

NHS BLOOD AND TRANSPLANT

National Organ Donation Committee

Investigation into timings of the donation process

1 Background

1.1 The length of the organ donation process and times of different events in the donation pathway are a crucial measure that must be investigated to establish if any trends have developed over time. Families are still declining donation in 12% of cases (146 out of 1267 declines in 2015/16) due to feeling the length of the donation process is too long. In addition to this it appears that key events in the donation pathway are increasingly occurring in the early hours of the morning. This could also be affecting consent/authorisation further.

1.2 Previous analysis in this area involved investigation of the DCD donation process by examining the distribution of treatment withdrawal times by day of week and time of day. This paper will build on this analysis by including more key event times and will investigate the DBD process also. In addition to this the length of time between different stages of both the DBD and DCD process will be investigated.

2 Cohort

2.1 The cohort examined for this paper is all eligible patients that died between 1 April 2010 and 31 March 2016 who were referred and whose family were approached. For some of the analysis this is further restricted to only those whose family consented/authorised to donation and the patient then proceeded to donate solid organs.

2.2 Note that the cohort used for this analysis incorporates changes made to the Potential Donor Audit (PDA) in April 2013. This change meant that cardiothoracic ICUs were now to be audited in addition to Emergency Departments and other ICUs. The age limit also increased from 75 years to 80 years. Therefore there was an increase in audited deaths from this date. This is visible within some data presented within this paper.

3 DBD process

When investigating timings within the DBD process there are four key events of interest, these can be seen in the flow diagram below.



To represent the time of transplant the time at which the donated kidney is first perfused with the recipient's blood has been used.

Firstly we assess the trends in the time between each of these events across financial years from 1 April 2010 to 31 March 2016; this can be seen in **Figure 1**. This data is calculated for all eligible DBD patients that proceeded to solid organ donation.

