

**NHS BLOOD AND TRANSPLANT****CARDIOTHORACIC ADVISORY GROUP – LUNG****REVIEW OF LUNG TRANSPLANT ALLOCATION DATA****SUMMARY****INTRODUCTION**

1. The super-urgent and urgent lung allocation schemes were introduced on 18 May 2017. This report presents outcomes of patients on the lung transplant waiting list, considering urgency group, centre and disease group. It also presents post-transplant outcomes by urgency group.

**DATA ANALYSIS**

2. The cohort of registrations covers 4.2 years, from 18 May 2017 to 31 July 2021. The cohort of transplants covers 3.9 years from 18 May 2017 to 31 July 2021, to allow for follow-up submission. The analysis considers adult patients only (age $\geq$ 16) and excludes heart-lung block registrations/transplants. For the post-transplant outcomes analysis, only first-time transplants were considered.

**RESULTS**

3. There were 918 non-urgent registrations, 171 urgent registrations and 30 super-urgent registrations in the time period. Super-urgent registrations represented 3% of all registrations and the majority of these were at Harefield. At time of analysis, 70% of super-urgent registrations ended in transplant, compared with 71% for urgent registrations and 36% for non-urgent registrations. 23% of super-urgent patients died on the list, compared with 11% for urgent registration and 17% for non-urgent registrations.
4. The most common primary disease in the super-urgent group was CF/bronchiectasis, followed by PF. PF patients had the highest mortality rate in each urgency group: 46% in the super-urgent group, 18% in the urgent group and 25% in the non-urgent group.
5. The median waiting times to transplant were 7 days for super-urgent, 22 days for urgent and 666 days (1.8 years) for non-urgent.
6. In the transplant cohort, the 90 day patient survival rate post-transplant was 85% for super-urgent patients, compared with 86% for urgent patients and 91% for non-urgent patients. At 1 year the survival rates were 75% for both super-urgent and urgent, and 83% for non-urgent. The proportion of patients requiring renal support in the first 30 days post-transplant was 65% in the super-urgent group, 30% in the urgent group and 22% in the non-urgent group.

**ACTION**

7. This information is provided for monitoring purposes, particularly in light of the recent implementation of the ECMO Bridge to Transplant policy.

## NHS BLOOD AND TRANSPLANT

### CARDIOTHORACIC ADVISORY GROUP – LUNG

#### REVIEW OF LUNG TRANSPLANT ALLOCATION DATA

#### INTRODUCTION

8. The super-urgent and urgent lung allocation schemes were introduced on 18 May 2017. This report presents outcomes of patients on the lung transplant waiting list, considering urgency group, centre and disease group. It also presents post-transplant outcomes by urgency group.

#### DATA AND METHODS

9. Data were extracted from the UK Transplant Registry on 26 August 2021 for all adult (age $\geq$ 16) patients registered for a lung transplant between 18 May 2017 and 31 July 2021. Registrations for heart-lung transplant were excluded, 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. Registration outcomes were analysed across urgency groups, by centre and primary disease group. Median age at registration was analysed across primary disease groups and urgency as well as median waiting time to transplant.
11. The number of adult lung transplants performed in each urgency category was analysed as well as short-term survival outcomes, where survival data were extracted on 12 August 2021. Heart-lung transplants were excluded.

#### RESULTS

##### Registration data

12. **Tables 1-3** present the outcomes of non-urgent, urgent and super-urgent registrations during the analysis period, by centre. Note that those patients registered towards the end of the time period are more likely to be “still waiting”. There were 918 non-urgent registrations (for 906 patients), 171 urgent registrations (for 169 patients), and 30 super-urgent registrations (for 30 patients). Super-urgent registrations represented 3% of all registrations in the period. Thirty six percent of non-urgent registrations ended in transplant compared with 71% for urgent registrations and 70% for super-urgent registrations.

