

NHS BLOOD AND TRANSPLANT
RESEARCH, INNOVATION AND NOVEL TECHNOLOGIES
ADVISORY GROUP

DCD HEART ACTIVITY

SUMMARY

INTRODUCTION

- 1 DCD heart retrieval began in February 2015 for a 15 month initial evaluation period involving two centres; Harefield and Papworth. Since the end of the evaluation period, activity has continued with a third centre, Manchester, joining the programme in December 2016. This paper looks at activity and patient outcomes from 1 February 2015 to 31 July 2018.

KEY RESULTS

Activity

- 2 In the time period, 112 DCD heart retrieval attendances were identified as having taken place, of which 74 were proceeding and a total of 66 hearts were successfully transplanted. Activity has varied throughout the period, with a peak of 11 performed in the first quarter (Jan-Mar) of 2018. Transplants were performed by four centres.

Utilisation

- 3 The retrieved but not transplanted rate for DCD hearts was 11%; significantly higher than the retrieved but not transplanted rate for hearts from DBDs aged 16-50, which was 4%. The transplantation rate of lungs, kidneys, livers and pancreases from DCD heart donors was higher than from the general DCD donor population.

Post-transplant survival and support

- 4 There have been 10 recorded deaths overall; one within 30 days, 8 between 30 days and one year, and one after the first year post-transplant. The 1 year post-transplant survival rate was 83.3%, which is comparable with DBD heart survival rate (however this is unadjusted and unmatched). 36% of the overall cohort required some form of mechanical circulatory support within the first 30 days and one patient required re-transplantation within 30 days.

DCD heart offering

- 5 In the last financial year, 2017/2018, offering information recorded by ODT Hub Operations suggests that 122 DCD hearts had been offered from 8 out of 12 SNOD regions, however clarity on whether all offers are recorded by the Hub is needed.

ACTION

- 6 This paper is to provide the national picture on DCD heart activity. Members are asked to review the contents of this paper.
- 7 Participating centres are asked to ensure they return a DCD Heart Supplementary Record form for all proceeding and non-proceeding DCD heart retrieval attendances.

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INTRODUCTION

- 1 DCD heart retrieval began in February 2015 for a 15 month initial evaluation period involving two centres; Harefield and Papworth. Since the end of the evaluation period, activity has continued with a third centre, Manchester, joining the programme in December 2016.
- 2 This paper looks at DCD heart activity and patient outcomes from 1 February 2015 to 31 July 2018. It evaluates the number of attendances, retrievals and transplants performed by each team in the time period, along with the short and medium term outcomes of the recipients. The outcomes of lungs and abdominal organs offered from the DCD heart donors over this period are also considered.

DATA

- 3 For each DCD heart retrieval attendance, a Supplementary DCD Heart Record form should be completed and sent to NHSBT Statistics and Clinical Studies. In cases where the DCD heart was transplanted, the form should be sent in after 30 days of transplant in order to capture key information about the short term outcome of the recipient. For non-transplanted DCD hearts the form can be sent in immediately after attendance at the donor. DCD heart attendances that do not lead to retrieval are difficult to identify from other data sources (i.e. the Retrieval Team Information Form), so it is important that a Supplementary Record form is completed in these non-proceeding scenarios.
- 4 The data presented in this paper are a combination of data held on the UK Transplant Registry (UKTR) and additional information from the Supplementary Record forms. At time of data analysis, all forms had been received for DCD heart retrievals but not all non-proceeding retrievals.
- 5 DCD heart offering data recorded by ODT Hub Operations were also analysed for offers made between 1 April 2017 and 31 March 2018, however since offering is conducted by Specialist Nurses in Organ Donation (SNODs), Hub Operations may not hear about every offer.

RESULTS

Activity

- 6 Between 1 February 2015 and 31 July 2018, 112 DCD heart retrieval attendances were identified as having taken place, of which 74 were proceeding and 38 were non-proceeding. There were a total of 66 DCD hearts successfully transplanted. In **Table 1** this activity is broken down by team and time period; during the initial evaluation period vs after. Manchester joined the programme on 5 December 2016 and so are only included after the initial evaluation period. Newcastle is not currently part of the programme but performed one DCD heart transplant in March 2018.

