

NHS BLOOD AND TRANSPLANT
CARDIOTHORACIC ADVISORY GROUP – HEART
SUPER-URGENT HEART TRANSPLANT OUTCOMES

INTRODUCTION

1. The primary indication for super-urgent heart listing is short-term ventricular assist device (ST VAD) or veno-arterial extra-corporeal membrane oxygenation (VV-ECMO) support. This paper compares the number of patients registered, demographic characteristics, median waiting time and post-transplant survival between the two support types. The time period analysed was 1 September 2017 to 31 March 2022.

DATA AND METHODS

2. All adult (age \geq 16) patient registrations onto the super-urgent heart transplant list between 1 September 2017 and 31 March 2022 were extracted from the UK Transplant Registry. These were subsequently restricted to those registered under category 11=*Adult or Small Adult patient on ST VAD or VA ECMO support*. This category previously allowed patients on Intra-Aortic Balloon Pumps (IABP) to be registered automatically onto the super-urgent list so anyone found to be registered due to IABP only was excluded.
3. Patients were categorised by the type of support they were on at time of super-urgent listing. This information was taken from three sources: the VAD Database was the primary source as this contains the most detail on mechanical circulatory support, however as 8% of the cohort couldn't be matched with the VAD Database, information on the Super-Urgent/Urgent Recipient Registration Form and the Cardiothoracic Audit Form were also used if present.
4. Demographic characteristics were compared between support types using the chi-squared test for categorical variables and Wilcoxon's rank-sum for continuous variables. Median time to transplant and patient survival post-transplant were analysed using the Kaplan-Meier method where support types were compared using the log-rank test.

RESULTS

5. There were 169 super-urgent registrations of interest, corresponding to 163 unique patients. A breakdown of these registrations by type of support and centre is shown in **Table 1**. In total, 88 (52%) patients were on a ST VAD only at time of super-urgent listing, 37 (22%) were on a ST VAD and ECMO, 36 (21%) were on ECMO only, 5 (3%) were on a LT VAD and ST VAD, 1 (<1%) was on a LT VAD and ECMO and for 2 patients the type of support could not be determined. Split into two broad groups this gave 74 in the ECMO group and 93 in the ST VAD group.

Support type	Birmingham	Glasgow	Harefield	Manchester	Newcastle	Papworth	Total
ST VAD	16	6	27	8	3	28	88
Centrimag	14	5	6	8	0	25	58
Impella	2	0	18	0	2	0	22
Biomedicus	0	0	1	0	0	0	1
Centrimag with BH cannula	0	0	0	0	1	0	1
Missing	0	1	2	0	0	3	6
ST VAD + ECMO	15	1	2	13	0	6	37
Centrimag	14	1	2	13	0	6	36
Impella	1	0	0	0	0	0	1
ECMO only	2	6	10	0	16	2	36
LT VAD + ST VAD	0	0	0	0	3	2	5
Heartware + Centrimag	0	0	0	0	2	0	2
Heartmate III + Unknown	0	0	0	0	0	1	1
Heartmate III + Centrimag	0	0	0	0	0	1	1
Heartware + Unknown	0	0	0	0	1	0	1
LT VAD + ECMO	0	0	0	0	1	0	1
Heartware	0	0	0	0	1	0	1
Missing	1	0	0	0	1	0	2
Total	34	13	39	21	24	38	169

6. **Table 2** shows patient demographics of ECMO registrations compared with ST VAD registrations. There were no differences across the two groups with respect to the demographics analysed.

Table 2 Demographic characteristics of ECMO versus ST VAD super-urgent registrations between 1 September 2017 and 31 March 2022

Patient demographics	ECMO (N=74)		ST VAD (N=93)		p-value
	N	%	N	%	
Sex					
Male	53	72	73	78	0.4
Female	21	28	20	22	
Primary disease					
Coronary heart disease	7	9	13	14	0.5
Cardiomyopathy	58	78	74	80	
Congenital heart disease	2	3	2	2	
Graft failure/rejection	1	1	1	1	
Other/not reported	6	8	3	3	
Previous open-heart surgery					
No	41	55	56	60	0.6
Yes	33	45	37	40	
Age (years), median (IQR)	37 (28-53)		45 (30-52)		0.4
Creatinine (umol/l), median (IQR)	81 (56-115)		84 (61-114)		0.7
Missing	4		9		
Bilirubin (umol/l), median (IQR)	21 (13-36)		22 (14-40)		0.8
Missing	4		9		