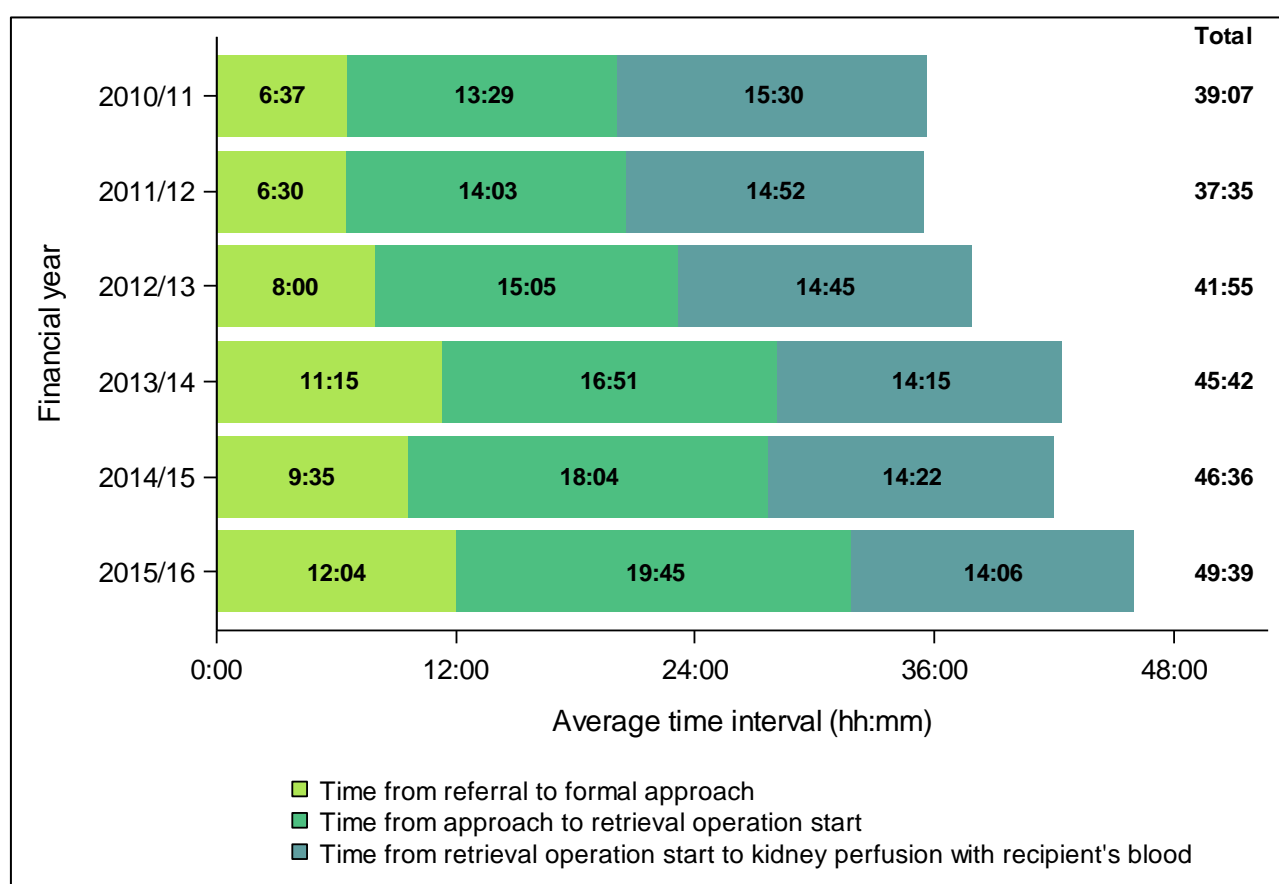


Figure 1 – Average times of DBD donation process by financial year

Figure 1 shows that the total average time for the DBD donation process has increased by over 10 hours from 2010/11 to 2015/16. This is mainly due to the length of time from referral to formal approach having nearly doubled over the six years and the length of time from approach to retrieval operation start having increased by approximately 50%.

The length of time from the start of the retrieval operation to the time at which a donated kidney was first perfused with the recipient's blood has decreased slightly in the six years. This is likely to be due to transplant centres trying to minimise harmful cold ischaemia time.

Table 1 shows heat maps of the distribution of retrieval operation starts times for consented DBD donors, for each financial year. These heat maps indicate that in the beginning of the cohort examined the main time of day that the retrieval operation is starting is the early hours of the morning, midnight to 6am. However, in recent years the heat maps show that this time has shifted to be later in the morning, around 2am to noon.

These heat maps also present the days of the week on which most retrieval operations occur, these are weekdays for all of the six financial years with the least retrieval operations taking place on Monday, Friday, or Sunday.

Table 1 - Distribution of retrieval operation start days and times for consented DBD patients
1 April 2010 - 31 March 2016

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2010/11													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	9	12	9	2	1	2	3	0	0	0	2	12	52
Tuesday	9	9	8	10	7	5	5	3	2	0	3	7	68
Wednesday	17	18	13	8	14	3	2	1	0	0	3	3	82
Thursday	12	13	14	6	3	3	0	2	2	1	1	4	61
Friday	9	10	15	12	9	2	1	3	1	0	3	4	69
Saturday	9	8	11	9	4	3	1	2	2	3	3	6	61
Sunday	13	9	7	3	3	1	1	0	0	2	1	7	47
													440

2011/12													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	4	13	13	10	3	5	4	3	2	0	2	6	65
Tuesday	16	12	10	5	8	4	1	4	1	0	5	6	72
Wednesday	12	17	9	15	5	6	2	0	2	1	0	5	74
Thursday	9	14	16	6	5	8	4	2	0	4	3	7	78
Friday	10	14	19	3	5	5	2	2	0	2	0	3	65
Saturday	7	14	9	11	4	6	3	2	0	2	2	4	64
Sunday	7	10	14	5	3	7	2	2	1	0	5	6	62
													480

2012/13													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	7	19	7	6	4	8	3	2	1	0	2	6	65
Tuesday	13	15	14	15	9	4	5	2	2	3	4	6	92
Wednesday	13	16	22	14	12	5	1	2	0	2	5	2	94
Thursday	7	5	18	13	7	4	4	1	2	0	6	3	70
Friday	10	9	17	12	10	9	7	2	4	3	5	5	93
Saturday	10	16	17	9	6	9	3	4	1	0	2	2	79
Sunday	11	10	11	6	9	10	3	5	2	1	1	4	73
													566

