# NHS BLOOD AND TRANSPLANT

# CARDIOTHORACIC ADVISORY GROUP – HEART

## DCD HEART ACTIVITY

## SUMMARY

### INTRODUCTION

1 DCD heart retrieval and transplantation began in February 2015, initially with two centres; Harefield and Papworth. Since then, other centres have joined the programme and on 7 September 2020, national allocation of DCD hearts was introduced as part of the Joint Innovation Fund (JIF) UK-wide DCD heart pilot. This paper presents activity from 1 February 2015 to 31 July 2023 and patient outcomes and offer data from 7 September 2020 to 31 July 2023.

### KEY RESULTS

2 **Activity**
One DCD Heart Passport form was outstanding for the analysis period. Between 1 February 2015 and 31 July 2023, there were 461 DCD heart retrieval attendances, proceeding to 294 heart retrievals and 259 transplants. Of the 294 DCD heart transplants, 134 were performed since the start of the JIF pilot. Since the start of the JIF pilot, the conversion from retrieval to transplanted increased to 92% from 84% pre-JIF and 69% of transplants were retrieved and transplanted by a different team compared with 6% pre-JIF. The highest number of transplants were performed between April-June 2023 (18).

3 **Utilisation of other organs**
Since 7 September 2020, the utilisation rate (transplanted out of offered) of lungs, livers and pancreases was higher in DCD heart donors than from the general standard DCD donor population (21% vs 13% for lungs, 51% vs 39% for livers, 31% vs 22% for pancreases), whereas the rates were similar for kidneys (97% vs 95% for kidneys).

4 **Post-transplant survival and support**
Of the 134 DCD heart transplants since 7 September 2020, there have been 18 recorded deaths up to 1 year post-transplant; 8 within 30 day and 10 between 30 days and one year, although one recipient transplanted in July 2023 had missing survival data. The 1-year post-transplant survival rate since the start of the JIF was 82.2% which is comparable with the DBD heart survival rate (86.5%). The percentage of recipients requiring mechanical support post-transplant since the JIF period was 37%, with some evidence that this is higher than the DBD rate of 29% across the same period.

5 **DCD heart offering**
Between 7 September 2020 and 31 July 2023, 470 hearts were offered from potential DCD heart donors across the 6 heart allocation zones; the highest number of offers came from the Harefield zone. The national utilisation (transplanted out of offered) rate was 28%, however offer acceptance rates varied across centres with 3-12% of offers being accepted and transplanted. Common reasons for decline were no suitable recipients, donor past history and poor function.

### ACTION

6 This report is for monitoring and assurance purposes, there is no specific action, but teams are reminded to return DCD Heart Passport forms in a timely manner.

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**Statistics and Clinical Research** **October 2023**

# NHS BLOOD AND TRANSPLANT

# DCD HEART OVERSIGHT GROUP

## DCD HEART ACTIVITY

### INTRODUCTION

1 The UK DCD heart programme began in February 2015 with an initial 15-month evaluation period involving two centres, Harefield and Papworth. After the initial evaluation period ended, other centres joined the programme including Manchester in December 2016, Newcastle in October 2018 and Glasgow in July 2019. Great Ormond Street Hospital transplanted their first DCD heart in February 2020.

2 On 7 September 2020, national retrieval of DCD hearts was introduced as part of the Joint Innovation Fund (JIF) UK-wide DCD heart pilot. Under the JIF pilot, three teams were initially responsible for retrieving DCD hearts (Harefield, Manchester and Papworth) but due to resource constraints, Manchester's involvement in the service became limited, and so a Hybrid Team of Harefield and Papworth was formed to maintain the service. On 19th September 2022, the Hybrid Team was discontinued and Glasgow began retrieving.

3 Prior to the JIF pilot, DCD hearts were locally allocated, but since 7 September 2020, DCD hearts have been allocated according to the non-urgent DBD heart allocation sequence. See https://nhsbtdbe.blob.core.windows.net/umbraco-assets-corp/26633/pol228.pdf.

4 This report presents DCD heart retrieval and transplant activity between 1 February 2015 and 31 July 2023 and patient outcomes after DCD heart transplant. Data on DCD heart offering and utilisation of other organs from DCD heart donors between 7 September 2020 and 31 July 2023 is also presented.

