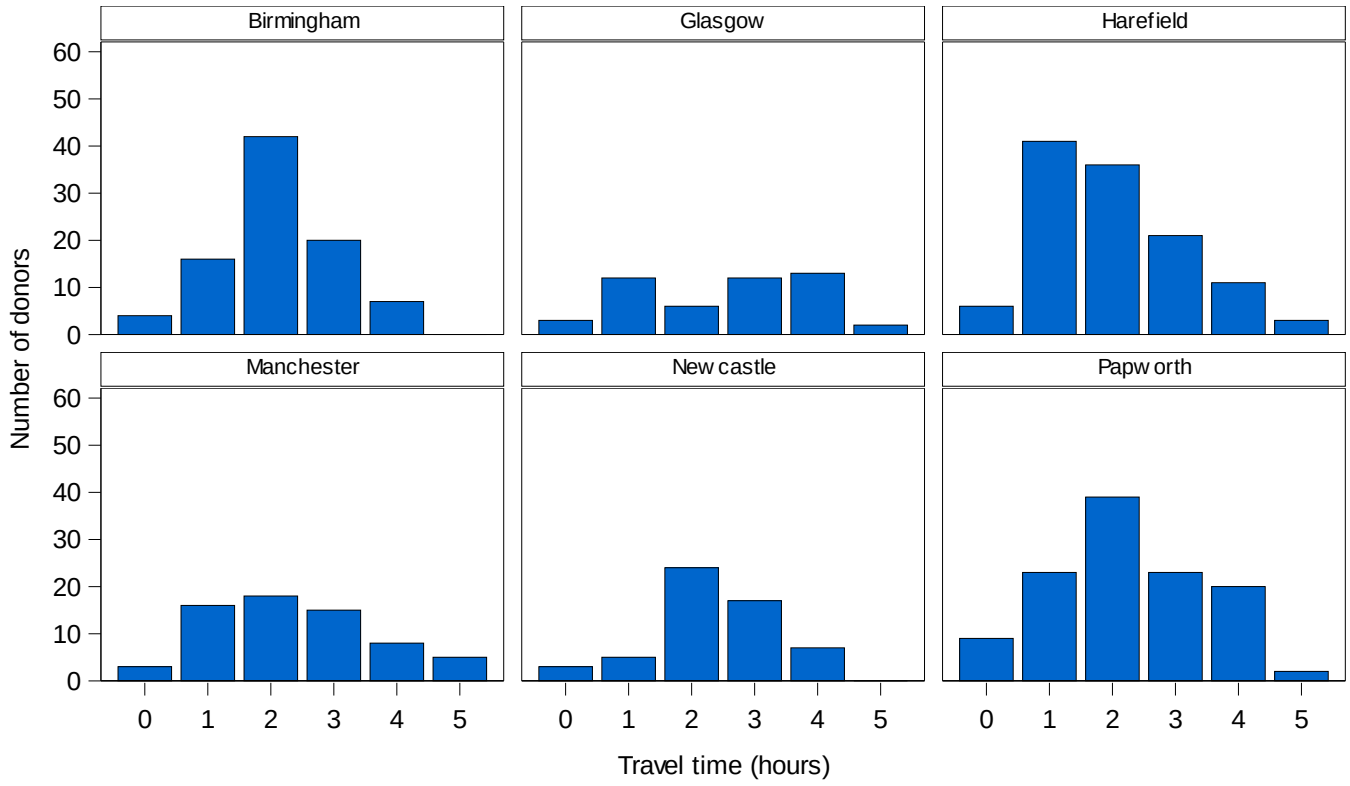


Figure 9b Travel time to donor hospital for each cardiothoracic team, between 1 April 2022 - 31 March 2023



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, 93.9% of actual DBD donors (donating at least one abdominal organ) donated their kidneys, 91.1% donated their liver, 32% donated their pancreas and 3.3% 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.

Table 2a **Organs retrieved from actual abdominal donors, 1 April 2022 - 31 March 2023, by attending retrieval team**

			% donors donating							
	No. of abdo. donors		Kidneys		Livers		Pancreases		Bowel	
Attending retrieval team	DBD	DCD	DBD	DCD	DBD	DCD	DBD	DCD	DBD	DCD
Birmingham	92	79	95.7	94.9	91.3	64.6	35.9	20.3	2.2	-
Cambridge	78	107	96.2	99.1	88.5	64.5	47.4	20.6	23.1	-
Cardiff	22	32	95.5	100	95.5	56.3	22.7	6.3	0	-
Edinburgh	60	70	91.7	94.3	93.3	65.7	28.3	17.1	0	-
King's College	136	82	92.6	96.3	89	56.1	22.8	17.1	1.5	-
Leeds	68	64	97.1	96.9	89.7	50	44.1	18.8	0	-
Manchester	79	58	97.5	98.3	91.1	48.3	35.4	20.7	0	-
Newcastle	73	48	93.2	100	94.5	45.8	34.2	8.3	0	-
Oxford	80	56	93.8	96.4	92.5	50	26.3	16.1	3.8	-
Royal Free	80	60	87.5	98.3	91.3	56.7	23.8	11.7	0	-
Total	**768**	**656**	**93.9**	**97.3**	**91.1**	**57**	**32**	**16.8**	**3.3**	**-**

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.

