

NHS BLOOD AND TRANSPLANT

CARDIOTHORACIC ADVISORY GROUP – HEART

LATEST HEART ALLOCATION DATA

SUMMARY

INTRODUCTION

1. The super-urgent heart allocation scheme was introduced on 26 October 2016. This report presents data from the first 2 years, up to 25 October 2018.

DATA

2. Data were extracted from the UK Transplant Registry on 28 February 2019 for all patients registered for a heart transplant between 26 October 2016 and 25 October 2018. Registration outcomes were analysed as well as median waiting time to transplant. The number of heart transplants performed in each urgency group was analysed including one year survival rates, where survival data were extracted on 14 March 2019.

KEY RESULTS

3. Nationally, for adult and paediatric patients combined, there were 389 non-urgent registrations (for 382 patients), 357 urgent registrations (for 347 patients) and 99 super-urgent registrations (for 93 patients) across the time period. For adults only, super-urgent and urgent registrations represented 14% and 39% of all registrations, respectively.
4. Sixteen percent of non-urgent registrations ended in transplant compared with 64% for urgent registrations and 71% for super-urgent registrations. The overall mortality rate (adult and paediatric combined) on each urgency list was 5% or less, however when considering urgent paediatric patients alone, the observed waiting list mortality rate was 18%.
5. Median waiting time to transplant was 9 days, 62 days and 110 days for super-urgent adult, urgent adult and urgent paediatric registrations, respectively. Urgent adult waiting time has increased since the introduction of the super-urgent scheme and the urgent waiting list increased 3-fold in the first year, but in the second year it has reduced slightly with 31 urgent patients waiting at the end of October 2018.
6. Of the 396 heart transplant performed, 23% were non-urgent, 60% urgent and 17% super-urgent. The one year patient survival rates were 81.6%, 81.2% and 78.3%, respectively (p=0.9).

CONCLUSION

7. This report provides the latest data on heart allocation in adult and paediatric patients since the super-urgent heart allocation scheme was introduced in October 2016. Patients on the urgent and super-urgent lists have a much higher chance of transplant compared with patients on the non-urgent list and the introduction of the super-urgent list has led to increases in waiting time to urgent transplant and in the size of the urgent waiting list. Unadjusted survival outcomes are comparable across urgency groups.

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INTRODUCTION

8. The super-urgent heart allocation scheme was introduced on 26 October 2016. Data on registrations, waiting times and survival for the first 12 months, up to 25 October 2017, were presented to the Cardiothoracic Advisory Group in April 2018. This report presents data from the first 2 years, up to 25 October 2018.

DATA AND METHODS

9. Data were extracted from the UK Transplant Registry on 28 February 2019 for all adult and paediatric patients registered for a heart transplant between 26 October 2016 and 25 October 2018. Registrations for heart-lung transplant were included, and multiple registrations for the same patient were allowed (so the same patient may appear in different urgency categories if they changed urgency within the time period).
10. The number of non-urgent, urgent and super-urgent patient registrations made by each centre in the time period was analysed as well as registration outcomes as at 28 February 2019. Median waiting time to transplant across urgency tiers was also analysed.
11. The number of heart transplants performed by each centre in each urgency tier was also extracted for the time period and post-transplant survival was analysed for first, adult, heart-only transplants, where survival data were extracted on 14 March 2019.

RESULTS**Registration data**

12. **Table 1** shows the number of registrations made by each centre during the 2 year time period. Nationally, there were 389 (46%) non-urgent registrations (for 382 patients), 357 (42%) urgent registrations (for 347 patients) and 99 (12%) super-urgent registrations (for 93 patients).