### DATA

5 The DCD Heart Supplementary Form was introduced for the initial evaluation period to collect specific data relating to DCD heart retrievals and transplants. For the JIF DCD heart pilot, this form was discontinued and a new DCD Heart Passport (FRM6356) was introduced. The data presented in this paper are a combination of the information collected on these forms and other data held on the UK Transplant Registry (UKTR).

6 **Table 1** shows the number of forms outstanding for the period 7 September 2020 to 31 July 2023, as of 22 September 2023. There was one form outstanding for the analysis period. A form is required to be completed whenever a team goes out to a donor with the intention of DCD heart retrieval. For transplanted DCD hearts, the form should be returned after 30 days of transplant in order to capture key details about the short-term outcome of the recipient.

**Table 1 Outstanding DCD heart supplementary forms and DCD heart passports for the period 7 September 2020 – 31 July 2023, as of 22 September 2023**

| Financial year | Centre | Attended not retrieved | Retrieved not transplanted | Transplanted | Total forms outstanding |
|---|---|---|---|---|---|
| 1 April 2023 - 31 July 2023 | Newcastle | 0 | 0 | 1 | 1 |

## RESULTS

### Activity

7 Between 1 February 2015 and 31 July 2023, 461 DCD heart retrieval attendances were recorded, of which 294 proceeded to DCD heart retrieval and 167 did not. There was a total of 259 DCD hearts successfully transplanted, including one heart-lung transplant, one heart-kidney, one heart-liver transplant, and 15 paediatric transplants (eight by Great Ormond Street Hospital and seven by Newcastle). This activity is broken down by centre and time period in **Table 2**. Since the start of the JIF DCD Heart pilot to 31 July 2023 there have been 134 DCD heart transplants. Conversion from retrieval to transplanted has improved from 84% pre-JIF to 92% since the JIF. Since the JIF, 69% of transplants were retrieved and transplanted by a different team compared with 6% pre-JIF.

**Table 2 DCD heart activity by period and centre, 1 February 2015 – 31 July 2023**

| Period | Centre | Attended | Retrieved | Transplanted (retrieved by own team) | Transplanted (retrieved by another team) |
|---|---|---|---|---|---|
| 1 February 2015 – 6 September 2020 | Glasgow | 2 | 2 | 1 | 0 |
| | Great Ormond Street | 0 | 0 | 0 | 5 |
| | Harefield | 80 | 28 | 20 | 0 |
| | Manchester | 14 | 10 | 9 | 0 |
| | Newcastle | 2 | 2 | 2 | 2 |
| | Papworth | 137 | 107 | 86 | 0 |
| | **Total** | **235** | **149** | **118** | **7** |
| 7 September 2020 – 31 March 2022 | Birmingham | 0 | 0 | 0 | 3 |
| | Glasgow | 1 | 1 | 1 | 2 |
| | Great Ormond Street | 0 | 0 | 0 | 4 |
| | Harefield | 33 | 15 | 12 | 1 |
| | Hybrid – Harefield/Papworth | 26 | 15 | 0 | 0 |
| | Manchester | 6 | 4 | 1 | 0 |
| | Newcastle | 0 | 0 | 0 | 16 |
| | Papworth | 40 | 27 | 8 | 7 |
| | **Total** | **106** | **62** | **22** | **33** |
| 1 April 2022 - 31 July 2023 | Birmingham | 0 | 0 | 0 | 13 |
| | Glasgow | 19 | 17 | 4 | 7 |
| | Great Ormond Street | 0 | 0 | 0 | 6 |
| | Harefield | 13 | 12 | 6 | 12 |
| | Hybrid – Harefield/Papworth | 16 | 6 | 0 | 0 |
| | Manchester | 0 | 0 | 0 | 7 |
| | Newcastle | 0 | 0 | 0 | 7 |
| | Papworth | 72 | 48 | 9 | 8 |
| | **Total** | **120** | **83** | **19** | **60** |
| 1 February 2015 – 31 July 2023 | Birmingham | 120 | 83 | 19 | 60 |
| | Glasgow | 0 | 0 | 0 | 16 |
| | Great Ormond Street | 22 | 20 | 6 | 9 |
| | Harefield | 0 | 0 | 0 | 15 |
| | Hybrid – Harefield/Papworth | 126 | 55 | 38 | 13 |
| | Manchester | 42 | 21 | 0 | 0 |
| | Newcastle | 20 | 14 | 10 | 7 |
| | Papworth | 2 | 2 | 2 | 25 |
| **TOTAL** | | **461** | **294** | **159** | **100** |

