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Supplementary appendix

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Supplementary appendix

ECMO network organisation and clinical outcomes during the COVID-19 pandemic in Greater Paris: a retrospective multicentre cohort study

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Statistical analysis plan

This work reports a multicenter cohort study on ECMO network organization and outcomes during the first wave of the COVID-19 pandemic. The aim of the report is to describe the characteristics, ECMO managements and the outcomes of COVID-19 patients and to determine the prognostic variables for survival at the 90-days after ECMO.

Schematic representation

A schematic representation will be presented to depict the Organization of the Greater Paris ECMO network during the COVID-19 pandemic (8 March and 3 June 2020).

Descriptive analysis

Patient's characteristics will be described as frequencies and percentages for categorical variables and as means and standard deviations or medians and interquartile ranges for quantitative variables. Categorical variables will be compared by Chi-square or Fisher's exact test, and continuous variables will be compared by Student's t test or Wilcoxon's rank-sum test based on the normality test by Shapiro-Wilk test.

Kaplan–Meier overall survival curves until Day 90 will be computed using the log-rank tests.

Multivariable analysis

Multivariable analysis to identify independent variables associated with 90-day survival after ECMO will be performed using logistic regression model, using backward step-wise conditional method. Variables selected a priori for the multivariable model based on the literature in the ECMO and COVID-19 fields include, Age, BMI, time between intubation and ECMO, Time between first symptoms and ECMO, Number of all ECMO in the previous year,

Number of VV-ECMO in the previous year, Pre-ECMO Renal component of the SOFA, Pre-ECMO Liver component of the SOFA score, Pre-ECMO High-dose corticosteroids, Diabetes, Hypertension, Immunocompromised status, Cannulation by a mobile ECMO team, Pre-ECMO neuromuscular blockade, Pre-ECMO PaCO2, Pre-ECMO Plateau pressure , Pre-ECMO Prone positioning, Pre-ECMO cardiovascular component of the SOFA score, Pre-ECMO PaO2/FiO2. No variable selection will be performed.

VV-ECMO done on the previous year will be categorized into two groups based on the literature [(1)]; <30 and >30 VV-ECMO. Variables such as age, time between intubation and ECMO will be tertiled to better visualize in Kaplan-Meier plot, their impact on the survival.

The results of the Multivariable analysis will be expressed as odds ratios (ORs) with 95% confidence intervals (CIs), together with the p values. The goodness of the overall fit of the model will be validated by Omnibus tests of model coefficients at the 5% level of significance and ROC analysis.

Multiple imputation of the missing values

Multiple-imputation analyses will be performed with linear regression method for quantitative variables and logistic regression for categorical variables. We will compare the imputed values with the observed values to establish the validity of the imputed data. The imputation will be repeated 10 times and Rubin's rule [(2)] will be used to combine variable estimates and standard errors. Sensitivity analysis will be performed to evaluate the robustness of our findings in terms of missing data.

The variables that will be used for the multiple imputation analysis will comprise, Age, BMI, time between intubation and ECMO, Time between first symptoms and ECMO, Number of all ECMO in the previous year, Number of VV-ECMO in the previous year, Pre-ECMO Renal

component of the SOFA, Pre-ECMO Liver component of the SOFA score, Pre-ECMO High-dose corticosteroids, Diabetes, Hypertension, Immunocompromised status, Cannulation by a mobile ECMO team, Pre-ECMO neuromuscular blockade, Pre-ECMO PaCO2, Pre-ECMO Plateau pressure , Pre-ECMO Prone positioning, Pre-ECMO cardiovascular component of the SOFA score, Pre-ECMO PaO2/FiO2.

Machine-learning approach

The popular machine-learning algorithm, 'Random Forest (RF)', will be used to validate our results of conventional model. RF is an ensemble-based technique that aims to minimize the limitations of classical decision trees by building multiple trees from a random subset of the original training data and considering only a random number of predictor variables at each split, instead of trying all the variables at every split, before aggregating their results [(3)(4)]. RF is more robust to overfitting than other normal decision trees and promises a good predictive performance. RF runs quite efficiently on large datasets; categorical and continuous. Atleast 5000 random trees will be set in our analysis. The top features ranked by their contributions to classification accuracy (Mean Dicrease Accuracy) will be compared to the results obtained by conventional model.

Principal component analysis (PCA)

PCA is a mathematical algorithm that reduces the dimensionality of the data, by the transformation of larger variable sets into small sets that retain most of the information in the large set. In a simpler term, PCA reduces the dimensionality of large datasets, thereby increases the interpretability, while simultaneously minimizing information loss. The first principal component (PC) explains the highest variability in the data and each of the succeeding PC accounts for the remaining variability in the dataset [(5)] . To form each

additional PC, it seeks out a second linear combination that can explain the maximum of the remaining variance. Variable loadings; variables that contributes for the variance for each PCs will be obtained. PCA is more a descriptive tool, rather than predictive, but partly can validate or explain the predicted findings. The loadings of the PCA will then be clustered by Pearson correlation to better depict the findings.

Statistical software

Descriptive, univariate, and multivariable analysis will be performed using SPSS software v26.0. Random forest, PCA, correlation network will be made using the R 3.5.3; packages include corrPlot, randomForest, and MetaboAnalystR.

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Table S1: Group statistics – multiple imputation − variables used in the multivariable analysis

Multiple-imputation analyses were done with linear regression method for quantitative variables and logistic regression for categorical variables. Variables entered in the model were selected a priori based on the literature in the ECMO and COVID-19 fields. Variables used in the model regardless of their p value include, Pre-ECMO High-dose corticosteroids, Diabetes, Hypertension, Immunocompromised, Mobile ECMO Transfer, Neuromuscular blockade, Pre-ECMO PaCO2, Pre-ECMO Plateau pressure , Pre-ECMO Prone positioning, Pre-ECMO Liver component of the SOFA score, Pre-ECMO VAC component of the SOFA score, Pre-ECMO PaO2/FiO2.

Imputation Number			N	Mean	Std. Deviation	Std. Error Mean	Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
Original data	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	160	30,594	5,592	0,442			
		Alive	136	30,722	6,213	0,533			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	159	15,547	6,878	0,545			
		Alive	136	13,647	5,305	0,455			
		Dead	164	5,866	4,078	0,318			

	Orotracheal intubation - ECMO delay	Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	137	0,409	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	156	2,237	1,719	0,138			
		Alive	128	2,102	1,822	0,161			
	Pre-ECMO Liver component of the SOFA	Dead	155	0,555	0,948	0,076			
		Alive	129	0,372	0,674	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	156	1,372	1,583	0,127			
		Alive	129	0,667	1,277	0,112			
	Pre-ECMO Plateau pressure	Dead	135	30,615	6,340	0,546			
		Alive	117	30,034	4,878	0,451			
	Pre-ECMO paCO2	Dead	154	59,500	16,579	1,336			
		Alive	132	56,462	14,781	1,286			
	Pre-ECMO paO2/FiO2	Dead	158	64,525	17,801	1,416			
		Alive	136	63,426	16,896	1,449			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
1	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,456	5,616	0,439			

		Alive	138	30,708	6,184	0,526			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,640	6,813	0,532			
		Alive	138	13,607	5,320	0,453			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,232	1,714	0,134			
		Alive	138	2,062	1,823	0,155			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,502	0,972	0,076			
		Alive	138	0,355	0,675	0,057			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,396	1,550	0,121			
		Alive	138	0,691	1,350	0,115			
	Pre-ECMO Plateau pressure	Dead	164	30,869	6,227	0,486			
		Alive	138	30,150	5,179	0,441			
	Pre-ECMO paCO2	Dead	164	59,322	16,292	1,272			
		Alive	138	56,974	15,025	1,279			
	Pre-ECMO paO2/FiO2	Dead	164	63,779	17,947	1,401			
		Alive	138	63,540	16,826	1,432			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			

	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
2	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,561	5,687	0,444			
		Alive	138	30,720	6,167	0,525			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,672	6,957	0,543			
		Alive	138	13,639	5,267	0,448			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,243	1,703	0,133			
		Alive	138	2,114	1,787	0,152			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,562	0,955	0,075			
		Alive	138	0,356	0,694	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,363	1,592	0,124			
		Alive	138	0,673	1,288	0,110			
		Dead	164	30,599	6,065	0,474			

	Pre-ECMO Plateau pressure	Alive	138	30,178	4,783	0,407			
	Pre-ECMO paCO2	Dead	164	59,005	16,539	1,291			
		Alive	138	56,807	14,966	1,274			
	Pre-ECMO paO2/FiO2	Dead	164	64,521	17,579	1,373			
		Alive	138	63,075	17,034	1,450			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
3	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,477	5,624	0,439			
		Alive	138	30,635	6,214	0,529			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,713	6,887	0,538			
		Alive	138	13,658	5,389	0,459			
		Dead	164	5,866	4,078	0,318			

	Orotracheal intubation - ECMO delay	Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,221	1,736	0,136			
		Alive	138	2,137	1,817	0,155			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,523	0,982	0,077			
		Alive	138	0,396	0,665	0,057			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,351	1,560	0,122			
		Alive	138	0,712	1,314	0,112			
	Pre-ECMO Plateau pressure	Dead	164	30,711	6,505	0,508			
		Alive	138	30,042	5,087	0,433			
	Pre-ECMO paCO2	Dead	164	59,963	16,382	1,279			
		Alive	138	56,466	14,645	1,247			
	Pre-ECMO paO2/FiO2	Dead	164	64,040	17,975	1,404			
		Alive	138	63,222	17,020	1,449			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
4	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,537	5,563	0,434			

		Alive	138	30,774	6,182	0,526			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,602	6,920	0,540			
		Alive	138	13,655	5,281	0,450			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,413	0,494	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,202	1,752	0,137			
		Alive	138	2,125	1,858	0,158			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,541	0,942	0,074			
		Alive	138	0,375	0,719	0,061			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,338	1,578	0,123			
		Alive	138	0,717	1,312	0,112			
	Pre-ECMO Plateau pressure	Dead	164	30,706	6,193	0,484			
		Alive	138	30,366	5,128	0,437			
	Pre-ECMO paCO2	Dead	164	59,830	16,550	1,292			
		Alive	138	56,670	14,742	1,255			
	Pre-ECMO paO2/FiO2	Dead	164	64,898	17,754	1,386			
		Alive	138	63,576	16,845	1,434			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			