Centre	Non-urgent		Urgent		Super-urgent		Total N	No. of patients
	N	%	N	%	N	%		
Adult								
Birmingham	45	39	55	48	15	13	115	98
Glasgow	20	42	14	29	14	29	48	40
Harefield	76	44	70	40	27	16	173	131
Manchester	49	49	35	35	17	17	101	89
Newcastle	81	57	53	37	8	6	142	112
Papworth	68	50	50	37	17	13	135	102
Total	339	47	277	39	98	14	714	572
Paediatric								
GOSH	35	47	39	52	1*	1	75	55
Newcastle	15	27	41	73	0	0	56	51
Total	50	38	80	61	1	1	131	106
TOTAL	389	46	357	42	99	12	845	678

* Incorrectly registered on the super-urgent heart scheme

13. **Tables 2-4** present the outcomes of non-urgent, urgent and super-urgent registrations during the period, by centre. Note that those patients registered towards the end of the time period are more likely to be “still waiting”. Sixteen percent of non-urgent registrations ended in transplant compared with 64% for urgent registrations and 71% for super-urgent registrations. Non-urgent patients were more likely to become urgent or super-urgent than to be transplanted from the non-urgent list. The overall (adult and paediatric) mortality rate on each list was 5% or less, however urgent paediatric patients had a particularly high waiting list mortality rate of 18%.

Centre	Still waiting		Died		Removed		Became S-U		Transplanted		Became U		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
Adult													
Birmingham	24	53	1	2	12	27	0	0	2	4	6	13	45
Glasgow	12	60	0	0	5	25	0	0	0	0	3	15	20
Harefield	29	38	2	3	15	20	4	5	5	7	21	28	76
Manchester	27	55	2	4	1	2	1	2	8	16	10	20	49
Newcastle	41	51	7	9	2	2	1	1	6	7	24	30	81
Papworth	11	16	3	4	0	0	2	3	29	43	23	34	68
Total	144	42	15	4	35	10	8	2	50	15	87	26	339
Paediatric													
GOSH	11	31	0	0	2	6	0	0	6	17	16	46	35
Newcastle	5	33	0	0	0	0	0	0	6	40	4	27	15
Total	16	32	0	0	2	4	0	0	12	24	20	40	50
TOTAL	160	41	15	4	37	10	8	2	62	16	107	28	389

Centre	Still waiting		Died		Removed*		Became SU		Transplanted		Total N
	N	%	N	%	N	%	N	%	N	%	
Adult											
Birmingham	0	0	1	2	15	27	3	5	36	65	55
Glasgow	0	0	0	0	1	7	5	36	8	57	14
Harefield	2	3	2	3	12	17	6	9	48	69	70
Manchester	1	3	0	0	10	29	2	6	22	63	35
Newcastle	1	2	2	4	12	23	5	9	33	62	53
Papworth	0	0	0	0	7	14	3	6	40	80	50
Total	4	1	5	2	57	21	24	9	187	68	277
Paediatric											
GOSH	4	10	6	15	11	28	0	0	18	46	39
Newcastle	0	0	8	20	10	24	0	0	23	56	41
Total	4	5	14	18	21	26	0	0	41	51	80
TOTAL	8	2	19	5	78	22	24	7	228	64	357

* Includes those re-registered on the non-urgent list

Table 4 Outcomes of SUPER-URGENT heart registrations, 26 October 2016 – 25 October 2018, as at 28 Feb 2019, by centre

Centre	Died		Removed		Transplanted		Became U		Total N
	N	%	N	%	N	%	N	%	
Birmingham	3	20	1	7	11	73	0	0	15
Glasgow	1	7	2	14	11	79	0	0	14
Harefield	0	0	13	48	14	52	0	0	27
Manchester	0	0	1	6	15	88	1	6	17
Newcastle	1	13	2	25	5	63	0	0	8
Papworth	0	0	3	18	14	82	0	0	17
Total	5	5	22	22	70	71	1	1	98

One patient at Great Ormond Street accidentally registered as super-urgent is excluded from this table

14. **Table 5** shows the number of registrations under each urgent and super-urgent category. Details of the categories are shown in **Appendix I**. The most common urgent category for adult patients was Category 21 'Adult inpatient dependent on intravenous inotropes and/or IABP which cannot be weaned' and for paediatric patients it was Category 55 'Paediatric >15kg on high-dose inotropes: Patients >15kg on continuous central infusion of a high dose intravenous inotrope'. The vast majority of super-urgent registrations were for Category 11 'Adult patient on temporary ventricular assist device (VAD) or extra-corporeal membrane oxygenation (ECMO) support'.

