A REVIEW OF HAEMATOLOGICAL PROFILES AND TRANSFUSION PRACTICES IN 300 PATIENTS AT A SINGLE ECMO CENTRE

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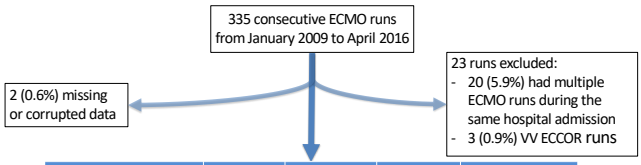
Introduction With the ability to support the function of both the lungs and heart, extracorporeal membrane oxygenation (ECMO) has revolutionised the organ support in critically ill patients in the last 20 years. However, anticoagulation management and blood product transfusion practices in patients with evolving disease states remains controversial.

Aims

1. To describe haematological profile and transfusion in different ECMO configurations in both surgical and non-surgical patients
2. To identify factors associated with mortality
3. To provide initial observational data for future prospective clinical trials

Method Retrospective evaluation of 310 ECMO runs in 300 patients between 2009-16 at a state-wide adult ECMO referral and Heart and Lung transplant centre.



	VV	VA	VPA	
SURGICAL	35 (11.3%)	102 (32.9%)	18 (5.8%)	155 (50%)
NONSURGICAL	70 (22.6%)	85 (27.4%)	0 (0%)	155 (50%)
	105 (33.9%)	187 (60.3%)	18 (5.8%)	310 (100%)

Results 2319 days on ECMO were included (mean runtime 7.5 days). Patient characteristics can be found in Table 1.

Number of days with aPTT >90 seconds was associated with higher mortality (*p<0.001*). This correlation was increased when platelet count was < 50x10^9 (*p<0.001*). Greater use of PRBC was associated with mortality (*p<0.001*) (figure 1).

Figure 1

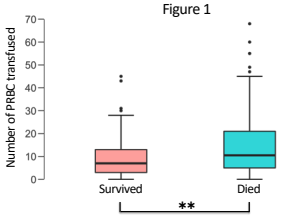
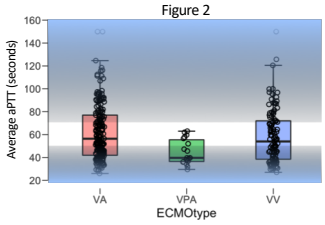


Figure 2



The mean haemoglobin was 101.6g/L (SD=16.7g/L) after initiation of ECMO and remained stable after an initial drop over the following 10 days while the mean platelet count was 164.0x10^9/L (SD=80.7x10^9/L) and was biphasic with a drop and subsequent recovery after day 5.

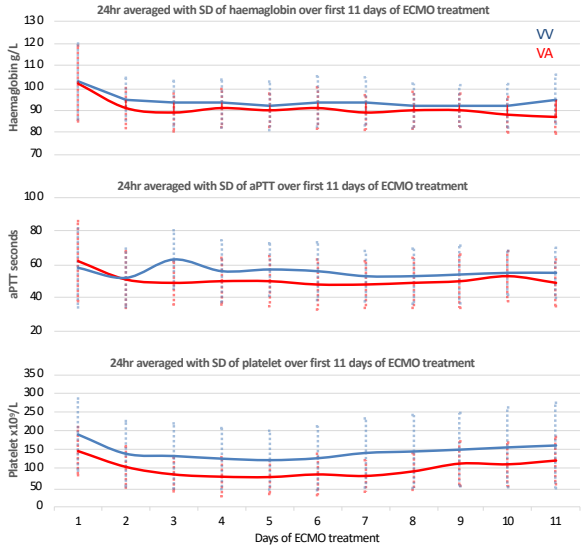
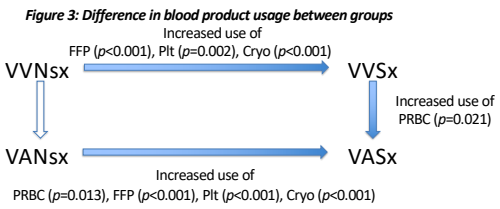