Notes:
- Non-proceeding attendances are identified by return of the DCD Heart Supplementary form/DCD heart passport or where information on the Retrieval Team Information form suggests that DCD heart retrieval was intended
- Papworth performed one DCD heart-kidney transplant and one DCD heart-lung transplant. Additionally, Birmingham performed a DCD heart-liver transplant
- 7 of the transplants performed at Newcastle were in paediatric patients
- Excluded from the total attendances is a case where a donor was changed to DBD after retrieval
- 18 hearts from hybrid team retrievals were transplanted, these are counted in the "Transplanted (retrieved by another team)" numbers for Newcastle (3), Birmingham (2), Manchester (1) and Papworth (5) and "Transplanted (retrieved by own team)" for Harefield (7)
- One of Glasgow's retrievals was performed with members of the Papworth team during the JIF period

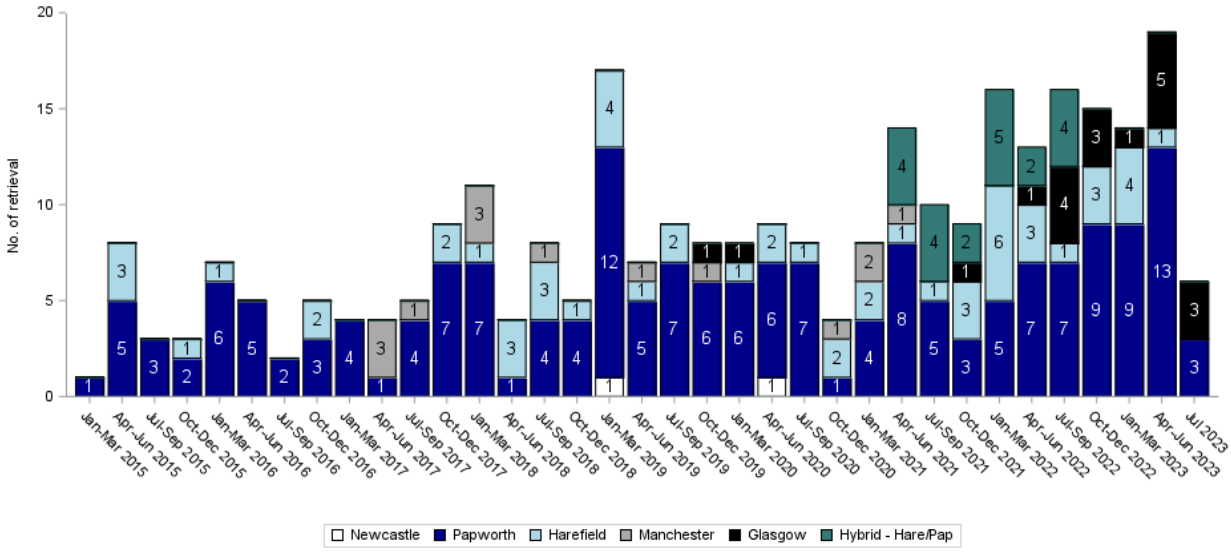
8 Since the start of the JIF, 11 (8%) DCD hearts were retrieved but not transplanted (note for reference, the discard rate for DBD hearts is 3%). The reason for non-use for each is seen below in **Table 3**. This information was primarily taken from the DCD Heart Passport, but where this was not available (as the form was returned incomplete), the reason was taken from the Hub Operations records.

