Additional report for Clinical Panel – ECMO as a bridge to lung transplant policy

Aim

The aim of the paper is to provide additional information on the lung allocation scheme, the patients in the super-urgent group and their outcomes.

This paper is included in the consultation to provide detailed background information and was used to help inform Clinical Panel discussions.

Background

For carefully selected patients, lung transplant offers both prognostic and quality of life benefits across all disease groups [1]. There have been recent increases in lung transplant numbers, with 214 transplants performed during the financial year 2017/18. However, the current financial year 2018/19 is likely to be approximately 20% lower than the preceding financial year with 156 transplants in the period up to 14th March 2019. On 31st March 2018 the national lung transplant list was 6% lower than on 31st March 2017 with 357 patients on the list. However this total is 56% higher than 10 years ago. Three years after listing 57% of adult patients on the lung only list had been transplanted and 26% had died (1st April 2014 – 31st March 2015). In the period 1st April 2012 to 31st March 2015 the national median waiting time was 282 days.

Current lung allocation scheme

The urgent (ULAS) and super-urgent allocation schemes (SULAS) were introduced on 18th May 2017 with the aim of balancing the needs of reducing waiting list mortality with improving outcomes for all listed patients. With the previous allocation scheme there was a gap between patient's clinical risk and their chances of receiving a lung transplant. Under that scheme patients with cystic fibrosis (CF) and pulmonary fibrosis (PF) had the highest waiting list mortality rates while patients with COPD had the greatest chance of receiving a lung transplant [2].

To be eligible for SULAS patients must be already registered onto the ULAS or non-urgent waiting list (NULAS) and endure an acute deterioration which they are highly unlikely to survive without extracorporeal support. These patients receive VV-ECMO as a bridge to transplant. These patients should have good rehabilitation potential which usually means they have had a short duration of severe illness.

Patients whose clinical condition has deteriorated on the SULAS (e.g. major sepsis, extrapulmonary organ failure) will be de-listed.

Each patient selected for the SULAS list is carefully considered by the transplant team but it is recognised that no allocation scheme can ever be perfect and address all needs. The allocation working group was reconvened in February this year to review the current criteria with a plan to utilise additional data from the CF Trust, the ILD database as well as NHSBT. NHSBT will also be undertaking work on better identifying clinical deterioration, however there will always be a cohort of patients that experience sudden, unexpected clinical deterioration.

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[1] Titman A et al. Disease-specific survival benefit of lung transplantation in adults : a national cohort study. Am J Transplant 2009 Jul; 9 (7): 1640-9

[2] Kourilouros A et al. Thorax 2018; 0:1-9 doi:10.1136/thoraxjnl-2018-211731

Characteristics of patients on the lung allocation schemes

Only patients supported on VV-ECMO or interventional lung assist (iLA) can be added to the SULAS. During the 20 month period between May 2017 and February 2019 there were 19 super-urgent registrations. This represents 4% of all registrations in that period. 18 of the 19 registrations were for patients on VV-ECMO with one additional patient not on VV-ECMO or iLA granted super-urgent listing as a special case

In the NULAS the most common disease types were COPD (27%), PF (37%) and CF (23%). However 39% of patients with COPD and CF were transplanted (between May 2017 and February 2019) compared to only 16% of those with PF. 5% of patients with CF and 5% of those with COPD died on the list compared to 19% with PF.

There were no patients with COPD on the ULAS or SULAS. On the ULAS 51% had PF (n=46) and of these 76% were transplanted (n=35). 31% had CF (n=28) and 71% (n=20) of these were transplanted. No CF patients died on the ULAS but 6 PF patients died (13%). On the SULAS 53% had CF (n=10) of which 90% were transplanted (n=9) and 42% had PF (n=8) of which 25% (n=2) were transplanted. 1 CF patient (10%) and 4 PF patients (50%) died on the list. This demonstrates that the primary disease group of patients on the SULAS and receiving ECMO BTL is different to the non-urgent transplant list.

Across all allocation schemes the patients with COPD (NULAS = 57 years) and PF (NULAS=58 years, ULAS =58 years, SULAS =57 years) had a much higher median age at registration compared to the CF group (NULAS=33 years, ULAS=30 years, SULAS=33years).

No children have accessed ECMO BTL. The policy is all ages however the therapy would only be suitable for adolescent patients of suitable height who have a chance of receiving an organ in a reasonable time frame. Numbers are likely to be extremely small.

Outcomes for patients on the SULAS

Of the patients in each category 63% on the SULAS received a transplant, 76% in the ULAS and 30% on the NULAS. The average wait time on the SULAS was eight days and 17 on the ULAS. Of the 12 SULAS lung transplants, 8 were undertaken at Harefield. Table 1 shows the distribution of adult lung transplants by urgency and centre between May 2017 and January 2019.