2013/14													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	12	13	9	12	9	12	6	4	3	3	1	6	90
Tuesday	8	14	17	9	13	13	8	4	1	5	8	5	105
Wednesday	10	18	19	19	10	11	8	3	2	1	6	4	111
Thursday	13	9	21	12	8	9	9	7	1	1	4	6	100
Friday	8	17	15	9	11	10	3	2	1	5	1	4	86
Saturday	7	16	8	20	8	7	6	2	4	6	4	5	93
Sunday	9	18	17	7	12	8	10	3	3	0	1	8	96
													681

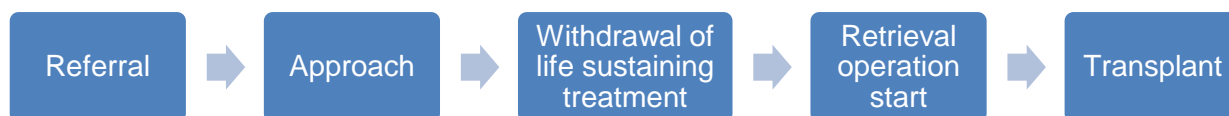
2014/15													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	9	14	11	17	11	16	7	4	2	4	6	4	105
Tuesday	10	15	12	16	10	15	7	10	5	4	5	9	118
Wednesday	5	13	23	13	6	10	10	9	1	5	2	7	104
Thursday	10	12	9	16	8	12	16	7	4	5	4	2	105
Friday	9	18	12	9	6	13	6	11	2	1	2	6	95
Saturday	6	13	10	10	5	17	10	5	4	3	2	7	92
Sunday	8	10	11	9	9	9	6	3	4	0	5	6	80
													699

2015/16													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	8	20	12	8	6	13	13	8	5	4	2	7	106
Tuesday	6	9	15	15	8	19	18	6	9	6	5	3	119
Wednesday	12	5	12	16	8	11	16	10	4	8	2	4	108
Thursday	12	12	14	18	4	16	12	10	4	7	3	5	117
Friday	9	8	8	13	13	6	10	8	7	3	2	4	91
Saturday	8	9	13	12	5	15	11	10	7	3	2	7	102
Sunday	5	9	15	4	6	9	5	10	10	3	3	7	86
													729



4 DCD process

When investigating timings within the DCD process there are five key events of interest, which can be seen in the flow diagram below.



As with the DBD process we first assess the trends in the amount of time between each of these events across financial years from 1 April 2010 to 31 March 2016; this can be seen in **Figure 2**. These data are calculated for all eligible DCD patients that proceeded to solid organ donation.