	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
5	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,544	5,582	0,436			
		Alive	138	30,685	6,207	0,528			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,618	6,860	0,536			
		Alive	138	13,654	5,286	0,450			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,263	1,729	0,135			
		Alive	138	2,193	1,915	0,163			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,526	0,969	0,076			
		Alive	138	0,342	0,721	0,061			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,318	1,627	0,127			
		Alive	138	0,680	1,257	0,107			
		Dead	164	30,475	6,132	0,479			

	Pre-ECMO Plateau pressure	Alive	138	30,169	5,111	0,435			
	Pre-ECMO paCO2	Dead	164	60,126	16,435	1,283			
		Alive	138	56,962	14,905	1,269			
	Pre-ECMO paO2/FiO2	Dead	164	64,472	17,674	1,380			
		Alive	138	63,640	17,099	1,456			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
6	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,563	5,584	0,436			
		Alive	138	30,678	6,178	0,526			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,584	6,788	0,530			
		Alive	138	13,615	5,285	0,450			
		Dead	164	5,866	4,078	0,318			

	Orotracheal intubation - ECMO delay	Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,239	1,708	0,133			
		Alive	138	2,075	1,974	0,168			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,542	0,942	0,074			
		Alive	138	0,374	0,698	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,404	1,575	0,123			
		Alive	138	0,677	1,358	0,116			
	Pre-ECMO Plateau pressure	Dead	164	30,750	6,137	0,479			
		Alive	138	30,285	5,282	0,450			
	Pre-ECMO paCO2	Dead	164	59,470	16,524	1,290			
		Alive	138	56,686	15,036	1,280			
	Pre-ECMO paO2/FiO2	Dead	164	65,052	18,159	1,418			
		Alive	138	63,074	17,122	1,458			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
7	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,507	5,575	0,435			

		Alive	138	30,678	6,201	0,528			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,583	6,816	0,532			
		Alive	138	13,648	5,296	0,451			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,413	0,494	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,196	1,767	0,138			
		Alive	138	2,160	1,846	0,157			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,543	0,956	0,075			
		Alive	138	0,390	0,696	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,410	1,581	0,123			
		Alive	138	0,667	1,321	0,112			
	Pre-ECMO Plateau pressure	Dead	164	30,683	6,226	0,486			
		Alive	138	30,543	5,303	0,451			
	Pre-ECMO paCO2	Dead	164	59,409	16,672	1,302			
		Alive	138	56,408	14,772	1,257			
	Pre-ECMO paO2/FiO2	Dead	164	64,278	17,786	1,389			
		Alive	138	63,344	16,929	1,441			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			

	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
8	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,603	5,586	0,436			
		Alive	138	30,674	6,247	0,532			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,692	6,892	0,538			
		Alive	138	13,697	5,287	0,450			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,413	0,494	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,259	1,737	0,136			
		Alive	138	2,122	1,791	0,152			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,511	0,951	0,074			
		Alive	138	0,343	0,698	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,319	1,575	0,123			
		Alive	138	0,676	1,310	0,112			
		Dead	164	30,377	6,329	0,494			

	Pre-ECMO Plateau pressure	Alive	138	29,754	4,908	0,418			
	Pre-ECMO paCO2	Dead	164	59,477	16,493	1,288			
		Alive	138	56,742	14,777	1,258			
	Pre-ECMO paO2/FiO2	Dead	164	64,473	17,843	1,393			
		Alive	138	63,587	16,881	1,437			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
9	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,713	5,609	0,438			
		Alive	138	30,698	6,184	0,526			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,557	6,864	0,536			
		Alive	138	13,700	5,410	0,461			
		Dead	164	5,866	4,078	0,318			

	Orotracheal intubation - ECMO delay	Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,224	1,722	0,134			
		Alive	138	2,111	1,832	0,156			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,536	0,938	0,073			
		Alive	138	0,392	0,690	0,059			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,378	1,565	0,122			
		Alive	138	0,653	1,289	0,110			
	Pre-ECMO Plateau pressure	Dead	164	30,909	6,348	0,496			
		Alive	138	30,378	5,575	0,475			
	Pre-ECMO paCO2	Dead	164	59,990	16,349	1,277			
		Alive	138	56,690	14,905	1,269			
	Pre-ECMO paO2/FiO2	Dead	164	64,489	18,183	1,420			
		Alive	138	63,362	16,937	1,442			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
10	All ECMO previous year	Dead	164	83,290	93,699	7,317			
		Alive	138	117,600	130,413	11,102			
	VV-ECMO previous year	Dead	164	20,744	21,583	1,685			
		Alive	138	29,877	26,426	2,250			
	Age	Dead	164	52,965	8,618	0,673			
		Alive	138	48,569	10,582	0,901			
	BMI	Dead	164	30,576	5,560	0,434			

		Alive	138	30,729	6,182	0,526			
	Hypertension	Dead	164	0,360	0,481	0,038			
		Alive	138	0,319	0,468	0,040			
	Diabetes	Dead	164	0,317	0,467	0,036			
		Alive	138	0,254	0,437	0,037			
	Immunocompromised	Dead	164	0,079	0,271	0,021			
		Alive	138	0,036	0,188	0,016			
	Symptoms - ECMO delay	Dead	164	15,575	6,812	0,532			
		Alive	138	13,664	5,345	0,455			
	Orotracheal intubation - ECMO delay	Dead	164	5,866	4,078	0,318			
		Alive	138	4,268	3,241	0,276			
	Mobile ECMO Transfer	Dead	164	0,348	0,478	0,037			
		Alive	138	0,406	0,493	0,042			
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,259	1,688	0,132			
		Alive	138	2,106	1,813	0,154			
	Pre-ECMO Liver component of the SOFA	Dead	164	0,523	0,939	0,073			
		Alive	138	0,373	0,684	0,058			
	Pre-ECMO Renal component of the SOFA	Dead	164	1,361	1,583	0,124			
		Alive	138	0,716	1,290	0,110			
	Pre-ECMO Plateau pressure	Dead	164	30,425	6,285	0,491			
		Alive	138	30,272	5,154	0,439			
	Pre-ECMO paCO2	Dead	164	59,734	16,399	1,281			
		Alive	138	56,978	14,894	1,268			
	Pre-ECMO paO2/FiO2	Dead	164	64,412	17,821	1,392			
		Alive	138	63,410	16,789	1,429			
	Pre-ECMO Prone positioning	Dead	164	0,945	0,228	0,018			
		Alive	138	0,942	0,235	0,020			
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982	0,134	0,010			
		Alive	138	0,942	0,235	0,020			

	Pre-ECMO High-dose corticosteroids	Dead	164	0,189	0,393	0,031			
		Alive	138	0,217	0,414	0,035			
Pooled	All ECMO previous year	Dead	164	83,290	93,699	7,317	0,000	0,000	1,000
		Alive	138	117,600	130,413	11,102	0,000	0,000	1,000
	VV-ECMO previous year	Dead	164	20,744		1,685	0,000	0,000	1,000
		Alive	138	29,877		2,250	0,000	0,000	1,000
	Age	Dead	164	52,965		0,673	0,000	0,000	1,000
		Alive	138	48,569		0,901	0,000	0,000	1,000
	BMI	Dead	164	30,554		0,444	0,029	0,030	0,997
		Alive	138	30,698		0,529	0,006	0,006	0,999
	Hypertension	Dead	164	0,360		0,038	0,000	0,000	1,000
		Alive	138	0,319		0,040	0,000	0,000	1,000
	Diabetes	Dead	164	0,317		0,036	0,000	0,000	1,000
		Alive	138	0,254		0,037	0,000	0,000	1,000
	Immunocompromised	Dead	164	0,079		0,021	0,000	0,000	1,000
		Alive	138	0,036		0,016	0,000	0,000	1,000
	Symptoms - ECMO delay	Dead	164	15,624		0,539	0,011	0,011	0,999
		Alive	138	13,654		0,454	0,005	0,005	1,000
	Orotracheal intubation - ECMO delay	Dead	164	5,866		0,318	0,000	0,000	1,000
		Alive	138	4,268		0,276	0,000	0,000	1,000
	Mobile ECMO Transfer	Dead	164	0,348		0,037	0,000	0,000	1,000
		Alive	138	0,408		0,042	0,008	0,008	0,999
	Pre-ECMO Cardiovascular component of the SOFA	Dead	164	2,234		0,137	0,032	0,033	0,997
		Alive	138	2,121		0,162	0,061	0,064	0,994
	Pre-ECMO Liver component of the SOFA	Dead	164	0,531		0,077	0,057	0,060	0,994
		Alive	138	0,370		0,063	0,112	0,124	0,989
	Pre-ECMO Renal component of the SOFA	Dead	164	1,364		0,128	0,075	0,079	0,993
		Alive	138	0,686		0,114	0,042	0,043	0,996
		Dead	164	30,650		0,523	0,134	0,150	0,987

	Pre-ECMO Plateau pressure	Alive	138	30,214		0,493	0,216	0,263	0,979
	Pre-ECMO paCO2	Dead	164	59,633		1,338	0,078	0,083	0,992
		Alive	138	56,738		1,283	0,027	0,028	0,997
	Pre-ECMO paO2/FiO2	Dead	164	64,442		1,448	0,072	0,076	0,993
		Alive	138	63,383		1,459	0,022	0,023	0,998
	Pre-ECMO Prone positioning	Dead	164	0,945		0,018	0,000	0,000	1,000
		Alive	138	0,942		0,020	0,000	0,000	1,000
	Pre-ECMO Neuromuscular blockade	Dead	164	0,982		0,010	0,000	0,000	1,000
		Alive	138	0,942		0,020	0,000	0,000	1,000
	Pre-ECMO High-dose corticosteroids	Dead	164	0,189		0,031	0,000	0,000	1,000
		Alive	138	0,217		0,035	0,000	0,000	1,000