Table 5 Number of urgent and super-urgent registrations under each category, 26 October 2016 – 25 October 2018, by centre

Centre	URGENT										SUPER-URGENT						Total		
	Adult categories				Paediatric categories						Total								
	21	22	23	31	51	54	55	56	59	88			11	12	21	22	23	88	
Adult																			
Birmingham	46	8	0	1	0	0	0	0	0	0	55	15	0	0	0	0	0	0	15
Glasgow	13	0	1	0	0	0	0	0	0	0	14	13	0	1	0	0	0	0	14
Harefield	44	20	2	0	1	0	3	0	0	0	70	26	1	0	0	0	0	0	27
Manchester	27	1	7	0	0	0	0	0	0	0	35	12	2	1	1	1	0	0	17
Newcastle	43	6	3	0	0	0	1	0	0	0	53	6	1	1	0	0	0	0	8
Papworth	39	7	4	0	0	0	0	0	0	0	50	16	0	1	0	0	0	0	17
Total	212	42	17	1	1	0	4	0	0	0	277	88	4	4	1	1	0	0	98
Paediatric																			
GOSH	0	0	0	0	6	4	9	8	8	4	39	0	0	0	0	0	0	1	1
Newcastle	2	0	0	0	9	5	13	9	3	0	41	0	0	0	0	0	0	0	0
Total	2	0	0	0	15	9	22	17	11	4	80	0	0	0	0	0	0	1	1
TOTAL	214	42	17	1	16	9	26	17	11	4	357	88	4	4	1	1	1	1	99

See **Appendix I** for description of categories

15. **Table 6** presents median waiting time to transplant across age group and urgency, including 95% confidence intervals (CI). Median waiting time to urgent adult transplant has increased since the introduction of the super-urgent tier (Ref: Table 3.2 of *Annual Report on Cardiothoracic Transplantation*, for registrations in 2012-2015 it was 26 days). Median waiting time to transplant is longer for urgent paediatric patients than for urgent adult patients.

Urgency	Number of registrations	Number transplanted as at 28 Feb 2019	Waiting time (days)	
			Median	95% CI
Adult				
Non-urgent ¹	339	50 (15%)	-	-
Urgent	277	187 (68%)	62	49 - 75
Super-urgent	98	70 (71%)	9	6 - 12
All	714	307 (43%)	231	106 - 356
Paediatric				
Non-urgent ¹	50	12 (24%)	-	-
Urgent	80	39 (49%)	110	71 - 149
Super-urgent	1	0 (-)	-	-
All	131	53 (40%)	182	107 - 257

¹ Not possible to estimate median/confidence interval

16. **Figure 1** shows the number of urgent registrations on a quarterly basis, split by centre. This shows a decreasing trend in the number of patients added to the urgent list over the time period. **Figure 2** shows the quarterly trend in the number of super-urgent registrations. There was a peak in the third quarter of the first year, but at this time a change was agreed to the super-urgent listing criteria to restrict access for patients on intra-aortic balloon pumps which led to a subsequent reduction in the number of patients being added to the super-urgent list.

Figure 1 Number of adult and paediatric registrations onto the urgent heart list, by quarter and transplant centre, Oct 2016 - Oct 2018