**Table 3** **Reasons for non-use of hearts retrieved from DCD donors, 7 September 2020 – 31 July 2023**

| Centre intending to transplant | Donation Date | Reason for non-use |
|---|---|---|
| Glasgow | June 2021 | Abnormal cardiac anatomy |
| | July 2022 | Liver malignancy |
| Harefield | October 2021 | Low aortic pressure |
| | May 2022 | Poor function on OCS |
| | April 2023 | Decline in function, not happy with gases |
| Newcastle | January 2023 | Poor function |
| Papworth | November 2020 | Deemed un-transplantable |
| | December 2020 | Deemed un-transplantable |
| | September 2021 | Poor function |
| | October 2021 | Offers withdrawn after team arrived at Addenbrookes |
| | January 2022 | Heart on OCS, CAD identified |

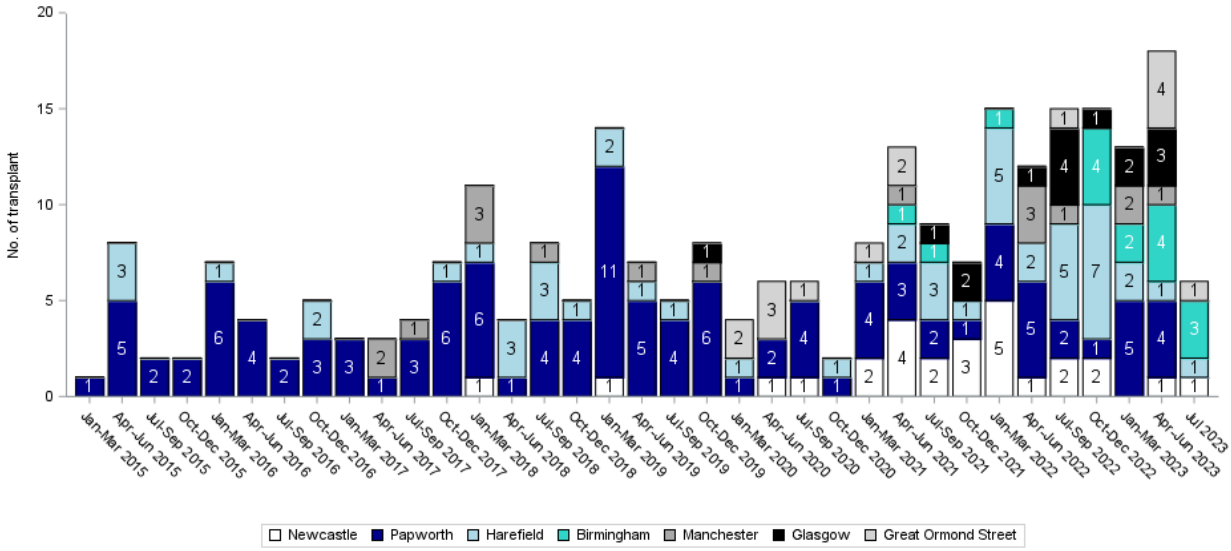
9 **Figure 1** shows the number of DCD heart retrievals by quarter and retrieval team. There has been a general increase over time. There have been 6 retrievals in the most recent quarter so far (July).

**Figure 1** **DCD heart retrieval activity, 1 February 2015 to 31 July 2023, by quarter and retrieval team**



10 **Figure 2** shows the number of DCD heart transplants by quarter and transplanting centre. The highest number of transplants were performed between April-June 2023 (18).

**Figure 2 DCD heart transplant activity, 1 February 2015 to 31 July 2023, by quarter and transplant centre**




11 **Table 4** shows the retrieval methods used for the 145 DCD hearts retrieved since the start of the JIF, broken down by retrieval team. Since the start of the JIF, 85% were retrieved using DRP only,15% were retrieved using A-NRP with DRP and no DCD hearts have been retrieved using TA-NRP. DRP only is the most common retrieval method used for DCD heart retrieval.

**Table 4 Retrieval method for DCD heart donors during the period 7 September 2020 – 31 July 2023**

| Retrieval team | Total retrieved | TA-NRP | A-NRP with DRP | DRP only |
|---|---|---|---|---|
| Glasgow | 18 | 0 | 3 | 15 |
| Harefield | 27 | 0 | 6 | 21 |
| Hybrid – Harefield/Papworth | 21 | 0 | 4 | 17 |
| Manchester | 4 | 0 | 0 | 4 |
| Papworth | 75 | 0 | 9 | 66 |
| **Total** | **145** | **0** | **22** | **123** |

## Utilisation of other organs

12 Of the 145 DCD heart donors since the start of the JIF, two only donated their heart. Utilisation of other organs from these donors are displayed in **Table 5**, where utilisation rates are compared to the standard and NRP DCD donor populations who donated at least one organ. Overall, the transplantation rate of lungs, livers and pancreases was higher in DCD heart donors than from the general DCD donor population (excluding NRP cases), whereas the rates were similar for kidneys.