Table S2: Independent samples test of the Multiple Imputation data

Imputation Number	Variables	Statistical test for Equality of Means							Fraction Missing Info.	Relative Increase Variance	Relative Efficiency
		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI of the Difference				
							Lower	Upper			
Original data	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,19	294	0,85	-0,13	0,69	-1,48	1,22			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,62	293	0,01	1,90	0,72	0,47	3,33			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,09	299	0,28	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,64	282	0,52	0,14	0,21	-0,28	0,55			
	Pre-ECMO Liver component of the SOFA	1,84	282	0,07	0,18	0,10	-0,01	0,38			

	Pre-ECMO Renal component of the SOFA	4,08	283	0,00	0,71	0,17	0,36	1,05			
	Pre-ECMO Plateau pressure	0,81	250	0,42	0,58	0,72	-0,84	2,00			
	Pre-ECMO paCO2	1,62	284	0,11	3,04	1,87	-0,65	6,72			
	Pre-ECMO paO2/FiO2	0,54	292	0,59	1,10	2,03	-2,90	5,10			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
1	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,37	300	0,71	-0,25	0,68	-1,59	1,09			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,85	300	0,00	2,03	0,71	0,63	3,44			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			

	Pre-ECMO Cardiovascular component of the SOFA	0,84	300	0,40	0,17	0,20	-0,23	0,57			
	Pre-ECMO Liver component of the SOFA	1,50	300	0,13	0,15	0,10	-0,05	0,34			
	Pre-ECMO Renal component of the SOFA	4,17	300	0,00	0,70	0,17	0,37	1,04			
	Pre-ECMO Plateau pressure	1,08	300	0,28	0,72	0,67	-0,59	2,03			
	Pre-ECMO paCO2	1,29	300	0,20	2,35	1,82	-1,23	5,92			
	Pre-ECMO paO2/FiO2	0,12	300	0,91	0,24	2,02	-3,73	4,20			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
2	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,23	300	0,82	-0,16	0,68	-1,50	1,19			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,82	300	0,01	2,03	0,72	0,61	3,45			

	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,64	300	0,52	0,13	0,20	-0,27	0,52			
	Pre-ECMO Liver component of the SOFA	2,10	300	0,04	0,21	0,10	0,01	0,40			
	Pre-ECMO Renal component of the SOFA	4,09	300	0,00	0,69	0,17	0,36	1,02			
	Pre-ECMO Plateau pressure	0,66	300	0,51	0,42	0,64	-0,83	1,67			
	Pre-ECMO paCO2	1,20	300	0,23	2,20	1,83	-1,40	5,80			
	Pre-ECMO paO2/FiO2	0,72	300	0,47	1,45	2,00	-2,49	5,39			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
3	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,23	300	0,82	-0,16	0,68	-1,50	1,18			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			

	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,85	300	0,00	2,05	0,72	0,63	3,48			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,41	300	0,68	0,08	0,20	-0,32	0,49			
	Pre-ECMO Liver component of the SOFA	1,29	300	0,20	0,13	0,10	-0,07	0,32			
	Pre-ECMO Renal component of the SOFA	3,81	300	0,00	0,64	0,17	0,31	0,97			
	Pre-ECMO Plateau pressure	0,98	300	0,33	0,67	0,68	-0,67	2,01			
	Pre-ECMO paCO2	1,94	300	0,05	3,50	1,80	-0,05	7,05			
	Pre-ECMO paO2/FiO2	0,40	300	0,69	0,82	2,03	-3,17	4,81			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
4	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			

	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,35	300	0,73	-0,24	0,68	-1,57	1,09			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,71	300	0,01	1,95	0,72	0,53	3,36			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,17	300	0,24	-0,07	0,06	-0,18	0,04			
	Pre-ECMO Cardiovascular component of the SOFA	0,37	300	0,71	0,08	0,21	-0,33	0,49			
	Pre-ECMO Liver component of the SOFA	1,70	300	0,09	0,17	0,10	-0,03	0,36			
	Pre-ECMO Renal component of the SOFA	3,67	300	0,00	0,62	0,17	0,29	0,95			
	Pre-ECMO Plateau pressure	0,51	300	0,61	0,34	0,66	-0,96	1,64			
	Pre-ECMO paCO2	1,74	300	0,08	3,16	1,82	-0,42	6,74			
	Pre-ECMO paO2/FiO2	0,66	300	0,51	1,32	2,00	-2,62	5,27			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			

	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
5	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,21	300	0,84	-0,14	0,68	-1,48	1,19			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,75	300	0,01	1,96	0,72	0,56	3,37			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,33	300	0,74	0,07	0,21	-0,34	0,48			
	Pre-ECMO Liver component of the SOFA	1,85	300	0,07	0,18	0,10	-0,01	0,38			
	Pre-ECMO Renal component of the SOFA	3,76	300	0,00	0,64	0,17	0,30	0,97			
	Pre-ECMO Plateau pressure	0,47	300	0,64	0,31	0,66	-0,99	1,60			

	Pre-ECMO paCO2	1,74	300	0,08	3,16	1,82	-0,42	6,74			
	Pre-ECMO paO2/FiO2	0,41	300	0,68	0,83	2,01	-3,13	4,79			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
6	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,17	300	0,86	-0,12	0,68	-1,45	1,22			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,77	300	0,01	1,97	0,71	0,57	3,37			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,77	300	0,44	0,16	0,21	-0,25	0,58			
	Pre-ECMO Liver component of the SOFA	1,74	300	0,08	0,17	0,10	-0,02	0,36			

	Pre-ECMO Renal component of the SOFA	4,25	300	0,00	0,73	0,17	0,39	1,06			
	Pre-ECMO Plateau pressure	0,70	300	0,49	0,46	0,67	-0,85	1,77			
	Pre-ECMO paCO2	1,52	300	0,13	2,78	1,83	-0,82	6,39			
	Pre-ECMO paO2/FiO2	0,97	300	0,33	1,98	2,04	-2,04	6,00			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
7	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,25	300	0,80	-0,17	0,68	-1,51	1,16			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,72	300	0,01	1,94	0,71	0,53	3,34			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,17	300	0,24	-0,07	0,06	-0,18	0,04			

	Pre-ECMO Cardiovascular component of the SOFA	0,17	300	0,86	0,04	0,21	-0,37	0,45			
	Pre-ECMO Liver component of the SOFA	1,56	300	0,12	0,15	0,10	-0,04	0,35			
	Pre-ECMO Renal component of the SOFA	4,38	300	0,00	0,74	0,17	0,41	1,08			
	Pre-ECMO Plateau pressure	0,21	300	0,84	0,14	0,67	-1,18	1,46			
	Pre-ECMO paCO2	1,64	300	0,10	3,00	1,83	-0,60	6,60			
	Pre-ECMO paO2/FiO2	0,46	300	0,64	0,93	2,01	-3,02	4,89			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
8	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,10	300	0,92	-0,07	0,68	-1,41	1,27			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,78	300	0,01	1,99	0,72	0,58	3,41			

	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,17	300	0,24	-0,07	0,06	-0,18	0,04			
	Pre-ECMO Cardiovascular component of the SOFA	0,67	300	0,50	0,14	0,20	-0,26	0,54			
	Pre-ECMO Liver component of the SOFA	1,72	300	0,09	0,17	0,10	-0,02	0,36			
	Pre-ECMO Renal component of the SOFA	3,81	300	0,00	0,64	0,17	0,31	0,98			
	Pre-ECMO Plateau pressure	0,94	300	0,35	0,62	0,66	-0,68	1,92			
	Pre-ECMO paCO2	1,50	300	0,13	2,74	1,82	-0,84	6,31			
	Pre-ECMO paO2/FiO2	0,44	300	0,66	0,89	2,01	-3,07	4,84			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
9	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			
	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	0,02	300	0,98	0,02	0,68	-1,32	1,35			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			

	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,58	300	0,01	1,86	0,72	0,44	3,28			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,55	300	0,58	0,11	0,20	-0,29	0,52			
	Pre-ECMO Liver component of the SOFA	1,49	300	0,14	0,14	0,10	-0,05	0,33			
	Pre-ECMO Renal component of the SOFA	4,35	300	0,00	0,73	0,17	0,40	1,05			
	Pre-ECMO Plateau pressure	0,77	300	0,44	0,53	0,69	-0,83	1,90			
	Pre-ECMO paCO2	1,82	300	0,07	3,30	1,81	-0,27	6,87			
	Pre-ECMO paO2/FiO2	0,55	300	0,58	1,13	2,04	-2,88	5,13			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			
	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
10	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86			

	VV-ECMO previous year	-3,31	300	0,00	-9,13	2,76	-14,57	-3,70			
	Age	3,98	300	0,00	4,40	1,10	2,22	6,57			
	BMI	-0,23	300	0,82	-0,15	0,68	-1,48	1,18			
	Hypertension	0,75	300	0,46	0,04	0,05	-0,07	0,15			
	Diabetes	1,21	300	0,23	0,06	0,05	-0,04	0,17			
	Immunocompromised	1,57	300	0,12	0,04	0,03	-0,01	0,10			
	Symptoms - ECMO delay	2,67	300	0,01	1,91	0,71	0,50	3,32			
	Orotracheal intubation - ECMO delay	3,72	300	0,00	1,60	0,43	0,75	2,44			
	Mobile ECMO Transfer	-1,04	300	0,30	-0,06	0,06	-0,17	0,05			
	Pre-ECMO Cardiovascular component of the SOFA	0,76	300	0,45	0,15	0,20	-0,24	0,55			
	Pre-ECMO Liver component of the SOFA	1,56	300	0,12	0,15	0,10	-0,04	0,34			
	Pre-ECMO Renal component of the SOFA	3,84	300	0,00	0,65	0,17	0,31	0,98			
	Pre-ECMO Plateau pressure	0,23	300	0,82	0,15	0,67	-1,16	1,47			
	Pre-ECMO paCO2	1,52	300	0,13	2,76	1,82	-0,82	6,33			
	Pre-ECMO paO2/FiO2	0,50	300	0,62	1,00	2,01	-2,94	4,95			
	Pre-ECMO Prone positioning	0,12	300	0,91	0,00	0,03	-0,05	0,06			