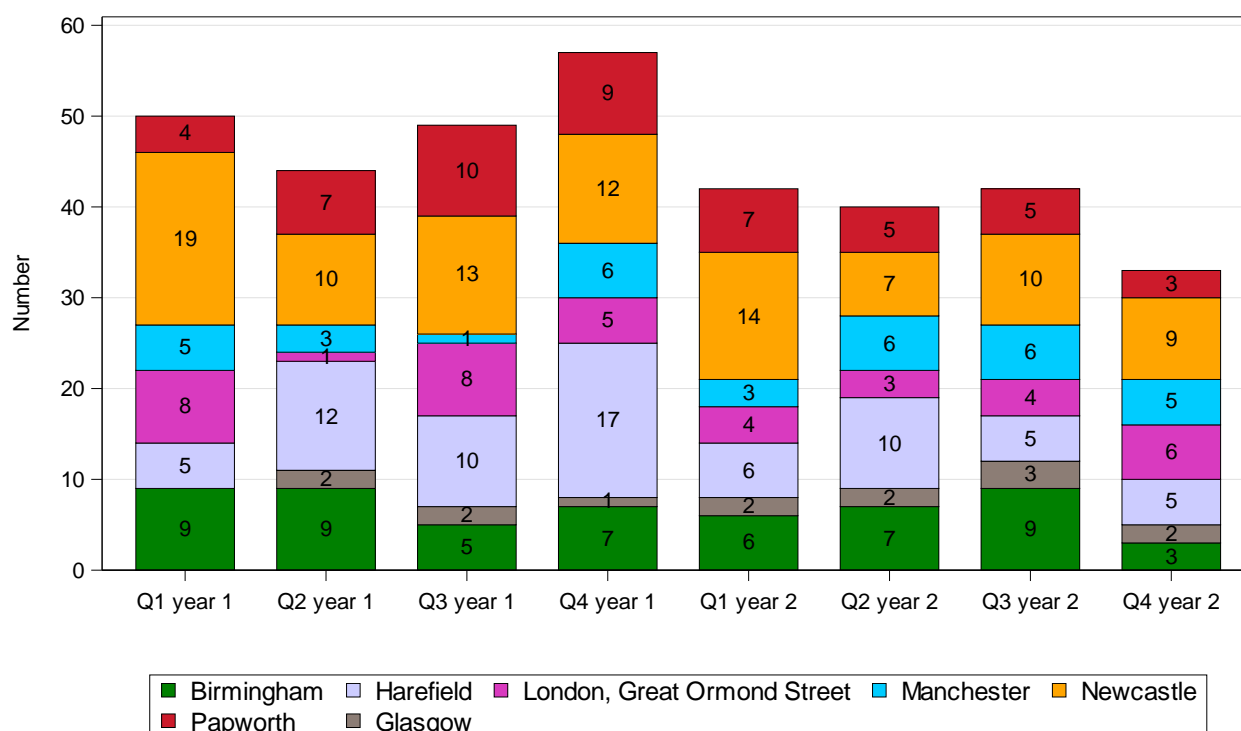
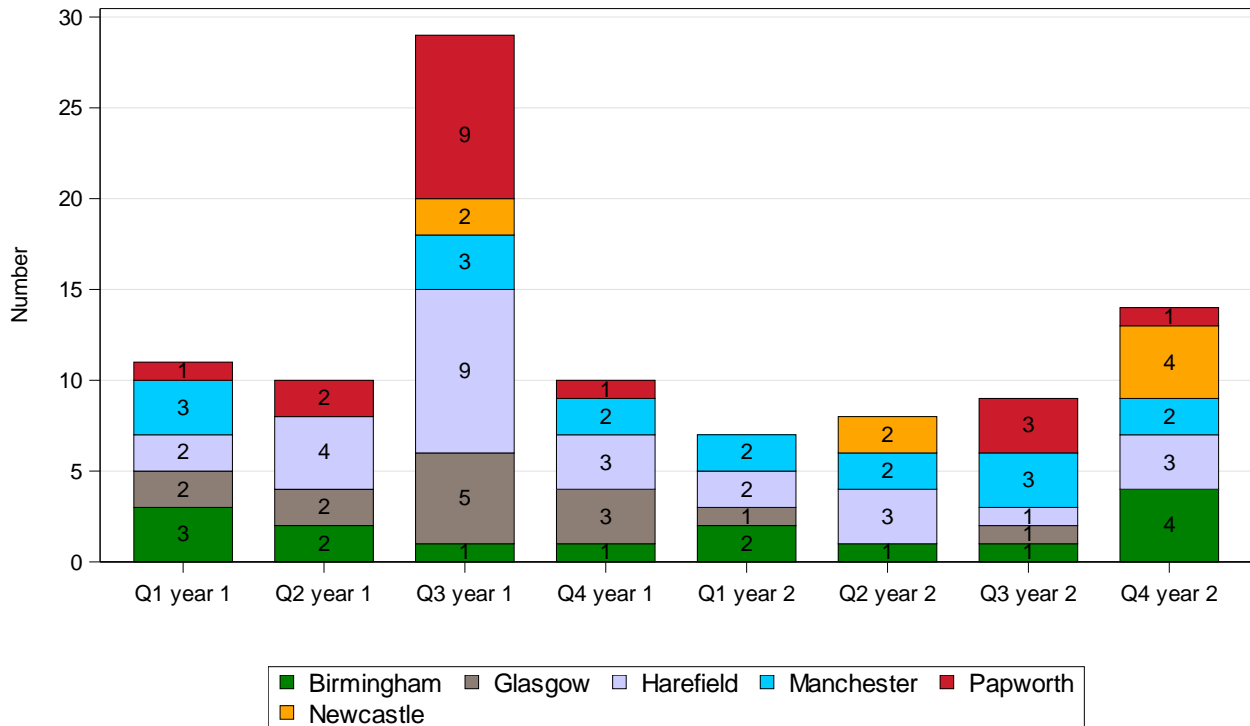