**Table 5 Abdominal and lung offer outcomes from 145 DCD heart donors during the period 7 September 2020 – 31 July 2023**

| Outcome | Lungs[1] | Kidney[1] | Liver | Pancreas |
|---|---|---|---|---|
| Offered | 104 | 143 | 139 | 131 |
| Retrieved | 27 | 141 | 105 | 79 |
| Transplanted (% of offered) | 22 (21%) | 138 (97%) | 71 (51%) | 40 (31%) |
| National standard DCD organ transplant rate (% of offered)[2] | 13% | 95% | 39% | 22% |
| National NRP organ transplant rate (% of offered) [3] | 8% | 94% | 65% | 21% |

[1] at least one
[2] DCD donors between 7 September 2020 – 31 July 2023, aged 16-50 and excluding cases where NRP was performed
[3]DCD donors between 7 September 2020 – 31 July 2023, aged 16-50 where NRP was performed

## Post-transplant survival and support

13 The 30-day outcomes of the 134 DCD heart transplant recipients since 7 September 2020 are summarised in **Table 6**. There have been eight deaths within 30 days. One recipient transplanted in July 2023 had missing survival data.

**Table 6 DCD heart patient outcomes at 30 days post-transplant, by centre, for transplants performed 7 September 2020 – 31 July 2023**

| Centre | Alive at 30 days | Died within 30 days | Unknown |
|---|---|---|---|
| Birmingham | 13 | 3 | 0 |
| Glasgow | 13 | 1 | 0 |
| Great Ormond Street | 10 | 0 | 0 |
| Harefield | 29 | 2 | 0 |
| Manchester | 8 | 0 | 0 |
| Newcastle | 21 | 1 | 1 |
| Papworth | 31 | 1 | 0 |
| **Total** | **125** | **8** | **1** |
| **DBD[1]** | **553** | **39** | **69** |

[1] Includes paediatric recipients and re-grafts, excludes multi-organ transplants

14 **Figure 3** shows the Kaplan-Meier patient survival curves up to one year for DCD heart transplants since the start of the JIF. Survival for adult DBD heart only transplants is shown for comparison. One patient with unknown post-transplant survival was excluded, twelve paediatric transplants and two patient who had had a previous heart transplant were included. The survival rates at one year are presented in **Table 7**. There was no difference in one year survival for DCD transplants compared with DBD transplants (p=0.5662).