	Pre-ECMO Neuromuscular blockade	1,84	300	0,07	0,04	0,02	0,00	0,08			
	Pre-ECMO High-dose corticosteroids	-0,61	300	0,54	-0,03	0,05	-0,12	0,06			
Pooled	All ECMO previous year	-2,65	300	0,01	-34,31	12,93	-59,76	-8,86	0,000	0,000	1,000
	VV-ECMO previous year	-3,31		0,00	-9,13	2,76	-14,55	-3,72	0,000	0,000	1,000
	Age	3,98		0,00	4,40	1,10	2,23	6,56	0,000	0,000	1,000
	BMI	-0,21	15827	0,83	-0,14	0,68	-1,48	1,20	0,014	0,014	0,999
	Hypertension	0,75		0,46	0,04	0,05	-0,07	0,15	0,000	0,000	1,000
	Diabetes	1,21		0,23	0,06	0,05	-0,04	0,17	0,000	0,000	1,000
	Immunocompromised	1,57		0,12	0,04	0,03	-0,01	0,10	0,000	0,000	1,000
	Symptoms - ECMO delay	2,74	47446	0,01	1,97	0,72	0,56	3,38	0,008	0,008	0,999
	Orotracheal intubation - ECMO delay	3,72		0,00	1,60	0,43	0,76	2,44	0,000	0,000	1,000
	Mobile ECMO Transfer	-1,08	165649	0,28	-0,06	0,06	-0,17	0,05	0,004	0,004	1,000
	Pre-ECMO Cardiovascular component of the SOFA	0,54	1248	0,59	0,11	0,21	-0,30	0,53	0,051	0,053	0,995
	Pre-ECMO Liver component of the SOFA	1,61	1081	0,11	0,16	0,10	-0,04	0,36	0,054	0,057	0,995
	Pre-ECMO Renal component of the SOFA	3,87	601	0,00	0,68	0,18	0,33	1,02	0,074	0,078	0,993

	Pre-ECMO Plateau pressure	0,62	373	0,53	0,44	0,70	-0,94	1,81	0,095	0,102	0,991
	Pre-ECMO paCO2	1,55	1107	0,12	2,89	1,87	-0,77	6,56	0,054	0,056	0,995
	Pre-ECMO paO2/FiO2	0,51	1074	0,61	1,06	2,07	-3,01	5,12	0,055	0,057	0,995
	Pre-ECMO Prone positioning	0,12		0,91	0,00	0,03	-0,05	0,06	0,000	0,000	1,000
	Pre-ECMO Neuromuscular blockade	1,84		0,07	0,04	0,02	0,00	0,08	0,000	0,000	1,000
	Pre-ECMO High-dose corticosteroids	-0,61		0,54	-0,03	0,05	-0,12	0,06	0,000	0,000	1,000

Table S3: ECMO consoles used.

Company	GETINGE		Medtronic	LIVANOVA		XENIOS	
Console	Cardiohelp	Rotaflow	Biomedicus	SCPC	Lifebox	DS	ECCO2R
Total	18	62	11	31	2	37	4

Table S4: Characteristics of the ECMO centres

Centre	University hospital	Cardiothoracic centre	Mobile ECMO team	VV ECMO 2019	ECMO COVID-19 patients	ICU beds	
						before crisis	during crisis
1	Yes	Yes	Yes	59	79	107	294
2	Yes	Yes	No	3	4	19	82
3	Yes	No	No	6	22	35	73
4	Yes	Yes	Yes	15	28	34	60
5	No	Yes	No	2	11	14	35
6	No	No	No	3	9	18	32
7	No	Yes	Yes	64	8	23	35
8	No	No	No	2	7	22	60
9	Yes	Yes	Yes	13	52	67	120
10	No	Yes	Yes	53	14	14	56
11	No	No	No	6	4	15	50
12	Yes	Yes	No	5	10	25	59
13	No	Yes	No	2	4	30	50
14	No	Yes	Yes	3	11	20	41
15	Yes	No	No	7	16	12	28
16	Yes	No	No	2	13	14	40
17	Yes	No	No	12	10	32	95
ECMO=extracorporeal membrane oxygenation. VV=venovenous.							

Table S5: Centre comparison on demographic, clinical, and ventilatory support characteristics of the patients' overall and according to survival status 90 days after ECMO

Characteristic	N	All patients (N=302)	Survival status 90 days after ECMO			
			Alive		Dead	
			(n=138)	p-value (between centres)	(n=164)	p-value (between centres)
Age (years)	302	52 (45–58)	49 (42–56)	ns	54 (48–60)	ns
Men	302	235 (78%)	103 (75%)	ns	132 (81%)	ns
Body mass index (kg/cm²)	298	29·7 (26·8–33·5)	30·0 (26·5–33·4)	ns	29·6 (27·1–33·7)	ns
SAPS-II	289	40 (31–56)	41 (31–55)	ns	39 (31–57)	ns
Total SOFA score	281	12 (9-14)	12 (9-13)	ns	12 (10-15)	<0.01
Renal component ≥3	285	60 (20%)	17 (12%)	ns	43 (26%)	ns
Cardiovascular component ≥3	284	149 (49%)	68 (49%)	ns	81 (49%)	ns
Comorbid conditions						
Hypertension	302	103 (34%)	44 (32%)	ns	59 (36%)	ns
Diabetes	302	87 (29%)	35 (25%)	ns	52 (32%)	ns
Ischaemic cardiomyopathy	302	10 (3%)	2 (2%)	ns	8 (5%)	ns
Chronic respiratory disease†	302	34 (11%)	19 (14%)	ns	15 (9%)	ns
Active smoker	302	11 (4%)	2 (2%)	ns	9 (5%)	0.01
Immunocompromised‡	302	18 (6%)	5 (4%)	ns	13 (8%)	ns
Delays (days)						
First symptoms to ECMO	295	14 (11–18)	13 (10–17)	0.035	14 (11–19)	ns
Hospitalisation to ECMO	302	7 (5–10)	6 (4–9)	ns	7 (5–11)	ns
Intubation to ECMO	302	5 (3–7)	4 (2–6)	ns	5 (3–8)	ns

Characteristic	N	All patients (N=302)	Survival status 90 days after ECMO			
			Alive		Dead	
			(n=138)	p-value (between centres)	(n=164)	p-value (between centres)
Transfer on ECMO by MERT from another hospital, n (%)	302	113 (37%)	56 (41%)	ns	57 (35%)	ns
Ventilation parameters						
FiO_2 (mm Hg)	296	100 (100–100)	100 (100–100)	<0.01	100 (100–100)	<0.01
PEEP (cm H_2O)	276	12 (10–14)	12 (10–14)	ns	12 (10–14)	ns
Tidal volume (mL/kg PBW)	260	5·6 (4·9–6·2)	5·8 (5·1–6·3)	ns	5·6 (4·7–6·1)	0.02
Respiratory rate (breaths/min)	245	28 (26–30)	29 (26–30)	<0.01	28 (26–30)	<0.01
Plateau pressure (cm H_2O)	252	30 (27–32)	30 (27–32)	ns	30 (26–34)	ns
Driving pressure (cm H_2O)	251	18 (14–21)	18 (15–20)	ns	18 (14–22)	ns
Last blood-gas values pre-ECMO						
pH	247	7·31 (7·23–7·37)	7·32 (7·26–7·38)	ns	7·29 (7·21–7·35)	ns
PaO_2/FiO_2	294	61 (54–70)	61 (53–70)	ns	60 (54–72)	ns
$PaCO_2$ (mm Hg)	286	57 (48–67)	56 (47–66)	ns	58 (50–68)	ns
Plasma bicarbonate lactate (mmol/L)	273	28 (24–32)	28 (24–32)	ns	28 (24–32)	ns
SaO_2 (%)	262	88 (83–92)	88 (82–92)	ns	88 (83–92)	ns
Arterial lactate (mmol/L)	276	1·7 (1·3–2·2)	1·7 (1·2–2·1)	ns	1·7 (1·4–2·3)	ns
Laboratory values						
White-cell count (g/L)	281	12·8 (9·6–16·6)	11·6 (9·3–15·5)	ns	14·1 (10·0–17·2)	ns

Characteristic	N	All patients (N=302)	Survival status 90 days after ECMO			
			Alive		Dead	
			(n=138)	p-value (between centres)	(n=164)	p-value (between centres)
Lymphocytes (g/L)	247	0·9 (0·6–1·3)	0·9 (0·6–1·5)	ns	1·0 (0·6–1·3)	ns
Serum creatinine (µmol/L)	270	83 (62–155)	69 (56–101)	ns	96 (71–216)	ns
Serum bilirubin (µmol/L)	268	13 (8–22)	12 (8–25)	ns	15 (8–21)	ns
Haematocrit (%)	273	30 (26–35)	31 (27–36)	ns	30 (25–35)	ns
Rescue therapy pre-ECMO, n (%)						
Neuromuscular blockade	302	291 (96%)	130 (94%)	ns	161 (98%)	ns
Prone positioning	302	285 (94%)	130 (94%)	ns	155 (95%)	ns
Inhaled nitric oxide or prostacyclin	302	169 (56%)	58 (42%)	<0.01	101 (62%)	<0.01
Steroids	302	61 (20%)	30 (22%)	<0.01	31 (19%)	ns
Renal-replacement therapy	302	37 (12%)	6 (4%)	ns	31 (19%)	ns

Data are median (interquartile range) or number (%). ECMO=extracorporeal membrane oxygenation. FiO_2=fraction of inspired oxygen. Fem=femoral. ICU=intensive care unit. MERT=Fr French, Jug jugular, Mobile ECMO Retrieval Team. PaO_2/FiO_2=ratio of the partial pressure of arterial oxygen to the fraction of inspired oxygen. PEEP=positive end-expiratory pressure. PBW=predicted body weight. PaO_2=partial pressure of arterial oxygen. $PaCO_2$=partial pressure of arterial carbon dioxide. SaO_2=arterial oxygen saturation. SAPS=Simplified Acute Physiology Score. SOFA=Sequential Organ-Function Assessment. ns =non-significant

†Chronic obstructive pulmonary disease or asthma.