Table 2b Abdominal organs donated, 1 April 2022 - 31 March 2023, by attending retrieval team

Attending retrieval team	Total donors		Kidney only		Liver only		Abdominal multi-organ	
	DBD	DCD	DBD	DCD	DBD	DCD	DBD	DCD
Birmingham	92	79	8	26	4	4	80	49
Cambridge	78	107	7	37	2	1	69	69
Cardiff	22	32	1	14	1	0	20	18
Edinburgh	60	70	4	23	5	4	51	43
King's College	136	82	15	34	10	3	111	45
Leeds	68	64	6	30	1	2	61	32
Manchester	79	58	6	29	1	1	72	28
Newcastle	73	48	4	26	5	0	64	22
Oxford	80	56	6	27	5	2	69	27
Royal Free	80	60	7	25	10	1	63	34
Total	**768**	**656**	**64**	**271**	**44**	**18**	**660**	**367**

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.

Table 2c Abdominal organs retrieved and percentage that went on to be transplanted, 1 April 2022 - 31 March 2023, by attending retrieval team

	Kidneys		Livers		Pancreases		Bowel	
Attending retrieval team	**Retrieved**	**% txd**	**Retrieved**	**% txd**	**Retrieved**	**% txd**	**Retrieved**	**% txd**
DBD								
Birmingham	173	90.8	84	89.3	33	45.5	2	100
Cambridge	150	95.3	69	87	37	78.4	18	100
Cardiff	42	95.2	21	95.2	5	60	0	-
Edinburgh	108	90.7	56	85.7	17	29.4	0	-
King's College	250	92.8	121	90.1	31	58.1	2	100
Leeds	129	91.5	61	83.6	30	56.7	0	-
Manchester	154	90.3	72	91.7	28	32.1	0	-
Newcastle	134	91	69	75.4	25	36	0	-
Oxford	148	92.6	74	82.4	21	38.1	3	66.7
Royal Free	138	87	73	80.8	19	47.4	0	-
Total	**1426**	**91.6**	**700**	**85.9**	**246**	**49.6**	**25**	**96**
DCD								
Birmingham	148	81.1	51	72.5	16	43.8	-	-
Cambridge	212	85.4	69	72.5	22	31.8	-	-
Cardiff	63	85.7	18	61.1	2	50	-	-
Edinburgh	131	90.1	46	69.6	12	50	-	-
King's College	156	83.3	46	63	14	57.1	-	-
Leeds	124	83.1	32	78.1	12	33.3	-	-
Manchester	114	86	28	53.6	12	16.7	-	-
Newcastle	94	74.5	22	59.1	4	100	-	-
Oxford	108	85.2	28	64.3	9	33.3	-	-
Royal Free	117	86.3	34	55.9	7	71.4	-	-
Total	**1267**	**84.2**	**374**	**66.6**	**110**	**42.7**	**-**	**-**
Total	**2693**	**88.1**	**1074**	**79.1**	**356**	**47.5**	**25**	**96**

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 2022 - 31 March 2023 by attending retrieval team**