Table 1 DCD heart activity by period and centre, 1 February 2015 – 31 July 2018

Period	Centre	Attended*	Retrieved	Transplanted
1 February 2015 – 12 May 2016	Harefield	9	5	4
	Papworth	24	20	19
	Total	33	25	23
13 May 2016 – 31 July 2018	Harefield	25	10	9
	Papworth	44	30	26
	Manchester	9	8	7
	Newcastle	1	1	1
	Total	79	49	43
Total		112	74	66

* Includes 8 cases (all Papworth) 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

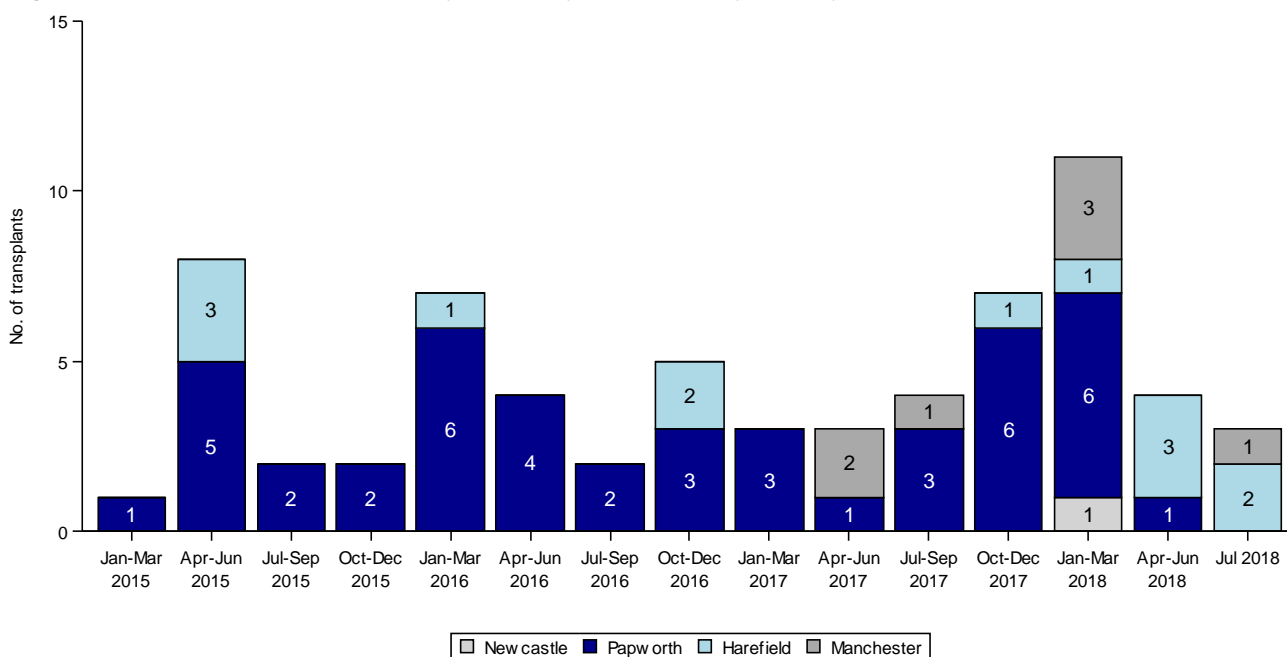
- 7 Across the time period, 8 (11%) DCD hearts were retrieved but not transplanted. The reason for non-use for each is seen below in **Table 2** and is taken from the DCD Heart Transplant Supplementary Record form. Where this is not available, as the form was returned incomplete, the reason was taken from the Hub Operations records.

Table 2 Reasons for non-use of hearts retrieved from DCD donors, 1 February 2015 – 31 July 2018

Centre	Donation Date	Reason for non-use
Harefield	October 2015	Continuous ventricular fibrillation after reperfusion on OCS
	December 2017	Poor function on OCS
Papworth	July 2015	Declined for transplantation due to rising lactate level
	June 2016	Function
	January 2017	Donation ceased at recipient hospital - due to donor pancreatic tumour results from histology
	September 2017	Heart hypertrophic enlarged aorta
Manchester	October 2017	Angio performed coronary artery disease noted
	June 2017	Function (wall motion abnormality, poor contractility and poor lactate profile)

- 8 **Figure 1** shows the number of DCD heart transplants by quarter and centre. Activity has been increasing in recent months, with 11 transplants performed in the first quarter of 2018. Please note that only July 2018 is included in the final bar.