‡Haematological malignancies, active solid tumour, or having received specific anti-tumour treatment within 1 year, solid-organ transplant or human immunodeficiency virus-infected, long-term corticosteroids or immunosuppressants.

§Plateau pressure minus PEEP.

Figure S1: The four steps of the Greater Paris extracorporeal membrane oxygenation network organisation
ECMO=extracorporeal membrane oxygenation. ICU=intensive care unit.

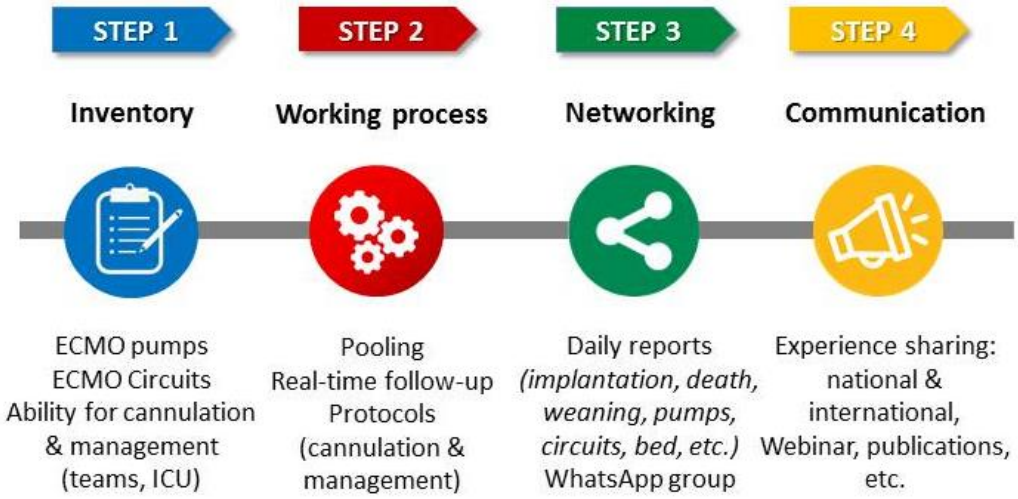


Figure S2: Principal component analysis (PCA) and correlation clustering
A. Overview of PCA, displaying pairwise score plot for top five components separating alive and dead. B. Component 1 capturing the largest variation, separating the groups by 9.7%. C. The PCA loading features are clustered by Pearson correlation, presenting two distinct clusters (Cluster I and Cluster II, positively and negatively correlated to 90-day survival, respectively). ECMO=extracorporeal membrane oxygenation.
**PCA is a mathematical algorithm that reduces the dimensionality of the data, by the transformation of larger variable sets into small sets that retain most of the information in the large set. The first principal component explains the highest variability in the data and each of the succeeding component accounts for the remaining variability in the dataset. Each dot in the figure represents individual patients (red for dead and blue for alive), the circle around both of these groups are 95% confidence regions. The variables that separate these groups are then clustered to find the inter- and intra-relationship of the features for the outcome; survival and death.*

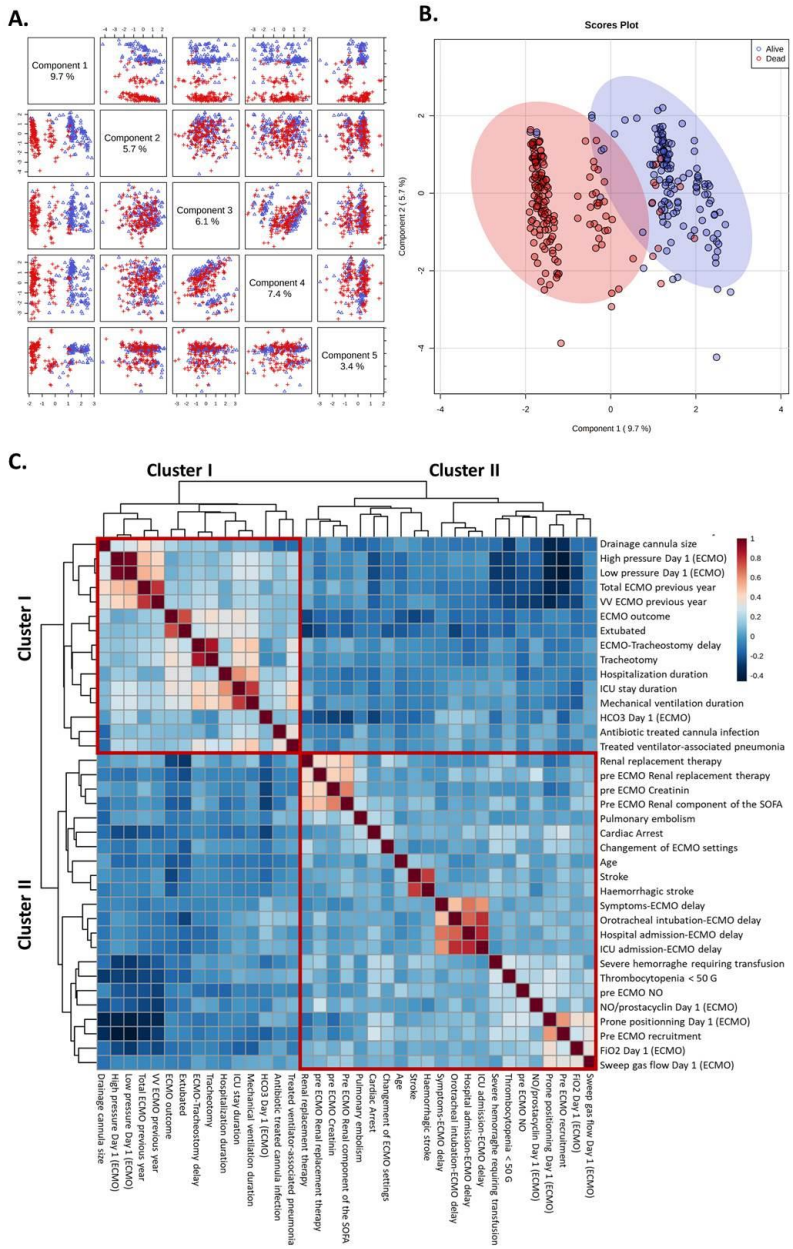


Figure S3: Number of phone calls (n=575) requesting extracorporeal membrane oxygenation (23 March to 11 May 2020)

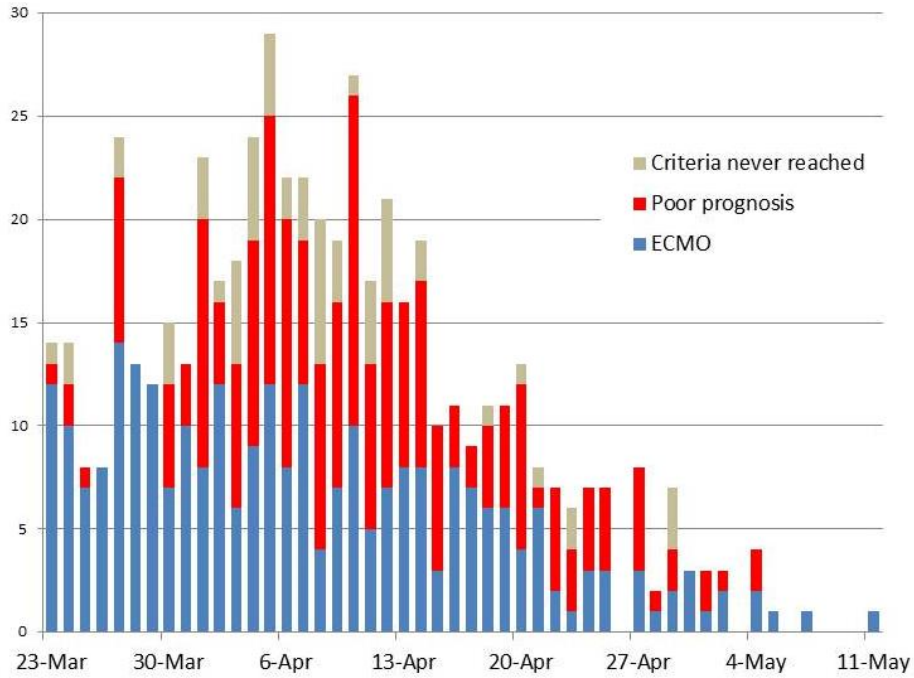


Figure S4: Map of the Greater Paris reporting the mobile extracorporeal membrane oxygenation team activity, and the number of hospitals where patients were cannulated