Figure 3: Difference in blood product usage between groups



VVNsx: VV ECMO, non surgical. VVSx: VV ECMO, surgical. VANsx: VA ECMO, non surgical. VVSx: VA ECMO, surgical. PRBC: Pack red blood cells FFP: Fresh Frozen Plasma. Plt: Pooled platelet. Cryo: Cryoprecipitate

The proportion with 24hr-averaged aPTT below and above the target range of 50 to 70 seconds were 43% and 30% respectively on the first day (figure 2) with the above target proportion decreasing to 10-15% in the following days. 54% of patients had at least 1 aPTT measurement above 70 seconds on the first day, and 31% above 140 seconds..

There was an overall higher blood product transfusion in surgical patients (figure 3).

		All	VV	VA	VPA	VV NSx	VV Sx	VA Nsx	VA Sx	Surv	Nsurv
N		310	105	187	18	70	35	85	102	198	112
Mean age (SD)		47.7 (15.3)	42.7 (15.3)	50.5 (14.6)	48.4 (16.7)	38.6 (14.9)	51.0 (12.9)	47.5 (13.9)	52.9 (14.7)	47.1 (14.8)	48.9 (16.2)
Male (%)		63	56	65	83	57	54	65	66	64	63
ECMO duration (hr)	Mean (Q1, Q3)	130 (74, 227)	187 (94, 380)	112 (69, 179)	139 (74, 169)	233.5 (127, 475)	109 (60, 206)	113 (52, 210)	112 (74, 165)	112 (79, 190)	146 (68, 354)
	Min	3	19	3	33	20	19	3	9	19	3
	Max	805	805	671	551	805	423	671	541	688	805
Mortality (%)		36	32	40	17	39	20	51	31		
Transfusion											
PRBC	Median (Q1,Q3)	8 (3,16)	6 (2, 11)	8 (4, 17)	9.5 (2, 19.5)	6 (2, 13)	6 (2, 9)	7 (2.5, 14.5)	11.5 (5, 18.5)	7 (3, 13)	10.5 (5, 21)
FFP	Median (Q1,Q3)	2 (0, 8)	0 (0, 6)	4 (0, 10)	8 (0, 16)	0 (0, 0)	4 (1, 7)	0 (0, 6)	5 (2, 14)	2 (0, 6)	2 (0, 12.8)
Pooled platelets	Median (Q1,Q3)	2 (0, 4)	0 (0, 3)	3 (0, 5)	3.5 (1, 6)	0 (0, 1)	2 (1, 3)	0 (0, 3)	3.5 (2, 6)	2 (0,4)	2 (0, 5)
Cryoprecipitate	Median (Q1,Q3)	4 (0, 12)	0 (0, 7)	4 (0, 12)	9 (3, 17.3)	0 (0, 0)	8 (0, 13)	0 (0, 8)	8 (4, 18)	4 (0, 10)	4 (0, 13.5)
Surgical site bleeding (%)		28	13	34	44	0	37	0	51	26	31
Cannular site bleeding (%)		11	10	13	0	9	6	20	8	8	16

Table 1: Baseline characteristics of 310 ECMO runs. Abbreviations: PRBC, pack red blood cells; FFP, Fresh Frozen Plasma; VV veno-venous; VA, veno-arterial; VPA, veno-pulmonary artery; NSx, non-surgical; Sx, surgical; Surv, survivors to hospital discharge.

Conclusions and future direction

Transfusion requirements differ with mode of ECMO and underlying conditions.
Platelet count, haemoglobin and APTT vary over the first 11 days of ECMO support.
The association of red cell and platelet transfusion with anticoagulation over time is complex and may determine complication rates and survival.
Future studies should prospectively capture these data to identify potential interventions, which need to be tested in randomised studies.