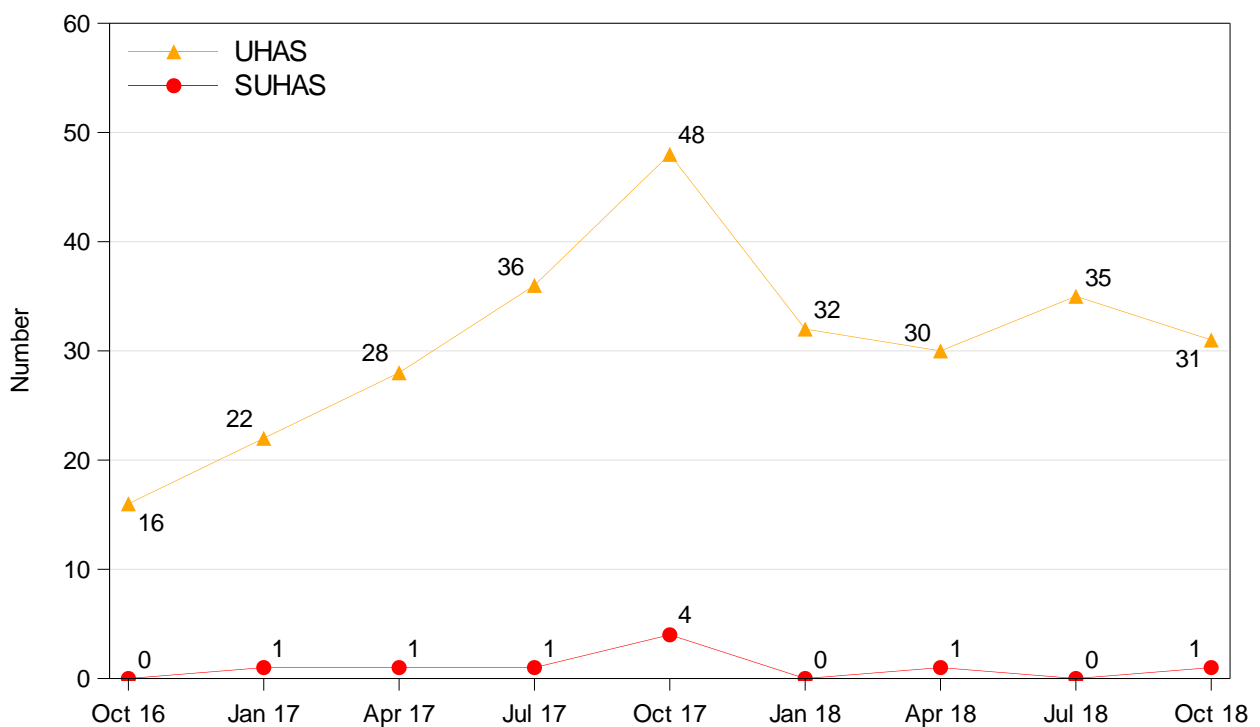