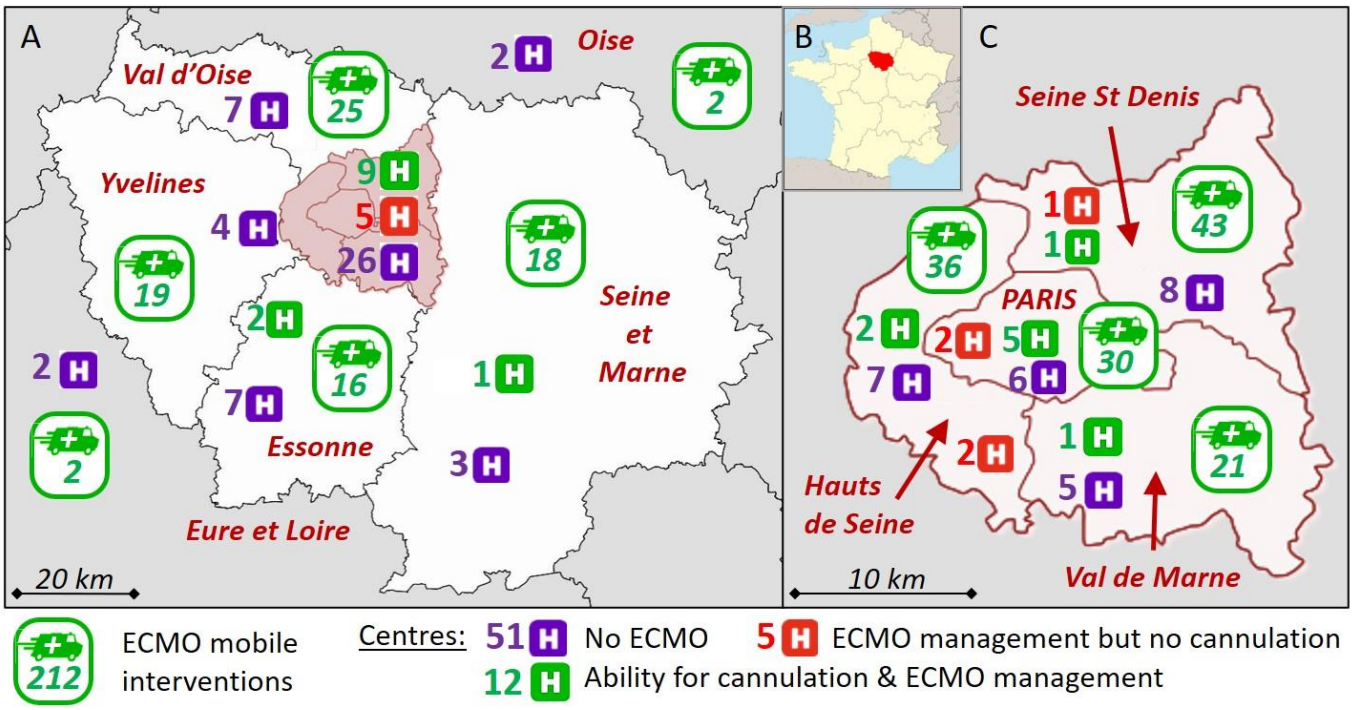
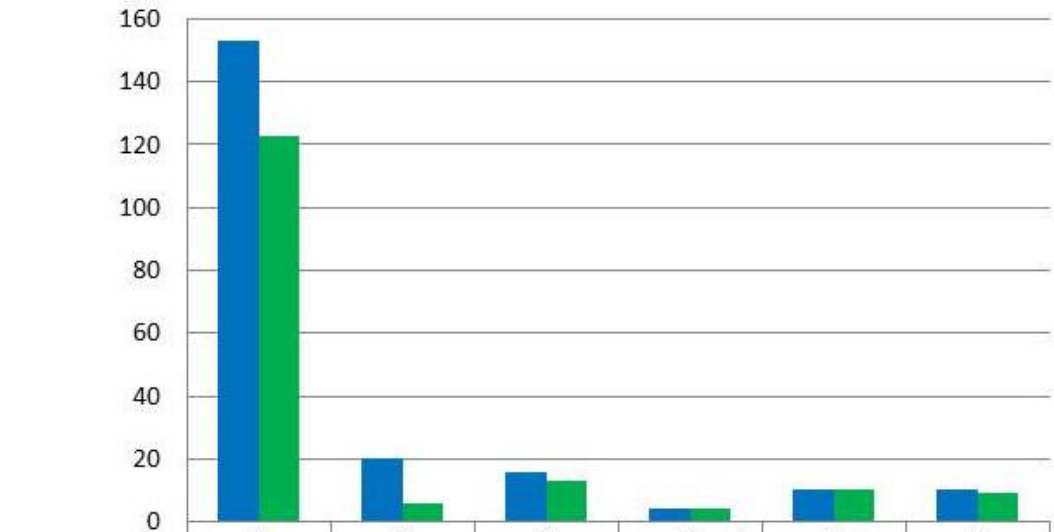


Figure S5: Numbers of extracorporeal membrane oxygenation implantations and transfers for each mobile ECMO team (designated in the figure as A to F)



	A	B	C	D	E	F
Implantation	153	20	16	4	10	10
Transfer	123	6	13	4	10	9

Figure S6: Random forest (RF) classified features
Features are ranked by their contributions to classification accuracy (mean decrease accuracy) which is a measure of permutation importance of the predictors. The top features are the major independent predictors that classify the classes (outcome at day 90). RF has accurately predicted the four features (above the dotted blue line) that were identified by the multivariable analysis.

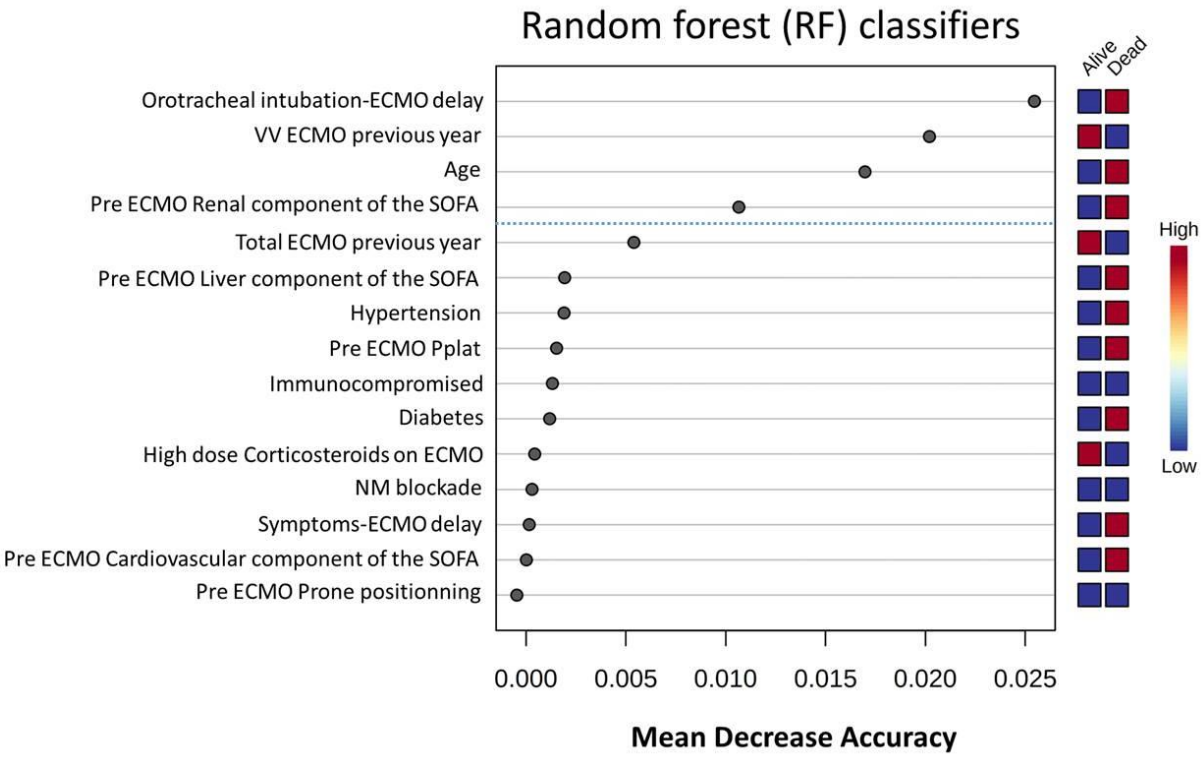
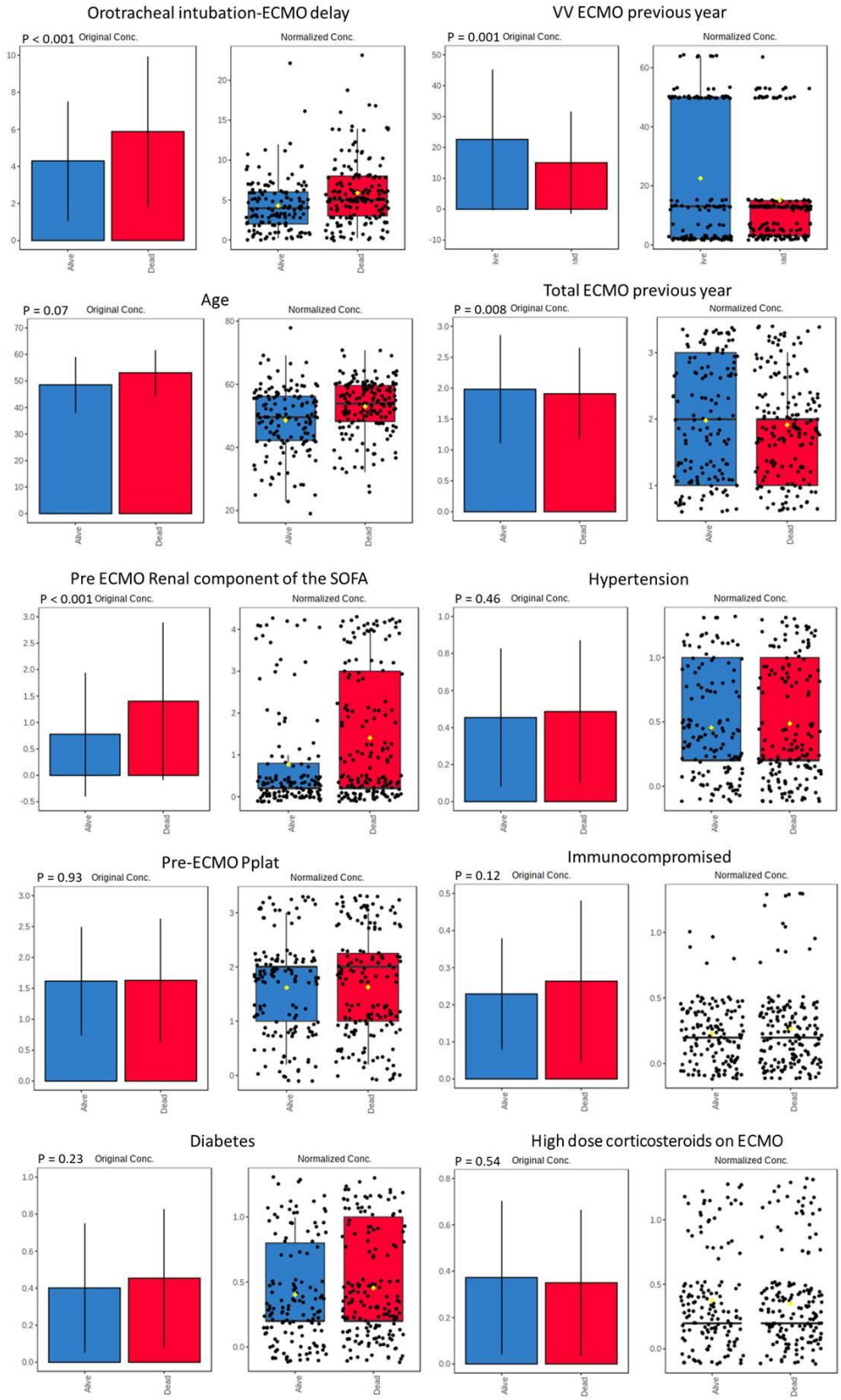
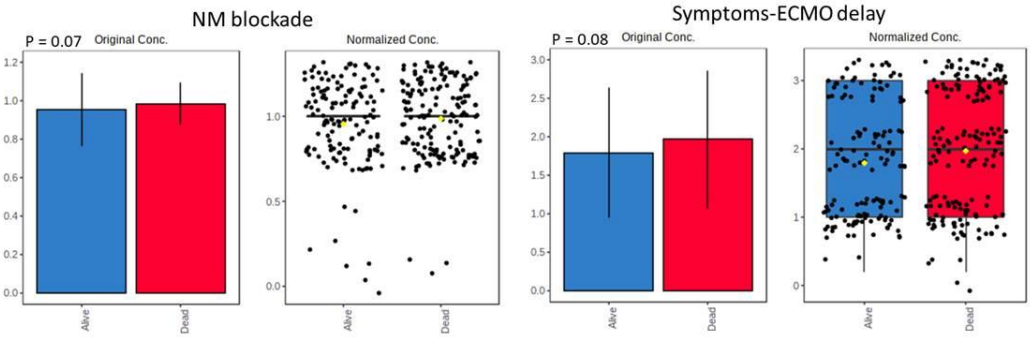