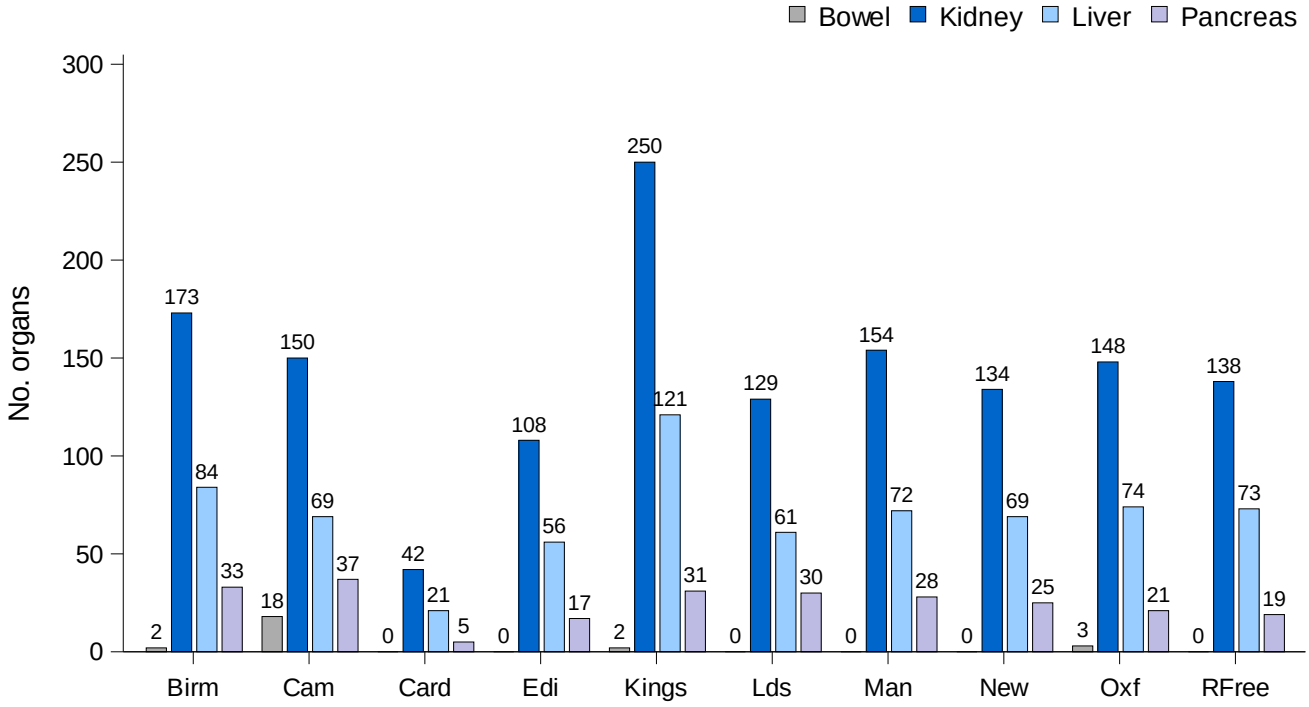


Figure 10b **DCD abdominal organs retrieved, 1 April 2022 - 31 March 2023 by attending retrieval team**

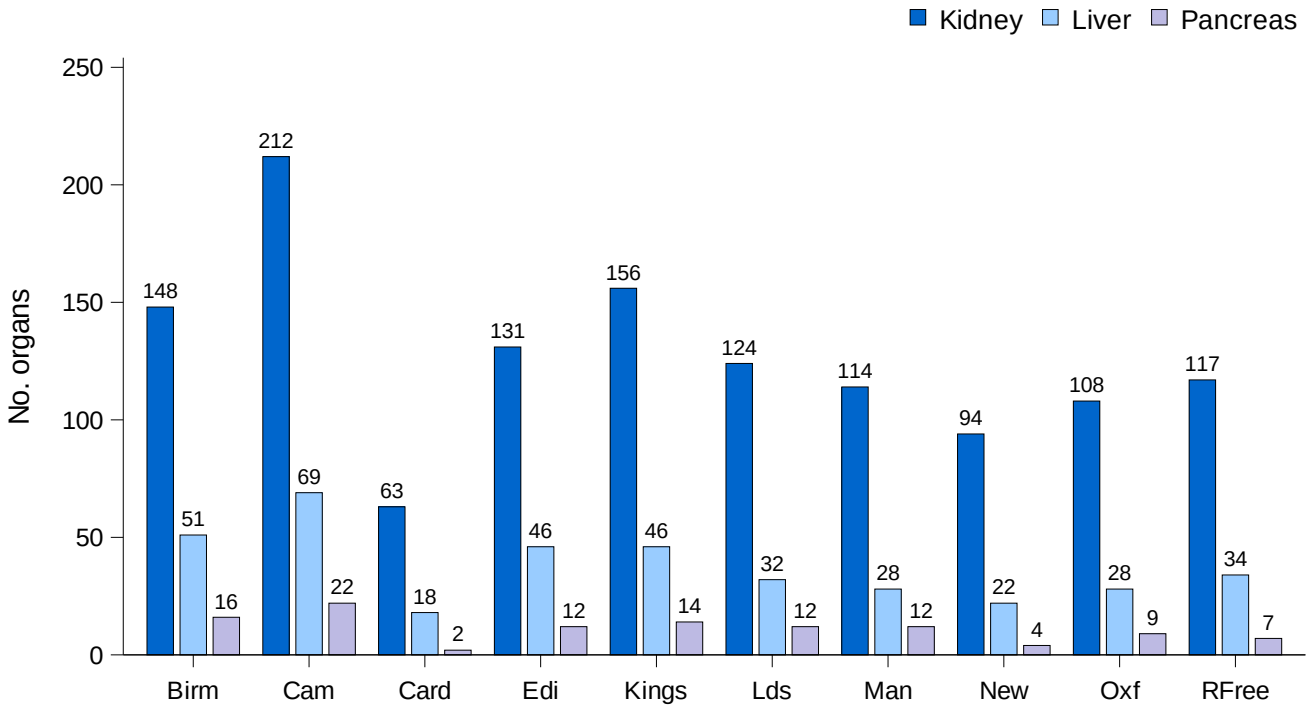


Table 2d shows the mean number of abdominal organs retrieved and transplanted for each proceeding abdominal donor, by attending retrieval team and donor type. Mean donor age is also reported.