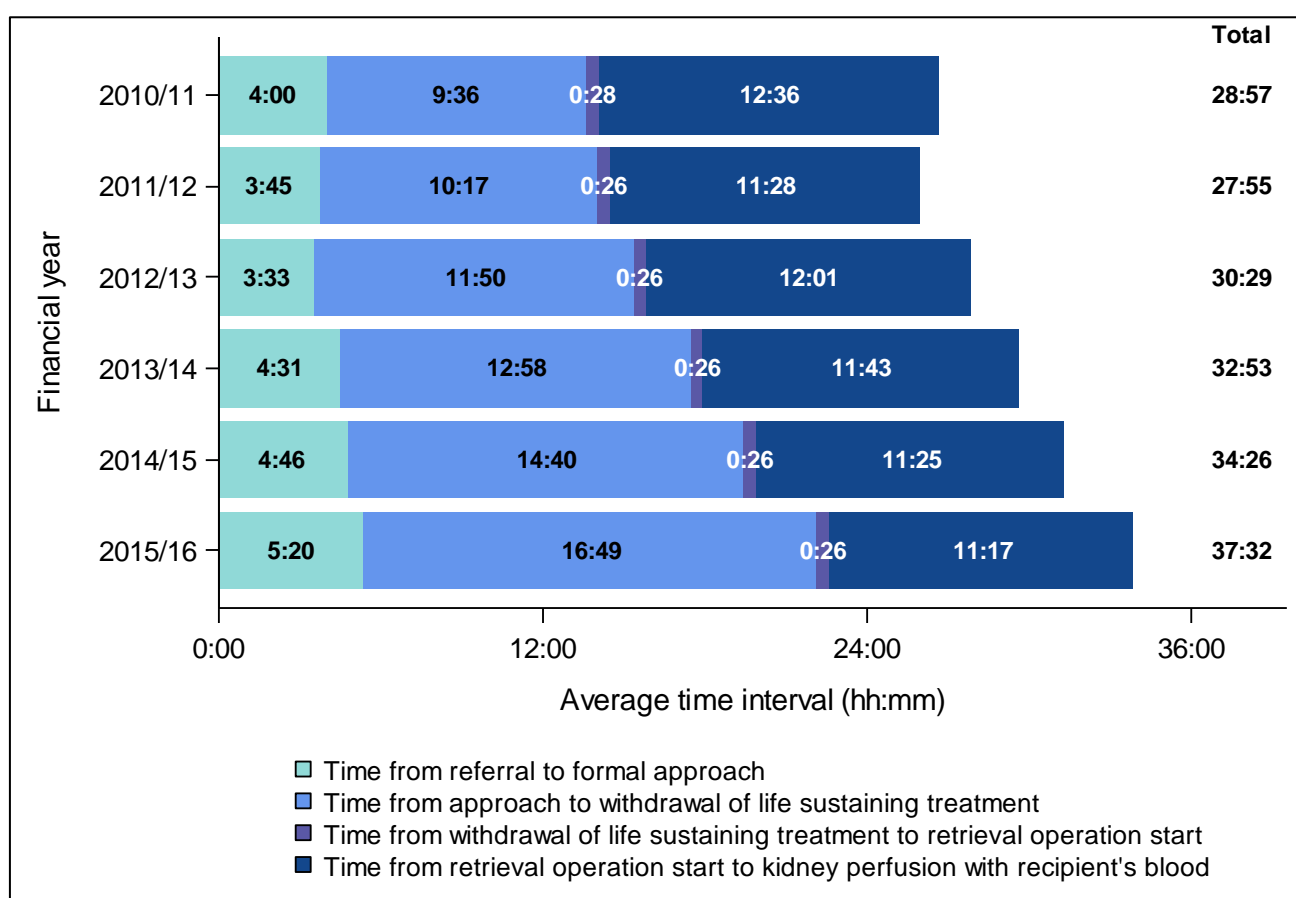


Figure 2 – Average times of DCD donation process by financial year

Figure 2 shows that the total average time for the DCD donation process has increased by around 8.5 hours from 2010/11 to 2015/16. This is mainly due to the average length of time between the formal approach and withdrawal of life sustaining treatment having increased by around 7 hours.

The length of time between referral and formal approach has increased only slightly, much less than the increase seen in the DBD process equivalent. The length of time between withdrawal of life sustaining treatment and operation start remains static. As with the DBD process the time for the retrieval and transplantation of solid organs has decreased.

Table 2 shows heat maps of the distribution of withdrawal of life sustaining treatment times for patients whose family had consented to/authorised DCD donation. Most treatment withdrawals occur between 10pm and 1am in the first two financial years. However the heat maps show that in more recent years a large number of treatment withdrawals have also been occurring between 2am and 5am.

The day of the week on which most treatment withdrawals occurs is Thursday or Friday for five of the six financial years presented. Throughout the six years the smallest numbers of treatment withdrawals occur on either a Monday or a Sunday.