Figure 2 Number of adult registrations onto the super-urgent heart list, by quarter and transplant centre, Oct 2016 - Oct 2018



17. **Figure 3** shows the number of patients waiting on the urgent and super-urgent lists at the end of each quarter of the last two years. The urgent waiting list increased 3-fold in the first year but has since decreased by 35%. The highest number of super-urgent patients waiting was 4 in October 2017.

Figure 3 Number of adult and paediatric patients active on the super-urgent and urgent heart lists at the end of each month, on a quarterly basis, Oct 2016 - Oct 2018



Transplant data

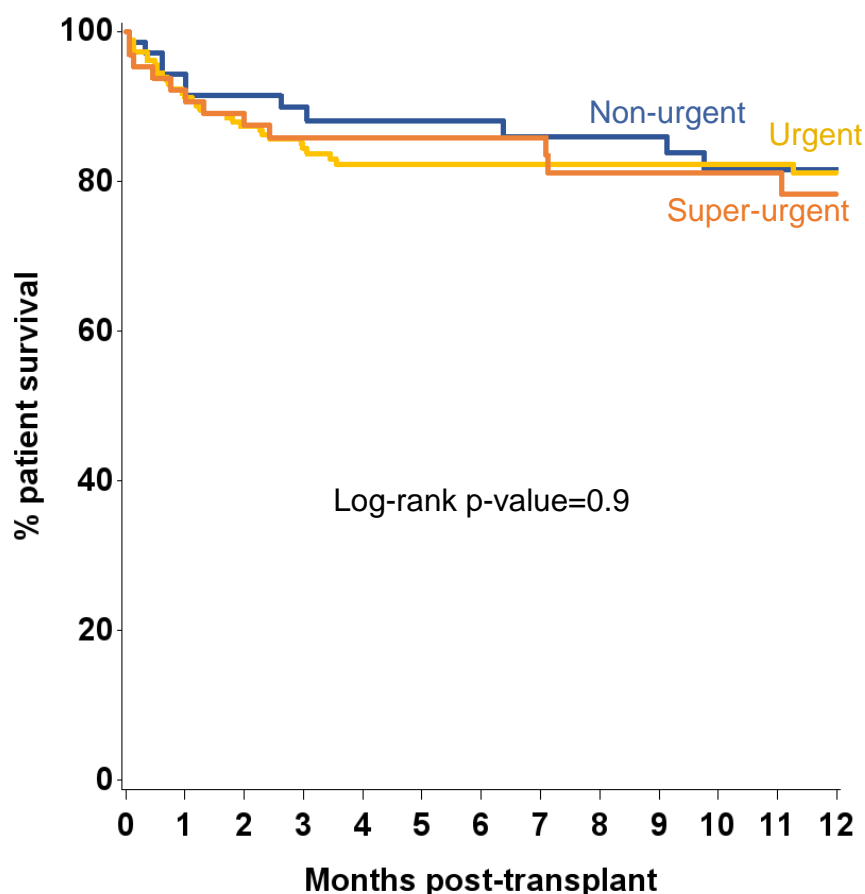
18. **Table 7** presents the number of transplants performed by each centre in each urgency category over the analysis period. Note that some of the patients were registered before the analysis period, so these number will not match up with those transplanted in the previous section.

	Non-urgent		Urgent		Super-urgent		Total N
	N	%	N	%	N	%	
Adult							
Birmingham	2	4	35	73	11	23	48
Glasgow	2	9	9	41	11	50	22
Harefield	10	14	48	68	13	18	71
Manchester	12	24	22	45	15	31	49
Newcastle	9	18	35	71	5	10	49
Papworth	40	41	43	44	14	14	97
Total	75	22	192	57	69	21	336¹
Adult							
GOSH	8	29	20	71	0	0	28
Newcastle	7	22	25	78	0	0	32
Total	15	25	45	75	0	0	60
TOTAL	90	23	237	60	69	17	396

¹ Includes 13 heart-lung transplants and one heart-liver transplant

19. **Figure 4** and **Table 8** present one year survival curves by urgency, where re-grafts (N=5), multi-organ transplants (N=14), and paediatric patients (N=60) were excluded. There was no significant difference between survival at one year across urgency groups in this unadjusted analysis.

Figure 4 1 year Kaplan-Meier patient survival curves for adult heart only recipients 26 October 2016 – 25 October 2018, by urgency



Urgency	Number of transplants	Number of deaths as at 14 Feb 2019	Survival (%)	95% CI
Non-urgent	70	11	81.6	68.8-89.6
Urgent	182	32	81.2	74.2-86.4
Super-urgent	64	12	78.3	64.3-87.4
Overall	316	55	80.7	75.4-84.9

CONCLUSION

20. This report provides the latest data on heart allocation in adult and paediatric patients since the super-urgent heart allocation scheme was introduced in October 2016. Patients on the urgent and super-urgent lists have a much higher chance of transplant compared with patients on the non-urgent list and the introduction of the super-urgent list has led to increases in waiting time to urgent transplant and in the size of the urgent waiting list. Unadjusted survival outcomes are comparable across urgency groups.