Centre	Still waiting		Died		Removed		Became S-U		Transplanted		Became U		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
Birmingham	40	31	34	26	12	9	2	2	32	25	10	8	130
Harefield	57	23	38	15	37	15	13	5	89	36	13	5	247
Manchester	41	30	12	9	17	12	0	-	60	44	7	5	137
Newcastle	58	29	48	24	16	8	3	1	44	22	33	16	202
Papworth	31	15	23	11	15	7	2	1	106	52	25	12	202
<b>Total</b>	<b>227</b>	<b>25</b>	<b>155</b>	<b>17</b>	<b>97</b>	<b>11</b>	<b>20</b>	<b>2</b>	<b>331</b>	<b>36</b>	<b>88</b>	<b>10</b>	<b>918</b>

Centre	Still waiting		Died		Became N-U		Removed		Became S-U		Transplanted		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
Birmingham	0	-	3	14	1	5	2	10	3	14	12	57	<b>21</b>
Harefield	0	-	1	3	0	-	5	17	5	17	19	63	<b>30</b>
Manchester	0	-	1	8	0	-	0	-	0	-	12	92	<b>13</b>
Newcastle	3	4	13	19	0	-	6	9	2	3	44	65	<b>68</b>
Papworth	1	3	1	3	0	-	2	5	1	3	34	87	<b>39</b>
<b>Total</b>	<b>4</b>	<b>2</b>	<b>19</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>15</b>	<b>9</b>	<b>11</b>	<b>6</b>	<b>121</b>	<b>71</b>	<b>171</b>

Centre	Died		Removed		Transplanted		Total N
	N	%	N	%	N	%	
Birmingham	1	33	0	-	2	67	<b>3</b>
Harefield	3	14	2	10	16	76	<b>21</b>
Manchester	0	-	0	-	0	-	<b>0</b>
Newcastle	3	75	0	-	1	25	<b>4</b>
Papworth	0	-	0	-	2	100	<b>2</b>
<b>Total</b>	<b>7</b>	<b>23</b>	<b>2</b>	<b>7</b>	<b>21</b>	<b>70</b>	<b>30</b>

Note: all 30 registrations were under category 91=VV-ECMO, except one patient registered by Papworth who was granted super-urgent listing by the adjudication panel as a special case

13. **Tables 4-6** present the outcomes of non-urgent, urgent and super-urgent registrations during the analysis period, by disease group. In this time period, pulmonary fibrosis represented 41% of non-urgent registrations, 52% of urgent registrations and 43% of super-urgent registrations and in each urgency group these patients had the highest mortality rate on the list. No patients with COPD listed as their primary disease were registered super-urgently. The most common primary disease group in the super-urgent group was CF and bronchiectasis.

**Table 4 Outcomes of NON-URGENT lung registrations, 18 May 2017 – 31 Jul 2021, as at 26 Aug 2021, by primary disease group**

Disease group	Still waiting		Died		Removed		Became S-U		Transplanted		Became U		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
COPD	59	24	25	10	18	7	0	-	140	57	2	1	<b>244</b>
CF and bronchiectasis	47	26	11	6	19	11	10	6	70	39	23	13	<b>180</b>
PF	89	23	95	25	49	13	9	2	87	23	50	13	<b>379</b>
PAH	8	29	3	11	3	11	1	4	4	14	9	32	<b>28</b>
Other	24	28	21	24	8	9	0	-	30	34	4	5	<b>87</b>
<b>Total</b>	<b>227</b>	<b>25</b>	<b>155</b>	<b>17</b>	<b>97</b>	<b>11</b>	<b>20</b>	<b>2</b>	<b>331</b>	<b>36</b>	<b>88</b>	<b>10</b>	<b>918</b>

**Table 5 Outcomes of URGENT lung registrations, 18 May 2017 – 31 Jul 2021, as at 26 Aug 2021, by primary disease group**