**Figure 3 Patient survival post- DCD heart transplant with DBD comparison, 7 September 2020 – 31 July 2023**

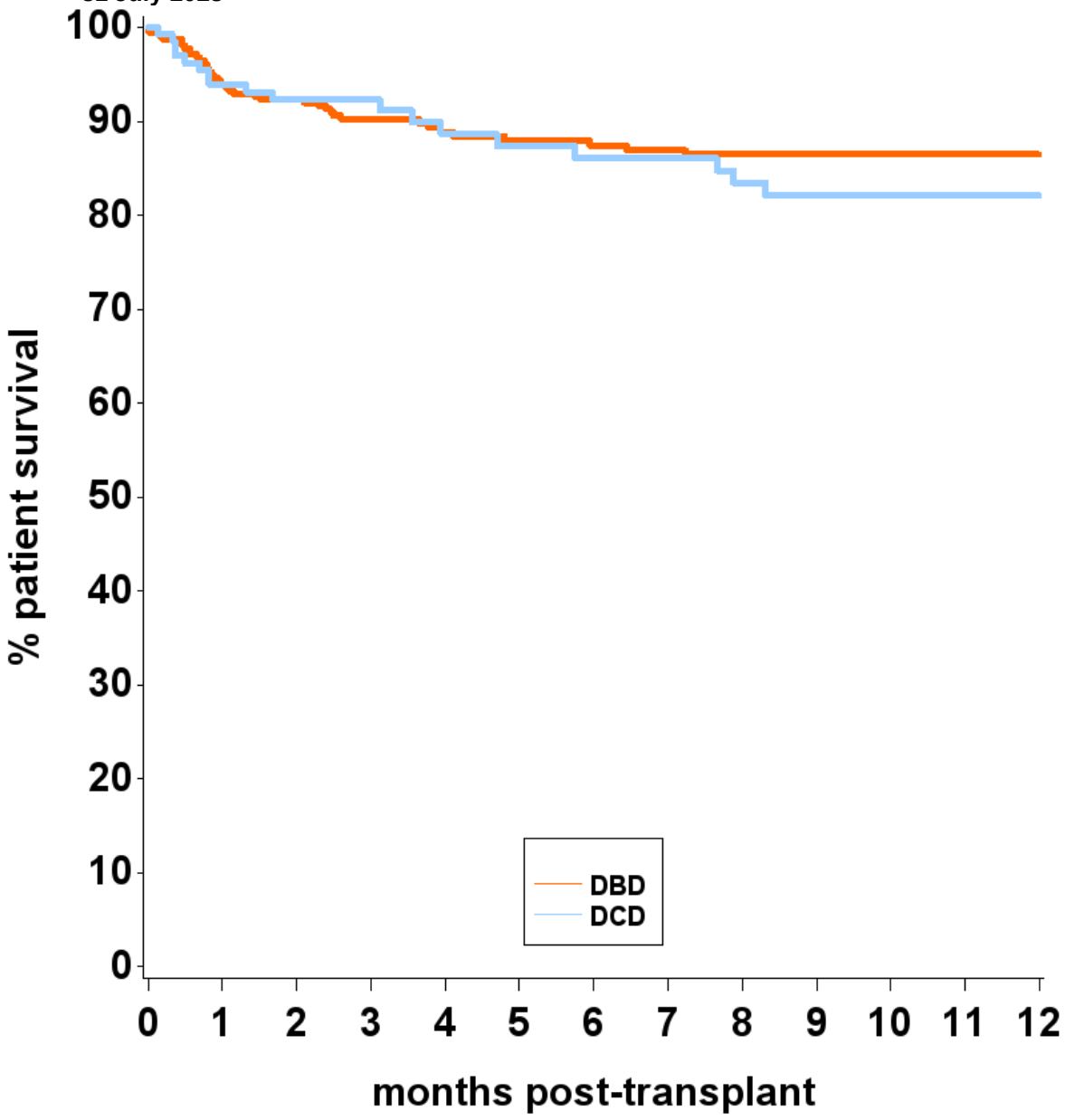



**Table 7 1-year patient survival rates after DCD heart transplant compared with adult DBD heart transplant survival, 7 September 2020 – 31 July 2023**

| Donor type | Number of transplants | Number of deaths | 1-year survival (95% CI) |
|---|---|---|---|
| **DCD[1]** | 133 | 18 | 82.2 (72.7 - 88.6) |
| **DBD[2]** | 313 | 38 | 86.5 (81.8 - 90.0) |

[1] Includes 12 paediatric transplants and 1 re-transplant; excludes one patient with unknown survival.
[2] Excludes paediatric recipients, re-grafts and multi-organ transplants.

15 **Table 8** gives a breakdown of the urgency status of DCD heart recipients at the time of transplant for the period 7 September 2020 – 31 July 2023, split by centre. Overall, 62% of DCD heart transplants in this period were performed in urgent or super-urgent recipients. There is evidence that this is a lower proportion compared with DBD transplants (81% v 62%, p<0.0001).