- The mean number of organs retrieved per DBD donor ranged from 2.9 to 3.5 across teams, analysis of variance indicated that the differences were statistically significant (p=0.0116).

- The mean number of organs transplanted per DBD donor ranged from 2.4 to 3.2 across teams, analysis of variance indicated that the differences were statistically significant (p=0.0005).

- 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=0.4313).

- 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=0.5154).

Table 2d Mean donor age, organs retrieved, and organs transplanted, per proceeding abdominal donor, 1 April 2022 - 31 March 2023, by attending retrieval team

	DBD							DCD						
		Donor age		Orgs. retrieved		Orgs. txd			Donor age		Orgs. retrieved		Orgs. txd	
Attending retrieval team	Actual abdo. donors	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Actual abdo. donors	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)
Birmingham	92	49.2	(16.9)	3.2	(0.8)	2.7	(1.0)	79	52.4	(16.7)	2.7	(0.8)	2.1	(1.2)
Cambridge	78	42.8	(19.2)	3.5	(1.0)	3.2	(1.2)	107	55.0	(13.0)	2.8	(0.7)	2.2	(1.0)
Cardiff	22	52.0	(15.4)	3.1	(0.7)	2.9	(0.7)	32	55.9	(14.5)	2.6	(0.6)	2.1	(1.0)
Edinburgh	60	53.1	(14.2)	3.0	(0.9)	2.5	(0.9)	70	51.9	(16.7)	2.7	(0.8)	2.2	(0.9)
King's College	136	51.5	(17.1)	3.0	(1.1)	2.7	(1.2)	82	54.1	(17.2)	2.6	(0.8)	2.0	(1.0)
Leeds	68	46.4	(16.6)	3.2	(0.8)	2.7	(1.0)	64	55.4	(14.1)	2.6	(0.8)	2.1	(1.0)
Manchester	79	50.9	(15.2)	3.2	(0.7)	2.7	(0.7)	58	54.6	(14.5)	2.7	(0.8)	2.0	(0.8)
Newcastle	73	50.5	(15.0)	3.1	(0.8)	2.5	(1.0)	48	56.1	(15.3)	2.5	(0.7)	1.8	(1.2)
Oxford	80	51.1	(15.7)	3.2	(1.4)	2.7	(1.4)	56	53.7	(17.1)	2.6	(0.8)	2.0	(1.0)
Royal Free	80	52.7	(15.4)	2.9	(0.9)	2.4	(1.0)	60	57.3	(13.7)	2.6	(0.7)	2.1	(0.8)
Total	**768**	**49.9**	**(16.5)**	**3.1**	**(1)**	**2.7**	**(1.1)**	**656**	**54.5**	**(15.3)**	**2.7**	**(0.8)**	**2.1**	**(1).0**

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, 64.9% of DBD donors (donating at least one cardiothoracic organ) donated their heart only, 20.4% donated their lung(s) only, and 14.7% 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 non recurrently in 2022/23 by NHSBT . Longer term funding to support commissioning of DCD heart retrieval has not yet been secured. Despite this, 50.6% of actual DCD donors donated their heart only, 33.3% donated their lung(s) only, and 16.1% donated their heart and lung(s). DCD heart retrieval contributed to 27% of all heart transplant in the UK in 2022/23. The Novel Technologies section of this report contains more information on DCD heart activity.

Table 3a **Organs retrieved from actual cardiothoracic donors, 1 April 2022 - 31 March 2023, by attending retrieval team**

	DBD donors donating				DCD donors donating			
Attending retrieval team	**N**	**Heart only (%)**	**Lung only (%)**	**Heart & lung (%)**	**N**	**Heart only (%)**	**Lung only (%)**	**Heart & lung (%)**
Birmingham	42	66.7	28.6	4.8	7	0.0	100	0.0
Glasgow	20	70.0	5.0	25.0	11	63.6	18.2	18.2
Harefield	43	62.8	25.6	11.6	26	50.0	38.5	11.5
Manchester	30	56.7	30.0	13.3	5	0.0	100	0.0
Newcastle	27	70.4	11.1	18.5	2	0.0	100	0.0
Papworth	29	65.5	10.3	24.1	36	66.7	8.3	25.0
Total	**191**	**64.9**	**20.4**	**14.7**	**87**	**50.6**	**33.3**	**16.1**

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 128 DBD lungs retrieved and of these 97.7% were transplanted.