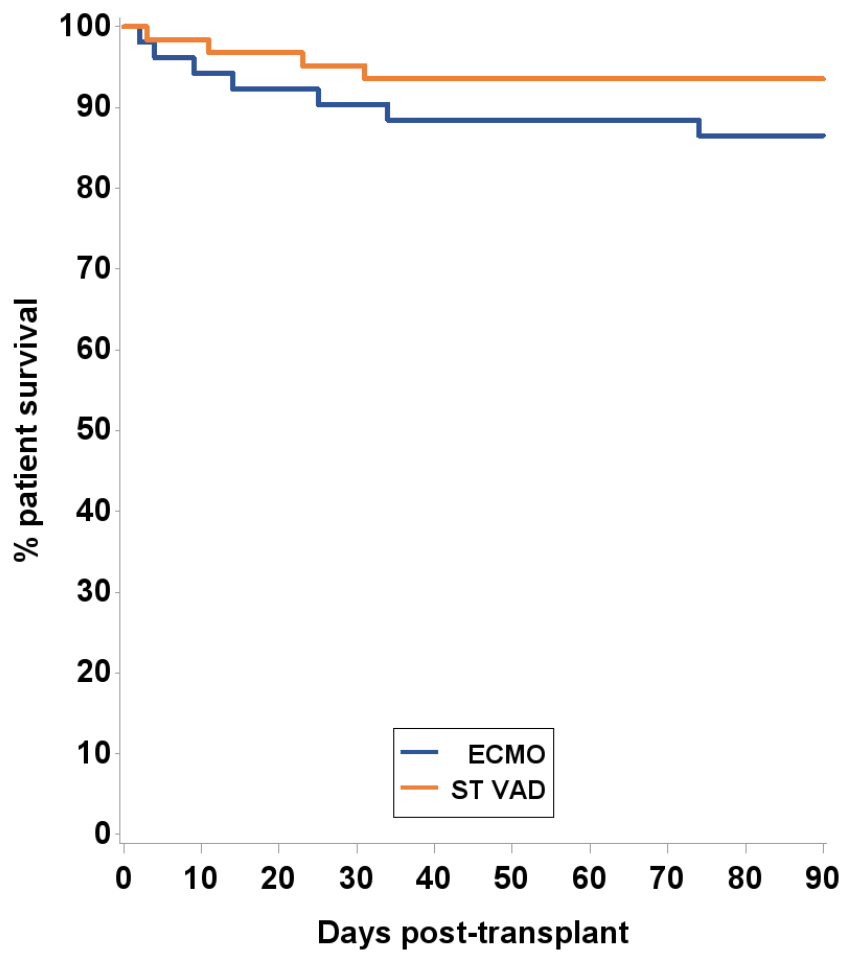
7. At time of data extraction all registrations had reached an outcome. In the ECMO group, 53 (72%) had received a transplant, 18 (24%) had been removed from the list and 3 (4%) had died on the list. In the ST VAD, 63 (68%) had received a transplant, 23 (25%) had been removed from the list and 7 (8%) had died on the list. Median waiting time to transplant across the two groups is shown in **Table 3**. There was no significant difference in median waiting time between the two groups (p=0.8).

Table 3 Median waiting time to transplant for ECMO versus ST VAD super-urgent registrations between 1 September 2017 and 31 March 2022

Support type	Number of registrations	Number receiving a transplant	Waiting time (days)	
			Median	95% CI
ECMO	74	53 (72%)	16	10 - 22
ST VAD	93	63 (68%)	18	13 - 23

8. Patient survival to 90 days post-transplant was analysed for 52 of the 53 ECMO patients and 62 of the 63 ST VAD patients reaching transplant, as two re-transplants were excluded for this part of the analysis. The survival curves are presented in **Figure 1**. There was no difference observed in the unadjusted survival curves (p=0.2).

Figure 1 Unadjusted post-transplant survival for ECMO versus ST VAD super-urgent transplants



ACTION

- 9. This is a preliminary analysis and needs refining, in particular the type of support needs verifying with centres. The analysis won't be published on the ODT Clinical Website until we are confident in the data.

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