Figure 1 DCD heart transplant activity, 1 January 2015 to 31 July 2018, by quarter and centre



Organ utilisation

- 9 Between 1 February 2015 to 31 July 2018, there were 482 hearts retrieved from UK DBD heart donors aged 16 to 50. Of these, 4% were not transplanted, which is significantly lower than the DCD discard rate of 11% (Fisher’s Exact p-value: 0.02).
- 10 Of the 74 DCD heart donors, two only donated their heart. The outcomes of the other organs are displayed in **Table 3**, where utilisation rates are compared to the general DCD donor population. The transplantation rate of lungs, kidneys, livers, and pancreases from DCD heart donors was higher than from the general DCD donor population.

Table 3 Abdominal and lung offer outcomes for 74 DCD heart donors during the period 1 February 2015 – 31 July 2018

Outcome	Lungs ¹	Kidney ¹	Liver	Pancreas
Offered	54	74	71	66
Retrieved	12	71	59	49
Transplanted (% of offered)	11 (20%)	65 (88%)	44 (62%)	25 (38%)
National DCD organ transplant rate (% of offered) ²	13%	64%	32%	19%

¹ at least one

² DCD donors between 1 February 2015 – 31 July 2018, aged 16-50 inclusive

- 11 The most commonly reported reasons for non-transplantation of offered organs from DCD heart donors were poor function for lungs, donor related issues (such as history and size) for livers and kidneys, and insufficient islet yield, donor history, and prolonged cold ischaemia time for pancreases.

Post-transplant survival and support

- 12 The 30 day patient outcome of all 66 heart transplants are summarised in **Table 4**. This information is taken from one of three sources: the DCD Heart Supplementary Record form, the cardiothoracic transplant record form, or the three month follow up form. There has only been one death within 30 days, with all other patients alive at that time.

Table 4 DCD heart patient outcomes at 30 days post-transplant, by centre, for transplants performed 1 February 2015 – 31 July 2018

Centre	Alive at 30 days	Died within 30 days
Harefield	12	1
Papworth	45	0
Manchester	7	0
Newcastle	1	0
Total	65	1

- 13 **Figure 2** below shows the Kaplan-Meier patient survival function up to one year for all 66 DCD heart recipients, split by perfusion method. The overall one year survival estimate for DCD heart recipients is 83.3% (95% CI: 69.5–91.2) and is comparable with DBD heart recipients (83.2% survival in 2017/2018 NHSBT Cardiothoracic Annual Report). **Table 5** shows the one year survival estimates by group. There were a total of 9 patient deaths within one year. Twenty of the 66 transplants (30%) used NRP for perfusion and there have been no reported deaths in this group, giving the 100% survival estimate.

Figure 2 Kaplan-Meier patient survival function for DCD heart transplant recipients by perfusion method, 1 February 2015 – 31 July 2018