Table 3b Cardiothoracic organs retrieved and percentage that went on to be transplanted, 1 April 2022 - 31 March 2023, by attending retrieval team

	Hearts		Lungs	
Attending retrieval team	**Retrieved**	**% txd**	**Retrieved**	**% txd**
DBD				
Birmingham	30	100	26	100
Glasgow	19	100	12	100
Harefield	32	100	31	93.5
Manchester	21	100	25	96.0
Newcastle	24	100	16	100
Papworth	26	100	18	100
Total	**152**	**100**	**128**	**97.7**
DCD[1]				
Birmingham	0	-	14	100
Glasgow	9	100	8	50.0
Harefield	16	87.5	26	84.6
Manchester	0	-	10	80.0
Newcastle	0	-	4	100
Papworth	33	97	24	87.5
Total	**58**	**94.8**	**86**	**84.9**
Total	**210**	**98.6**	**214**	**92.5**

[1]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 2022 - 31 March 2023 by attending retrieval team**

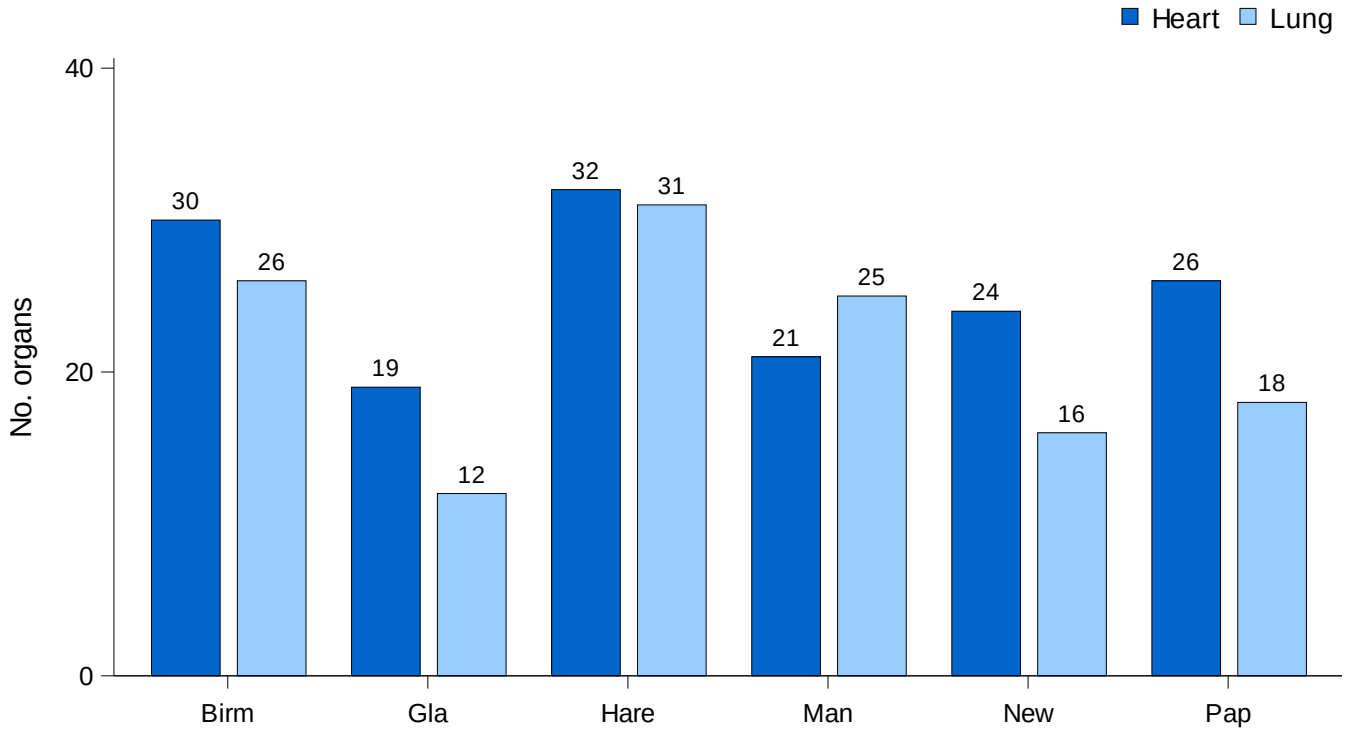


Figure 11b **DCD cardiothoracic organs retrieved, 1 April 2022 - 31 March 2023 by attending retrieval team**