Disease group	Still waiting		Died		Became N-U		Removed		Became S-U		Transplanted		Total N
	N	%	N	%	N	%	N	%	N	%	N	%	
COPD	0	-	0	-	0	-	0	-	0	-	2	100	<b>2</b>
CF and bronchiectasis	1	2	2	4	0	-	6	12	5	10	36	72	<b>50</b>
PF	2	2	16	18	0	-	7	8	5	6	59	66	<b>89</b>
PAH	1	4	1	4	1	4	2	8	1	4	19	76	<b>25</b>
Other	0	-	0	-	0	-	0	-	0	-	5	100	<b>5</b>
<b>Total</b>	<b>4</b>	<b>2</b>	<b>19</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>15</b>	<b>9</b>	<b>11</b>	<b>6</b>	<b>121</b>	<b>71</b>	<b>171</b>

**Table 6 Outcomes of SUPER-URGENT lung registrations, 18 May 2017 – 31 Jul 2021, as at 26 Aug 2021, by primary disease group**

Disease group	Died		Removed		Transplanted		Total N
	N	%	N	%	N	%	
COPD	0	-	0	-	0	-	<b>0</b>
CF and bronchiectasis	1	6	0	-	15	94	<b>16</b>
PF	6	46	2	15	5	38	<b>13</b>
PAH	0	-	0	-	1	100	<b>1</b>
Other	0	-	0	-	0	-	<b>0</b>
<b>Total</b>	<b>7</b>	<b>23</b>	<b>2</b>	<b>7</b>	<b>21</b>	<b>70</b>	<b>30</b>

14. **Table 7** presents median age at registration and the inter quartile range (IQR), by disease group and urgency. CF and bronchiectasis were younger on average, with a median of 32-33 years. PF patients were older with a median age of 56-58. The overall median age of super-urgent patients was 37 years, compared with 51 for urgent and 55 for non-urgent.

Disease group	Non-urgent			Urgent			Super-urgent		
	N	Median	IQR	N	Median	IQR	N	Median	IQR
COPD	244	57	52-60	2	44	24-63	0	-	-
CF and bronchiectasis	180	32	25-40	50	33	28-40	16	33	25-35
PF	379	58	52-62	89	57	52-61	13	55	50-57
PAH	28	44	33-52	25	46	39-52	1	-	-
Other	87	54	44-59	5	49	42-61	0	-	-
<b>Total</b>	<b>918</b>	<b>55</b>	<b>44-60</b>	<b>171</b>	<b>51</b>	<b>38-59</b>	<b>30</b>	<b>37</b>	<b>33-54</b>

15. **Table 8 (removed as patient specific)** presents details of the 30 super-urgent patients registered during the time period, including their primary disease, the super-urgent category they were registered under, their age, their time on the non-urgent and/or urgent waiting list before super-urgent registration, their time spent on the super-urgent waiting list and their super-urgent registration outcome.

16. **Table 9** presents median waiting time to transplant across urgency groups, including 95% confidence intervals (CI).

Urgency	Number of registrations	Number transplanted as at 26 Aug 2021	Waiting time (days)	
			Median	95% CI
Non-urgent	919	331 (36%)	666	556 - 776
Urgent	171	121 (71%)	22	15 - 29
Super-urgent	30	21 (70%)	7	2 - 12
<b>Overall<sup>1</sup></b>	<b>1119</b>	<b>473 (42%)</b>	<b>517</b>	<b>418 - 616</b>