Table 2 - Distribution of treatment withdrawal days and times of eligible approached and consented/authorised DCD patients
1 April 2010 - 31 March 2016

2010/11													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	9	7	6	2	4	4	2	5	5	14	6	21	85
Tuesday	26	19	12	6	3	4	1	4	1	7	17	31	131
Wednesday	15	9	8	4	3	2	2	2	7	7	14	23	96
Thursday	14	11	14	6	3	2	5	5	8	5	16	22	111
Friday	12	17	5	6	6	2	5	3	5	8	21	27	117
Saturday	25	9	5	3	2	2	3	2	4	7	11	12	85
Sunday	11	6	8	3	1	2	2	3	1	6	7	14	64
													689

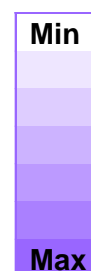
2011/12													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	9	14	6	5	1	5	2	3	8	11	13	20	97
Tuesday	20	16	5	4	2	3	8	1	4	9	15	26	113
Wednesday	24	13	18	6	6	8	3	4	6	12	9	15	124
Thursday	17	16	10	7	2	7	3	5	9	12	16	29	133
Friday	36	17	13	7	1	5	2	3	9	6	19	24	142
Saturday	19	20	13	3	1	7	4	2	7	4	12	14	106
Sunday	14	11	6	3	5	5	1	3	1	2	10	16	77
													792

2012/13													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	9	20	4	5	4	5	4	10	2	10	15	21	109
Tuesday	15	22	17	13	7	7	3	9	7	14	14	20	148
Wednesday	20	16	13	8	6	9	6	5	6	4	15	22	130
Thursday	28	18	22	16	11	7	6	1	7	4	12	22	154
Friday	23	15	19	9	7	6	8	5	12	5	18	21	148
Saturday	23	18	13	8	10	9	7	7	4	9	13	18	139
Sunday	17	15	9	4	9	3	5	3	5	7	9	15	101
													929

2013/14													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	14	14	14	6	5	4	7	6	6	8	8	10	102
Tuesday	19	24	18	11	11	9	11	7	9	4	12	20	155
Wednesday	25	27	17	17	8	10	8	12	6	10	11	21	172
Thursday	30	28	21	10	10	12	7	9	6	11	19	18	181
Friday	26	37	17	12	12	5	7	10	7	9	12	14	168
Saturday	32	28	18	17	13	15	11	7	4	7	12	15	179
Sunday	17	14	12	5	5	6	6	5	7	4	9	19	109
													1066

2014/15													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	18	15	6	7	7	6	5	6	3	7	6	12	98
Tuesday	24	19	20	6	14	13	11	9	6	10	10	19	161
Wednesday	19	26	25	14	13	8	8	11	6	10	14	17	171
Thursday	19	18	18	11	10	19	16	5	10	9	7	9	151
Friday	18	22	14	20	15	21	6	12	7	13	11	22	181
Saturday	24	26	15	12	18	19	11	9	5	9	11	9	168
Sunday	17	16	13	6	7	12	10	8	6	7	2	5	109
													1039

2015/16													
	Hour												TOTAL
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-23	
Monday	14	14	11	7	8	5	13	15	7	3	7	14	118
Tuesday	17	8	17	16	11	16	13	6	5	7	9	7	132
Wednesday	14	19	30	17	12	19	14	16	7	10	8	15	181
Thursday	21	21	22	17	11	19	26	10	12	9	11	15	194
Friday	16	28	22	16	12	15	21	14	9	8	12	25	198
Saturday	15	20	24	12	10	19	10	17	8	7	5	13	160
Sunday	15	17	15	8	5	14	17	6	6	4	9	9	125
													1108



5 Key findings

- The average lengths of the DBD and DCD donation processes have increased by around 10 and 9 hours since 2010/11, respectively.
- In the DBD process this increase is due to longer time between referral and formal approach to family, and formal approach to family and retrieval operation start. The average length of the retrieval operation and transplant procedure has decreased.
- In the DCD process the length of time between formal approach to family and withdrawal of life sustaining treatment has increased most out of all time points in this process; from around 9 ½ hours to nearly 17 hours. The average time from referral to formal approach has increased by just over an hour. As with DBD, the average length of the retrieval operation and transplant procedure has decreased.
- Retrieval operations in the DBD process begin mainly in the early hours of the morning with this becoming later in more recent years.
- Withdrawal of life sustaining treatment when the family consent to / authorise donation occurs mainly between 10pm and 1am but in recent years more withdrawals have occurred between 2am and 5am.