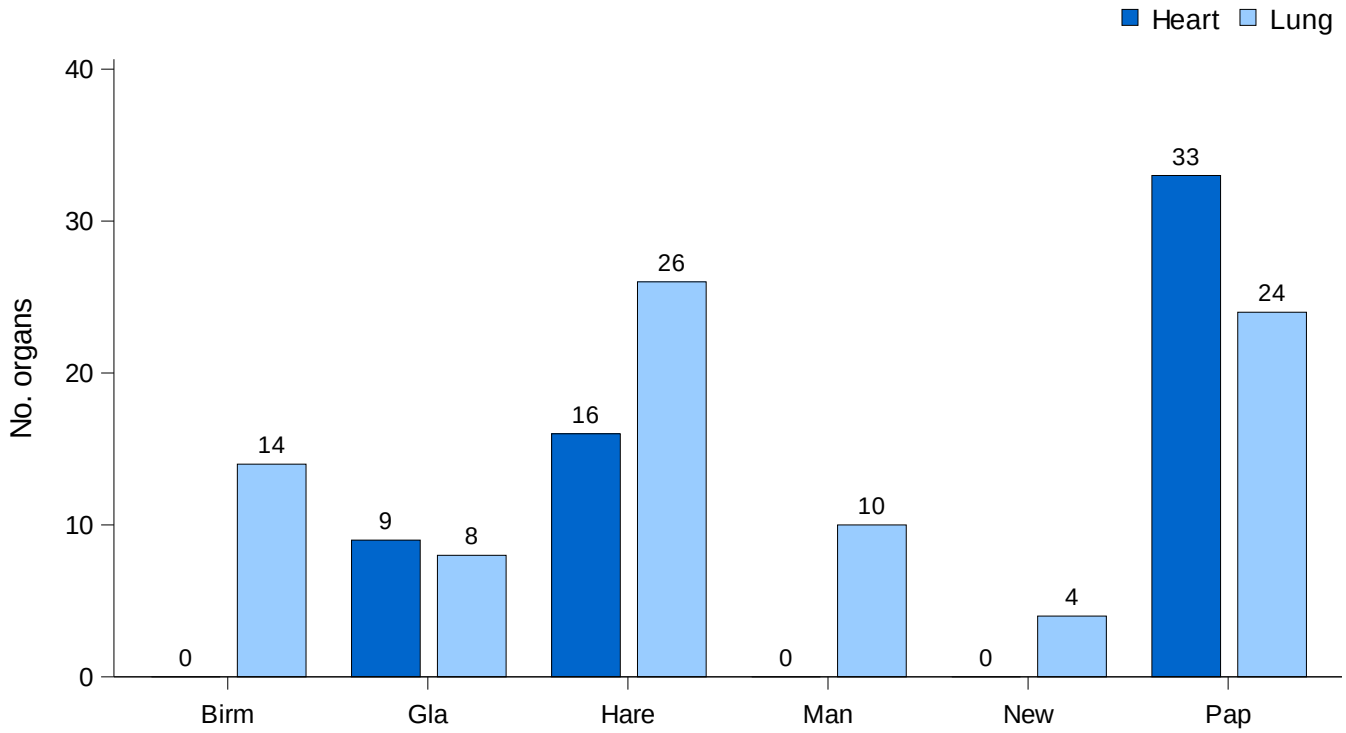


Table 3c shows the mean number of cardiothoracic organs retrieved and transplanted for each proceeding cardiothoracic donor, by attending retrieval team and donor type. Mean donor age is also reported.

- The mean number of organs retrieved per DBD donor ranged from 1.3 to 1.6 across teams, analysis of variance indicated that the differences were not statistically significant (p=0.8393).

- The mean number of organs transplanted per DBD donor ranged from 1.3 to 1.6 across teams, analysis of variance indicated that the differences were not statistically significant (p=0.8577).

- The mean number of organs retrieved per DCD donor ranged from 1.5 to 2 across teams, analysis of variance indicated that the differences were not statistically significant (p=0.6113).

- The mean number of organs transplanted per DCD donor ranged from 1.2 to 2 across teams, analysis of variance indicated that the differences were not statistically significant (p=0.3801).