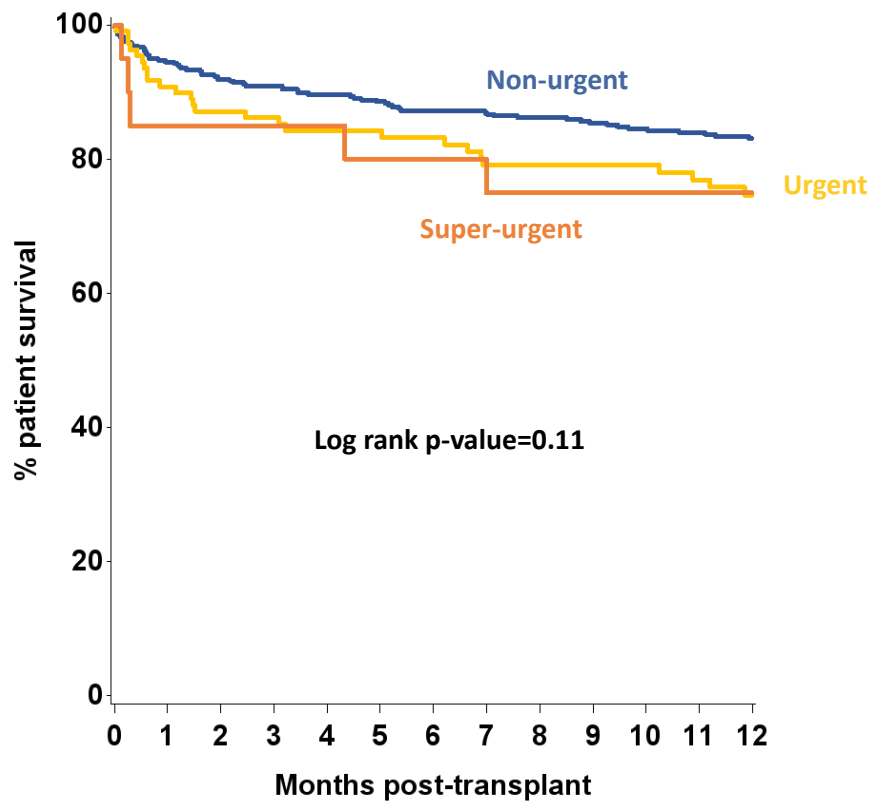
### Transplant data

17. **Table 10** presents the number of transplants performed by each centre in each urgency category between 18 May 2017 and 31 March 2021. 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.

Centre	Non-urgent		Urgent		Super-urgent		Total N
	N	%	N	%	N	%	
Birmingham	40	74	12	22	2	4	<b>54</b>
Harefield	136	80	18	11	15	9	<b>169</b>
Manchester	73	85	13	15	0	-	<b>86</b>
Newcastle	73	65	38	34	1	1	<b>112</b>
Papworth	107	76	31	22	2	1	<b>140</b>
<b>Total</b>	<b>429</b>	<b>76</b>	<b>112</b>	<b>20</b>	<b>20</b>	<b>4</b>	<b>561</b>

18. **Figure 1** and **Table 11** present one year survival curves by urgency, where re-grafts (N=6) and patients with missing survival data were excluded (3 non-urgent transplants, 2 urgent transplant and 0 super-urgent transplants). Of the 20 super-urgent transplants performed there were 5 deaths recorded post-transplant, however the survival rates should be interpreted with caution due to small numbers (hence the wide confidence intervals).

**Figure 1** 1 year Kaplan-Meier patient survival curves for adult patients transplanted 18 May 2017 – 31 March 2021, by urgency



**Table 11** Patient survival post-lung transplant by urgency for adult patients first transplanted 18 May 2017 – 31 March 2021

Urgency	Number of transplants	Number of deaths as at 12 Aug 2021 <sup>1</sup>	90 days		1 year	
			Survival (%)	95% CI	Survival (%)	95% CI
Non-urgent	421	67	91	88 - 93	83	79 - 86
Urgent	109	26	86	78 - 91	75	65 - 82
Super-urgent	20	5	85	60 - 95	75	50 - 89
<b>Overall</b>	<b>550</b>	<b>98</b>	<b>90</b>	<b>87 - 92</b>	<b>81</b>	<b>78 - 84</b>

19. **Table 12** shows the numbers of patients requiring renal support within 30 days post-first lung transplant, by urgency. The proportion requiring renal support in the super-urgent group was significantly higher than the other urgency groups, at 65%.

<b>Urgency</b>	<b>Number of transplants<sup>1</sup></b>	<b>Haemofiltration/Haemodialysis required</b>		<b>Chi-square p-value</b>
		<b>Number</b>	<b>%</b>	
Non-urgent	416	93	22	<0.0001
Urgent	109	33	30	
Super-urgent	20	13	65	
<b>Overall</b>	<b>545</b>	<b>139</b>	<b>26</b>	

<sup>1</sup> 10 transplants excluded due to missing renal support data