**Table 8 Urgency status of DCD heart recipients, by centre, 7 September 2020 – 31 July 2023**

| Transplant centre | Non-urgent (%) | Urgent (%) | Super-urgent (%) | (% DBD* transplant urgent/super-urgent) |
|---|---|---|---|---|
| Birmingham | 7(44) | 8(50) | 1(6) | (85) |
| Glasgow | 6(43) | 5(36) | 3(21) | (71) |
| Great Ormond Street | 5(50) | 2(20) | 3(30) | (79) |
| Harefield | 9(29) | 17(55) | 5(16) | (89) |
| Manchester | 2(25) | 6(75) | 0(0) | (89) |
| Newcastle | 9(39) | 10(43) | 4(17) | (90) |
| Papworth | 13(41) | 13(41) | 6(19) | (68) |
| **Total** | **51(38)** | **61(46)** | **22(16)** | **(81)** |

* Includes paediatric recipients

16 The need for post-transplant mechanical support within 30 days is shown in **Table 9** along with the devices used. Information on whether mechanical support was needed was received for 132 of the 134 DCD heart transplants. Of these, 49 (37%) required support (including IABP only). There is some borderline evidence that this is higher than in DBD transplants (29%, p=0.068).

**Table 9 Use of mechanical support within 30 days post-transplant, for DCD and DBD heart transplants performed 7 September 2020 – 31 July 2023**

| Mechanical support post-transplant | DCD | DBD* |
|---|---|---|
| Yes | 49(37%) | 104(29%) |
| -IABP only | 6 | 26 |
| -ECMO only | 35 | 52 |
| -VAD only | 1 | 3 |
| -ECMO and IABP | 2 | 10 |
| -VAD and IABP | 0 | 0 |
| -ST VAD and ECMO | 3 | 11 |
| -ST VAD, ECMO and IABP | 0 | 2 |
| -Unknown | 2 | 0 |
| No | 83 | 260 |
| Unknown | 2 | 0 |
| **Total** | **134** | **364** |

* Includes paediatric recipients

## DCD heart offering

16 **Table 10** shows a breakdown of the number of potential DCD donors whose heart was offered between 7 September 2020 and 31 July 2023 by heart allocation zone and whether the heart was accepted, retrieved, transplanted and if transplanted whether it was within zone. The 470 potential donors include 90 who did not donate any organs, it also includes 19 aged less than 16 whose heart was offered to paediatric centres first. Of the 470 hearts offered, 291 (62%) were accepted, 145 (31%) were retrieved and 134 (28%) were transplanted. The highest number of offered hearts came from the Newcastle and Harefield zones.

**Table 10** **DCD hearts offered, accepted, retrieved, transplanted, and transplanted by heart allocation zone, 7 September 2020 – 31 July 2023**

| Allocation zone | Number of hearts offered | Number accepted | Number retrieved | Number transplanted | Number transplanted by zonal centre |
|---|---|---|---|---|---|
| Birmingham | 65 | 39 | 21 | 21 | 12 |
| Glasgow | 39 | 22 | 14 | 11 | 6 |
| Harefield | 115 | 71 | 37 | 34 | 20 |
| Manchester | 62 | 32 | 15 | 13 | 6 |
| Newcastle | 110 | 75 | 34 | 33 | 16 |
| Papworth | 79 | 52 | 24 | 22 | 18 |
| **Total** | **470** | **291** | **145** | **134** | **78** |

17 The 470 DCD hearts offered between 7 September 2020 and 31 July 2023 generated 1,853 offers. The results of these offers are shown in **Table 11**, split by centre. Each centre received 200-300 DCD heart offers, with all centres utilising at least one offer. The highest utilisation of offers was for Papworth (12%).

**Table 11** **DCD heart offers made during 7 September 2020 – 31 July 2023, by centre and result**

| Centre | Offers | Declined | | Accepted, not used | | Accepted and used | |
|---|---|---|---|---|---|---|---|
| | N | N | % | N | % | N | % |
| Birmingham | 239 | 201 | 84 | 22 | 9 | 16 | 7 |
| Glasgow | 202 | 173 | 86 | 15 | 7 | 14 | 7 |
| Great Ormond Street | 284 | 263 | 93 | 11 | 4 | 10 | 4 |
| Harefield | 296 | 217 | 73 | 48 | 16 | 31 | 10 |
| Manchester | 260 | 244 | 94 | 8 | 3 | 8 | 3 |
| Newcastle | 298 | 244 | 82 | 31 | 10 | 23 | 8 |
| Papworth | 274 | 190 | 69 | 52 | 19 | 32 | 12 |
| **Total** | **1853** | **1532** | **83** | **187** | **10** | **134** | **7** |

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