Table 3c Mean donor age, organs retrieved, and organs transplanted, per proceeding cardiothoracic donor, 1 April 2022 - 31 March 2023, by attending retrieval team

	DBD							DCD						
		Donor age		Orgs. retrieved		Orgs. txd			Donor age		Orgs. retrieved		Orgs. txd	
Attending retrieval team	Actual cardio. donors	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)	Actual cardio. donors	Mean	(SD.)	Mean	(SD.)	Mean	(SD.)
Birmingham	42	33.3	(12.9)	1.3	(0.6)	1.3	(0.6)	7	55.0	(5.7)	2.0	(0.0)	2.0	(0.0)
Glasgow	20	38.8	(12.1)	1.6	(0.9)	1.6	(0.9)	11	36.4	(16.2)	1.5	(0.8)	1.2	(0.8)
Harefield	43	37.2	(11.8)	1.5	(0.7)	1.4	(0.7)	26	40.8	(12.1)	1.6	(0.7)	1.4	(0.9)
Manchester	30	34.7	(14)	1.5	(0.7)	1.5	(0.7)	5	58.0	(10.1)	2.0	(0.0)	1.6	(0.9)
Newcastle	27	39.8	(13.6)	1.5	(0.8)	1.5	(0.8)	2	63.5	(2.1)	2.0	(0.0)	2.0	(0.0)
Papworth	29	32.3	(16.4)	1.5	(0.8)	1.5	(0.8)	36	34.1	(11.5)	1.6	(0.9)	1.5	(0.9)
Total	**191**	**35.7**	**(13.5)**	**1.5**	**(0.7)**	**1.5**	**(0.7)**	**87**	**40.1**	**(14.2)**	**1.7**	**(0.7)**	**1.5**	**(0.8)**

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

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 to provide oversight and governance for A-NRP and to support new teams wishing to utilise the technology. For 2022/23, ANRP was funded partially by some of the UK health departments, partially by NHSBT, and partially by the employing transplant centres on a limited basis, with no longer term funding secured.

Table 4 shows the number of DCD attendances in the last year, along with how many underwent NRP and the number of donors proceeding to donation.
In total, there were 168 A-NRP attendances, with 129 (76%) proceeding to donate at least one organ. Note these numbers contain 13 DCD attendances where the NRP team below were not the main abdominal team in attendance, but did attend to perform NRP.

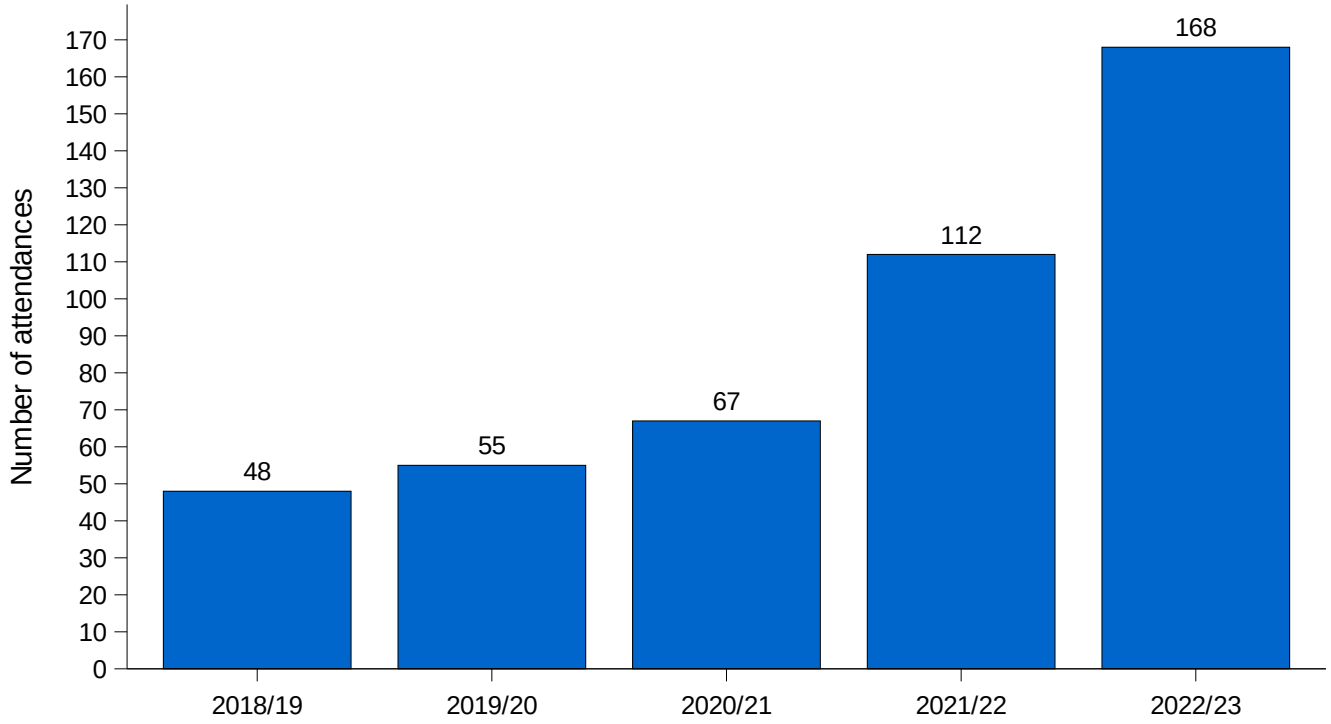
Table 4 **DCD and NRP attendances by A-NRP retrieval team, 1 April 2022 - 31 March 2023**