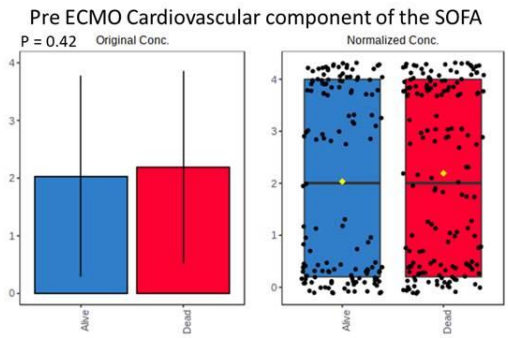
Figure S7: Boxplots of the features used in the random forest machine-learning algorithm

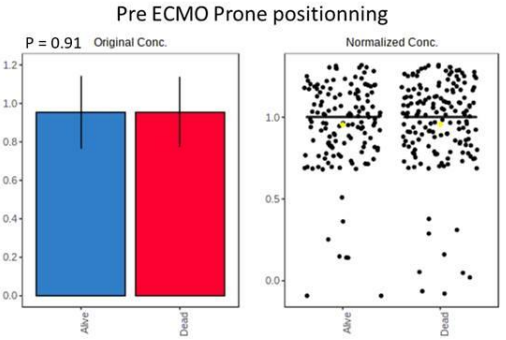
Boxplots of both the original and the normalized values depicting each patient are presented along with their p values.

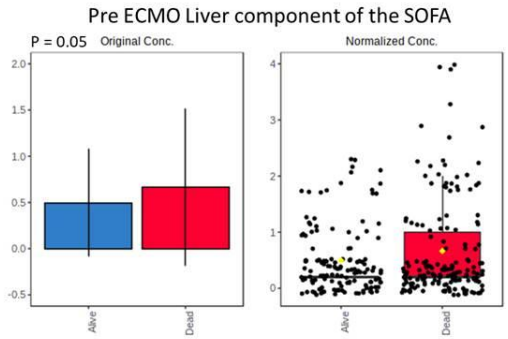


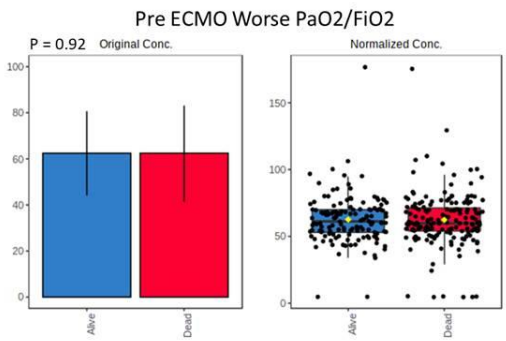

NM blockade
P = 0.07
Original Conc.
Normalized Conc.
Alive
Dead

Symptoms-ECMO delay
P = 0.08
Original Conc.
Normalized Conc.
Alive
Dead


Pre ECMO Cardiovascular component of the SOFA
P = 0.42
Original Conc.
Normalized Conc.
Alive
Dead


Pre ECMO Prone positionning
P = 0.91
Original Conc.
Normalized Conc.
Alive
Dead


Pre ECMO Liver component of the SOFA
P = 0.05
Original Conc.
Normalized Conc.
Alive
Dead


Pre ECMO Worse PaO2/FiO2
P = 0.92
Original Conc.
Normalized Conc.
Alive
Dead

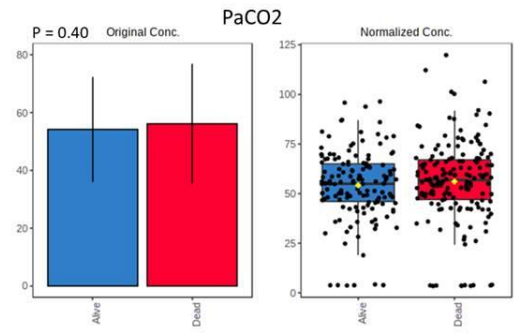
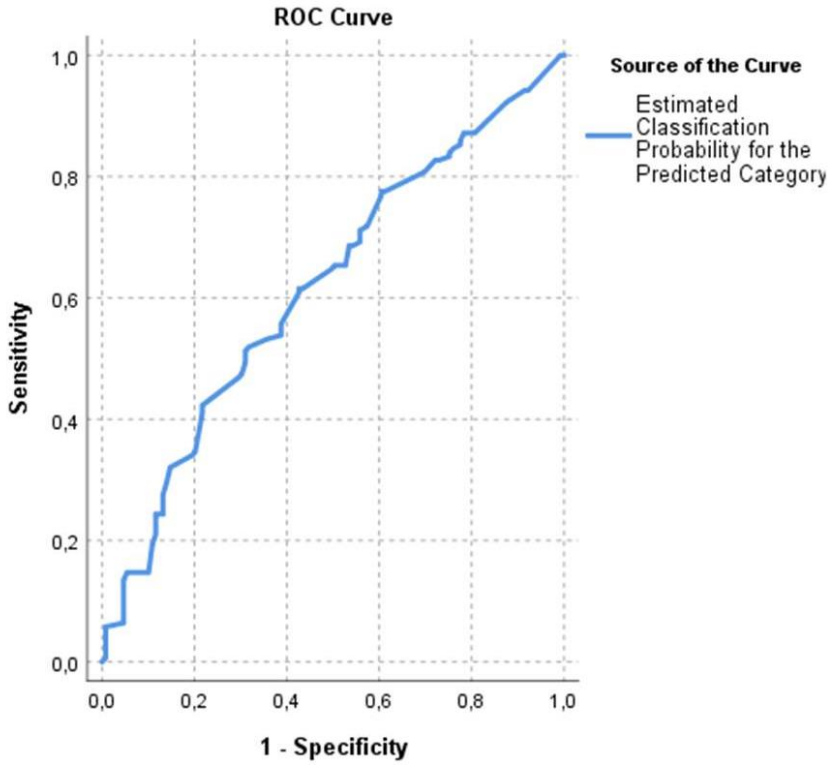

PaCO2
P = 0.40
Original Conc.
Normalized Conc.
Alive
Dead

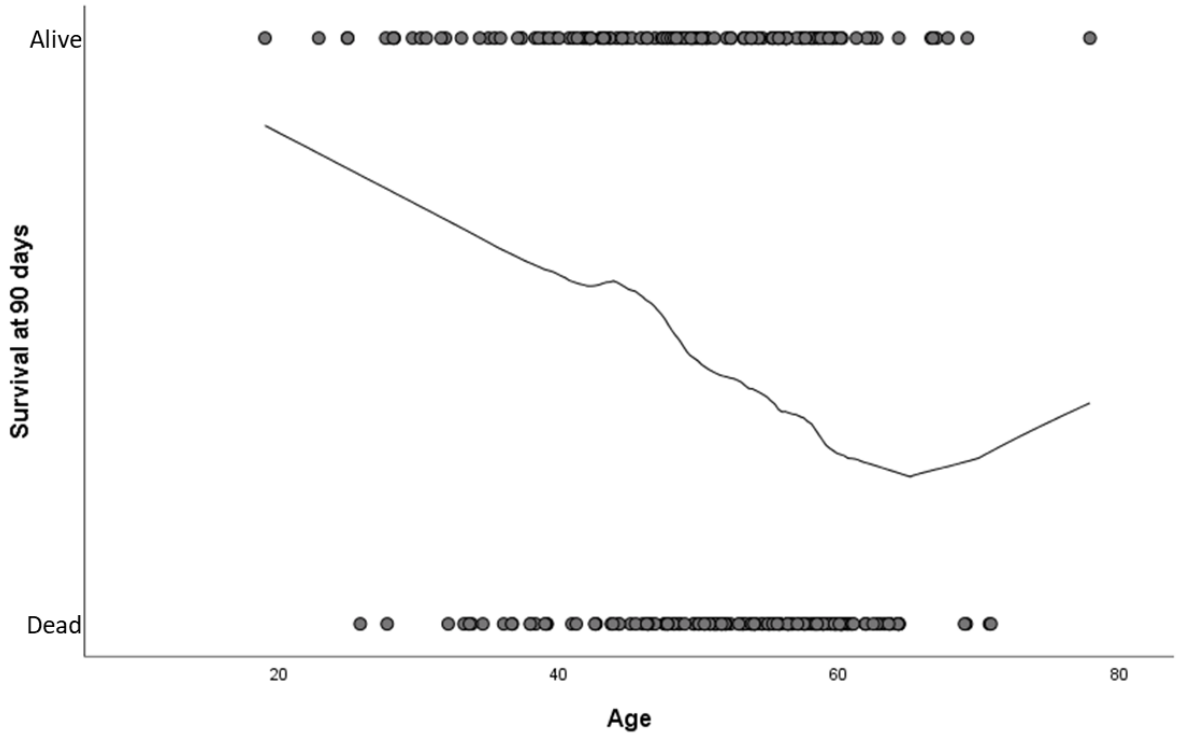
Figure S8: Area under the curve (AUC) of receiving operating characteristic (ROC) curves.
The AUC ROC of 0·62 (95% CI 0·55−0·68) shows an overall good model quality, with a p<0·001.