Appendix I – Urgent and Super-Urgent heart listing categories

Listing criteria for adult Urgent Heart Allocation Scheme registration

- Category 21 - Adult inpatient dependent on intravenous inotropes and/or IABP which cannot be weaned
- Category 22 - Adult long-term VAD or TAH patient, agreed by CTAG Adjudication Panel (Section 7) and evidence of agreement emailed to NHSBT, with one of the following complications:
 - Right ventricular failure dependent on inotropes
 - Recurrent systemic infection related to VAD/TAH
 - Other VAD/TAH issues including recurrent or refractory VAD/TAH thrombosis.
- Category 23 - Exceptionally sick adult patient - high risk of dying or having an irreversible complication but does not meet urgent listing criteria. Patient registration must be agreed by CTAG Adjudication Panel and evidence of agreement emailed to NHSBT (Section 7).
- Category 31 - ACHD arrhythmia patients. Refractory arrhythmia (> 1 hospital admission over last 3 months with haemodynamic instability or associated with kidney or liver dysfunction).
- Category 32 - ACHD patients with no option for conventional escalation of therapy. Inpatients unsuitable for inotropes and/or VAD with one of the following:
 - Bilirubin and transaminases > 2x normal
 - Deteriorating renal function (eGFR <50ml/min/1.73m², or 20% reduction from baseline);
 - Requirement for dialysis/CVVH for fluid or electrolyte management;
 - Recurrent admissions (> 3 in preceding 3 months) with episodes of right heart failure or protein losing enteropathy requiring ascites drainage.

Listing criteria for paediatric Urgent Heart Allocation Scheme registration

- Category 51 - Paediatric with short-term mechanical circulatory support device (MCSD): Mechanical circulatory support for acute haemodynamic decompensation using a short-term right, left or bi-ventricular device (including Berlin Heart), implanted as a specific bridge-to-transplantation.
- Category 52 - Paediatric with MCSD with device-related complications: Mechanical circulatory support with objective medical evidence of significant device-related complications such as thrombo-embolism, device infection, mechanical failure and/or life-threatening ventricular arrhythmias. Panel reactive antibody sensitisation does not qualify for urgent registration in this criterion.
- Category 54 - Paediatric with veno-arterial ECMO: Mechanical circulatory support using extra-corporeal membrane oxygenation as a specific bridge-to-transplantation.
- Category 55 - Paediatric >15kg on high-dose inotropes: Patients >15kg on continuous central infusion of a high dose intravenous inotrope.
- Category 56 - Paediatric ≤15kg on ventilation and inotropes: Patients ≤15kg who are ventilated and on inotropes.
- Category 59 - Paediatric, Other: Paediatric patients outside the criteria listed above, but for whom the patient's transplant physicians believe urgent listing is justified using acceptable medical criteria not included above. Approval for listing under this category is as follows:
 - a) For paediatric patients whereby a maximum acceptable donor size has been specified to be <160cm in height and <60kg in weight, their eligibility for registering under this category must be discussed and agreed by the other paediatric transplant centre and the CTAG Chair or deputy and evidence of agreement emailed to NHSBT.
 - b) For paediatric patients whereby a maximum acceptable donor size has been specified to be ≥160 cm in height or ≥60kg in weight, their eligibility for registering under this category must be discussed and agreed by the other paediatric transplant centre and the CTAG (Heart) Adjudication panel via the Chair or deputy and evidence of agreement emailed to NHSBT.

Listing criteria for adult Super-Urgent Heart Allocation Scheme registration

- Category 11 - Adult patient on temporary ventricular assist device (VAD) or extra-corporeal membrane oxygenation (ECMO) support.
- Category 12 – Agreed by CTAG Adjudication Panel (Section 7) and evidence of agreement emailed to NHSBT, and either:
 - on intra-aortic balloon pump (IABP) support
 - at imminent risk of dying or irreversible complications. Meets criteria for urgent listing but is not suitable for long-term VAD and/or other exceptional circumstances.