Retrieval team	All DCD attendances	Total proceeding[1]	NRP attendances	NRP proceeding[1]
Birmingham	101	79	12	10
Cambridge	160	114	58	44
Cardiff	38	32	12	10
Edinburgh	97	74	76	57
King's College	106	82	-	-
Leeds	91	62	-	-
Manchester	85	58	-	-
Newcastle	68	45	4	4
Oxford	78	54	-	-
Royal Free	76	59	6	4
Total	**900**	**659**	**168**	**129**

[1]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 2022/23 having a 50% increase in attendances compared to the previous year.

Figure 12 A-NRP donor attendances between 1 April 2018 - 31 March 2023



Organ utilisation rates for the 129 proceeding NRP donors between 1 April 2022 and 31 March 2023 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.

Table 5 Abdominal and lung offer outcomes from 129 NRP donors, 1 April 2022 - 31 March 2023

Outcome	Kidney[1]	Liver	Pancreas	Lungs[1]	Heart
Offered	126	127	59	58	29
Accepted	123	121	31	17	20
Retrieved	122	103	23	6	8
Transplanted	117	81	8	5	7
% Transplanted of offered	93%	64%	14%	9%	24%
% Transplanted of retrieved	96%	79%	35%	83%	88%
National DCD organ % transplanted of offered*	88%	34%	22%	16%	43%
National DCD organ % transplanted of retrieved*	89%	62%	45%	86%	96%

[1] at least one
* Based on all UK proceeding DCD donors between 1 April 2022 and 31 March 2023 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.
The DCD heart program continued to be funded during 2022/23 by NHSBT, from non-recurrent funds.
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 2022 and 31 March 2023. Overall, there were 95 attendances where DCD heart retrieval was planned, with 58 (61.1%) proceeding to DCD heart retrieval, resulting in 55 transplants. Attendances are identified through Retrieval Team Information forms as well as DCD Heart Passports. Information on patient outcomes following DCD heart transplantation can be found in the NHSBT Annual Report on Cardiothoracic Organ Transplantation.

Table 6 DCD heart activity by centre, 1 April 2022 - 31 March 2023

Retrieval team	Attended[1]	Retrieved	Transplanted[2]
Glasgow	12	9	9
Harefield	13	10	9
Hybrid - Hare/Pap	16	6	5
Papworth	52	31	30
Total	**95**	**58**	**55**

[1] Includes cases where a DCD Heart Supplementary form has not been returned but notes reported on the Retrieval Team Information form suggest that DCD heart retrieval was intended.
[2] Transplanted at any UK transplant centre

Organ utilisation rates for the 58 proceeding DCD heart donors between 1 April 2022 and 31 March 2023 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.

Table 7 **Abdominal and lung offer outcomes from 58 DCD heart donors, 1 April 2022 - 31 March 2023**

Outcome	Lungs[1]	Kidney[1]	Liver	Pancreas
Offered	39	58	57	52
Accepted	21	58	53	39
Retrieved	14	58	46	32
Transplanted	12	58	38	18
% Transplanted of offered	31%	100%	67%	35%
% Transplanted of retrieved	86%	100%	83%	56%
National DCD organ % transplanted of offered*	12%	88%	38%	16%
National DCD organ % transplanted of retrieved*	86%	89%	64%	37%

[1] At least one
* Based on all UK proceeding DCD donors between 1 April 2022 and 31 March 2023 where the heart was not retrieved

APPENDIX

Appendix 1 Retrieval data missing form rates, 1 April 2022 - 31 March 2023

Attending retrieval team	Number of forms due	Retrieval team forms missing		SNOD forms missing	
		N	%	N	%
Abdominal					
Birmingham	196	1	0.5	0	0
Cambridge	234	3	1.3	0	0
Cardiff	60	1	1.7	0	0
Edinburgh	153	3	2	0	0
King's College	246	1	0.4	0	0
Leeds	161	4	2.5	0	0
Manchester	165	0	0	0	0
Newcastle	146	1	0.7	0	0
Oxford	163	2	1.2	0	0
Royal Free	158	3	1.9	0	0
Cardiothoracic					
Birmingham	93	0	0	0	0
Glasgow	49	0	0	0	0
Harefield	121	1	0.8	0	0
Manchester	67	0	0	0	0
Newcastle	58	1	1.7	0	0
Papworth	123	2	1.6	0	0
Total	**2193**	**23**	**1**	**0**	**0**

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