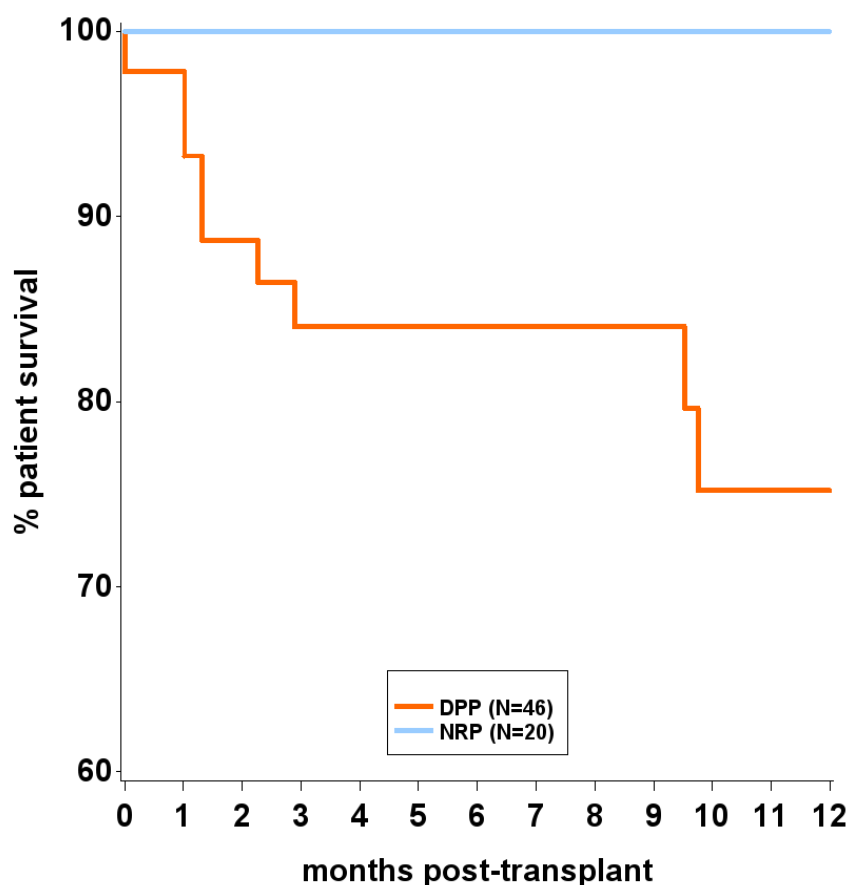


Table 5 1 year patient survival rates after DCD heart transplant, by perfusion method, 1 February 2015 – 31 July 2018

Perfusion method	Number of transplants	Number of deaths	1 year survival (95% CI)	P-value
DPP	46	9	75.2 (56.1–86.9)	0.03
NRP	20	0	100 (–)	
Total	66	9¹	83.3 (69.5–91.2)	

¹ Of these, 7 died post mechanical circulatory support

- 14 As at 6 September 2018, there have been 10 recorded deaths of DCD heart recipients (all but one within one year of transplant). **Table 6** gives a breakdown of the recorded causes of deaths for these patients. One patient received a re-transplant with a DBD heart within 30 days but died shortly after.

Table 6 Causes of death of 10 patients who have died post DCD heart transplant, 1 February 2015 – 31 July 2018

Cause of death	Number of patients
Sudden unexplained cardiac death	1
Cerebro-vascular accident	1
Septicaemia	1
Multi-system failure	2
Donor organ failure	1
End-stage heart failure	1
Other (no further information provided)	3
Total	10

- 15 The need for post-transplant mechanical support within 30 days is shown in **Table 7** along with the devices used. Out of the 66 patients, 24 (36%) required mechanical support; most of which were IABP only or ECMO only.

Table 7 Use of mechanical support within 30 days post-transplant, for DCD heart transplants performed 1 February 2015 – 31 July 2018

Mechanical support post-transplant	Number of patients
Yes	24
- IABP only	10
- ECMO only	9
- ECMO and IABP	3
- ST VAD and ECMO	2
No	42

DCD heart offering

- 16 The offering information that has been recorded by ODT Hub Operations suggests that 122 DCD hearts had been offered during the 12 month period 1 April 2017 to 31 March 2018. **Table 8** shows a breakdown of these donors by Organ Donation Services Team and whether or not the heart was accepted, retrieved and transplanted. These offers came from 8 out of 12 SNOD regions.

Table 8 DCD hearts offered, accepted, retrieved and transplanted by Organ Donation Services Team, 1 April 2017 – 31 March 2018

Organ Donation Services Team	Number of hearts offered	Number accepted	Number retrieved	Number transplanted
Eastern	42	14	6	6
London	17	8	6	5
Midlands	10	1	1	0
North West	13	6	4	4
South Central	6	2	1	1
South East	9	5	2	1
South West	4	3	1	1
Yorkshire	21	10	8	7
Total	122	49	29	25

- 17 These 122 hearts generated 226 offers, 94 (42%) made to Papworth, 81 (36%) to Harefield and 51 (23%) to Manchester, as shown in **Table 9**. Overall, 78% of offers were declined, mostly due to donor past history (22% of declines) and no suitable recipients (20% of declines), but also donor size (9%), age (9%) and poor function (7%). Of the 25 accepted and not used offers, 4 hearts were declined after retrieval, and 7 donors did not proceed to solid organ donation due to prolonged time to asystole; the remaining hearts were declined before retrieval, mainly on function.

Table 9 DCD heart offers recorded on the UKTR as being made to participating centres during 1 April 2017 – 31 March 2018 and results

Centre	Offers		Declined		Accepted, not used		Accepted and used	
	N		N	%	N	%	N	%
Harefield	81		68	84	11	14	2	2
Papworth	94		66	70	12	13	16	17
Manchester	51		43	84	2	4	6	12
Overall	226		177	78	25	11	24	11

ACTION

- 18 This paper is to provide the national picture on DCD heart activity. Numbers of transplants have now reached more than 50 and unadjusted/unmatched survival outcomes are comparable to that of DBD transplants. Members are asked to review the contents of this paper.
- 19 Participating centres are asked to ensure they return a DCD Heart Supplementary Record form for all proceeding and non-proceeding DCD heart retrieval attendances.