Table 1	Adult lung transplant performed in the UK, 18 May 2017 – 17 Jan 2019, by centre and urgency						
Centre	**Non-urgent**		**Urgent**		**Super-urgent**		**Total**
	N	**%**	**N**	**%**	**N**	**%**	**N**
Birmingham	20	67	8	27	2	7	30
Harefield	76	80	11	12	8	8	95
Manchester	33	80	8	20	0	0	41
Newcastle	34	60	23	40	0	0	57
Papworth	54	73	18	24	2	3	74
Total	**217**	**73**	**68**	**23**	**12**	**4**	**297**

The one year unadjusted survival curves by urgency allocations are presented in Figure 1 and Table 2. The one year survival rate of 73.3% should be interpreted with caution due to small numbers and the relatively short follow up period. The differences in survival rates are not statistically significant.
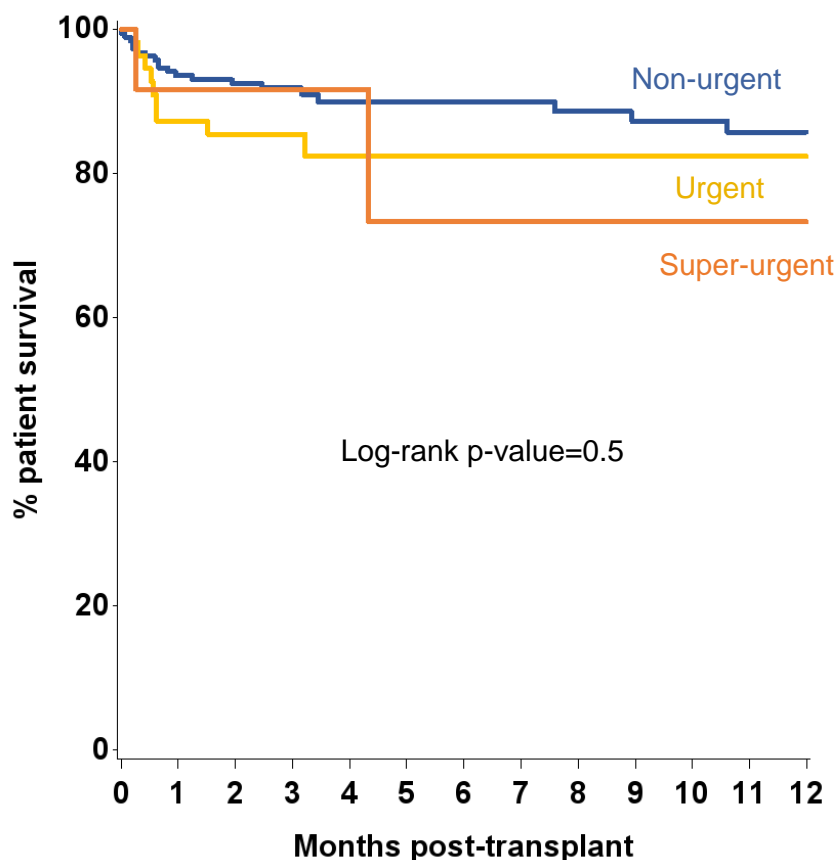

Figure 1   **1 year Kaplan-Meier patient survival curves for adult patients transplanted 18 May 2017 – 17 Jan 2019, by urgency**

Table 2	Unadjusted 1 year patient survival rates post-lung transplant by urgency for adult patients first transplanted 18 May 2017 – 17 Jan 2019			
Urgency	**Number of transplants**	**Number of deaths as at 14 Feb 2019**	**Survival (%)**	**95% CI**
Non-urgent	187	20	85.8	77.8-91.0
Urgent	55	9	82.4	68.4-90.6
Super-urgent	12	2	73.3	24.3-93.4
Overall	**254**	**31**	**84.5**	**78.0-89.2**

All outcome data is reviewed at the Lung Cardiothoracic Advisory Group which is convened by NHSBT and is attended by all transplant centres, NHSE, professional societies and lay members. This

early outcome data is on par with European and North American centres where ECMO BTL is an established intervention.

Conclusion

The patient group that have received ECMO BTL to date (those on the SULAS) are different to patients on the NULAS – they are predominantly patients with CF and PF. Those with CF are also younger.

ECMO BTL is an effective intervention for a carefully selected group of patients and reduces waiting list mortality for this cohort. Transplant outcomes for patients who have received ECMO BTL are broadly comparable with other transplant patients.

The outcomes for all disease groups within the three allocation tiers are closely monitored by the multidisciplinary Lung Cardiothoracic Advisory Group. The criteria for lung allocation is currently subject to review to improve the balance between equity of access, reduction in waiting list mortality and preservation of good post-operative outcomes. The stipulation that ECMO support is needed to be eligible for SULAS is unlikely to change but the outcome data for this patient group will inform future revisions. Changes to the lung urgency categories will be based on identifying and validating improved disease specific prognostic markers: this will take up to two years to implement and outcome data will not be available for at least three years.