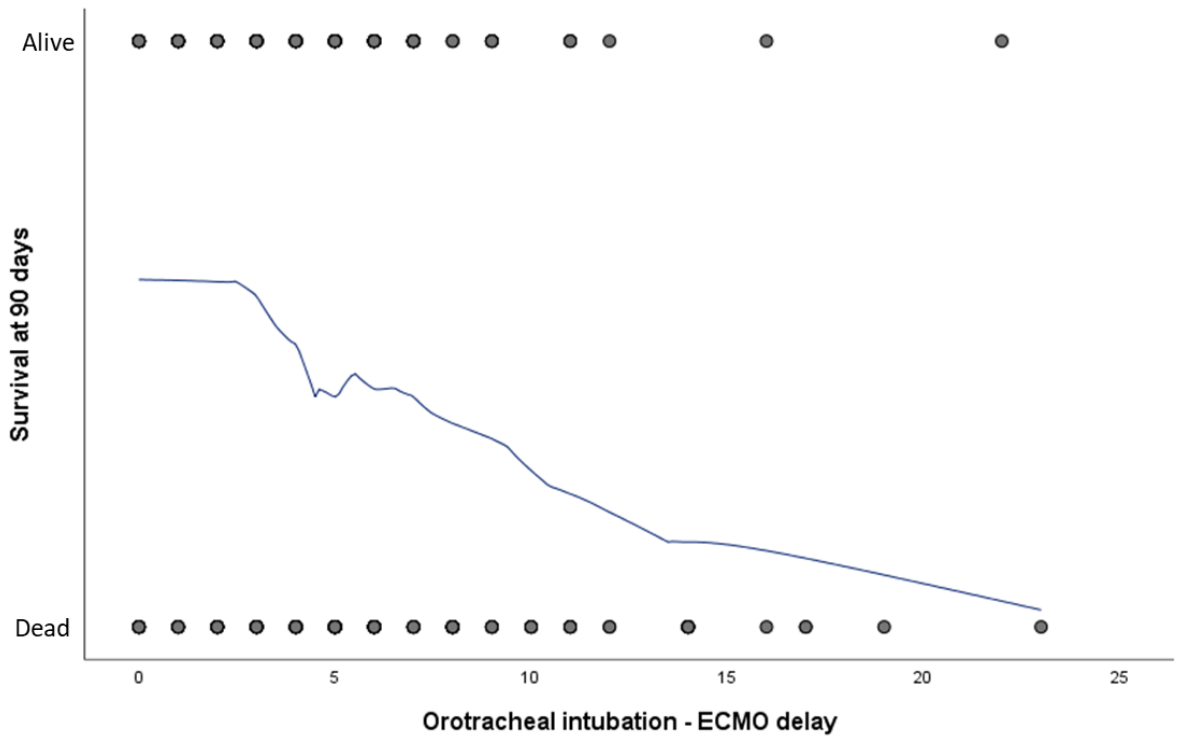
Area Under the ROC Curve					
Test Result Variable(s)	Area	Std. Error	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
Estimated Classification Probability for the Predicted Category	0.617	0.033	<0.001	0.552	0.682

Figure S9: Scatter plot for Age (A), orotracheal intubation-ECMO delay (B), symptoms-ECMO delay (C), pre-ECMO plateau pressure (D), total ECMO (E) and VV-ECMO previous year (F), BMI (G), components of SOFA score (H: cardiovascular, I: renal, J: liver), and pre-ECMO PCO_2 (K) and $Pa0_2/FiO_2$ (L).
ECMO=extracorporeal membrane oxygenation.

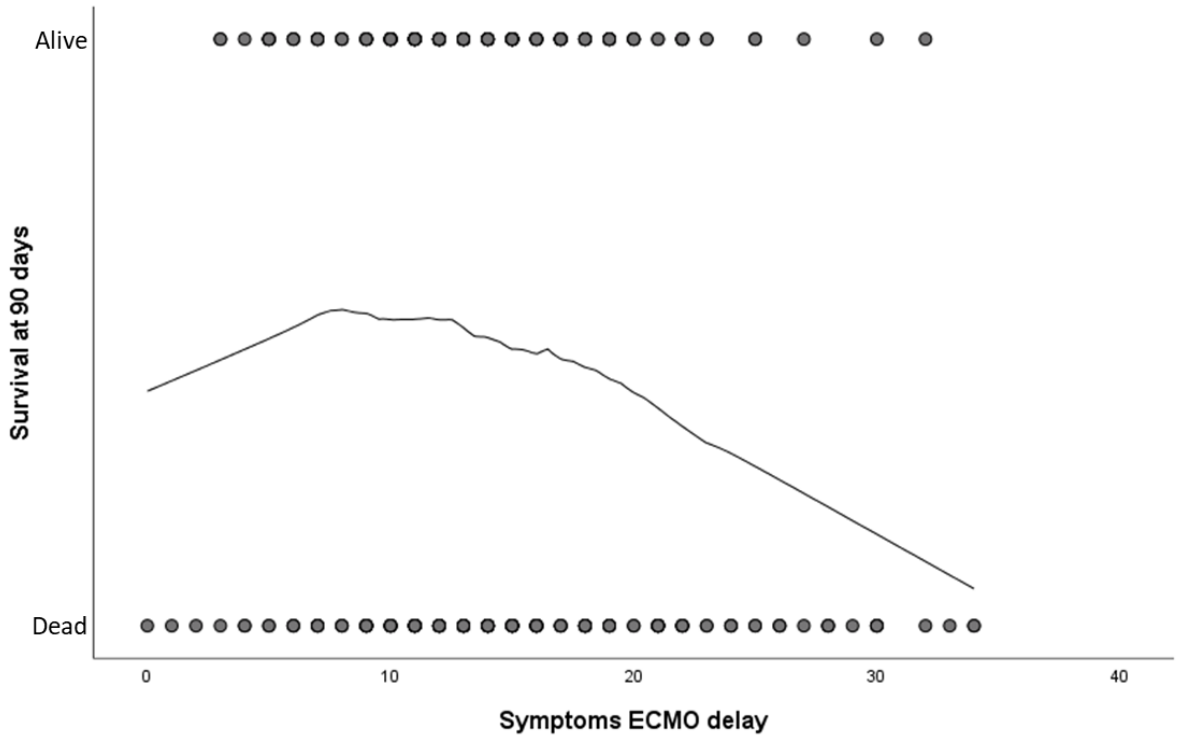
A.



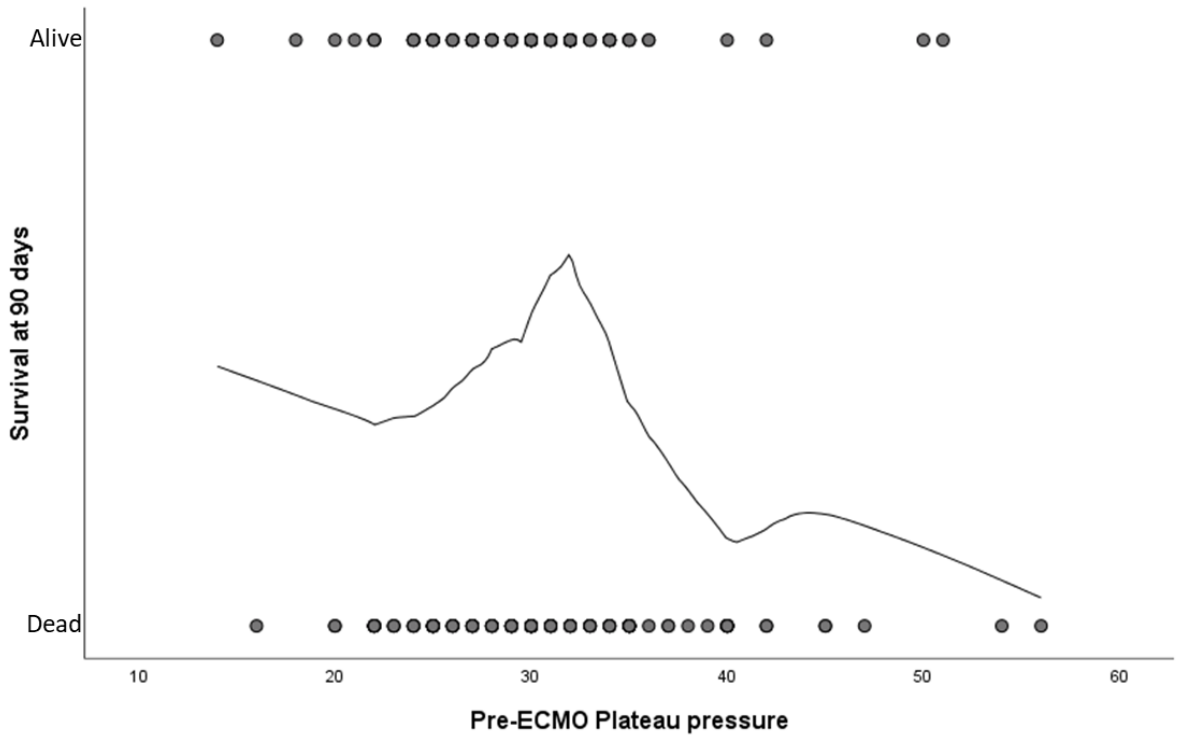
B.



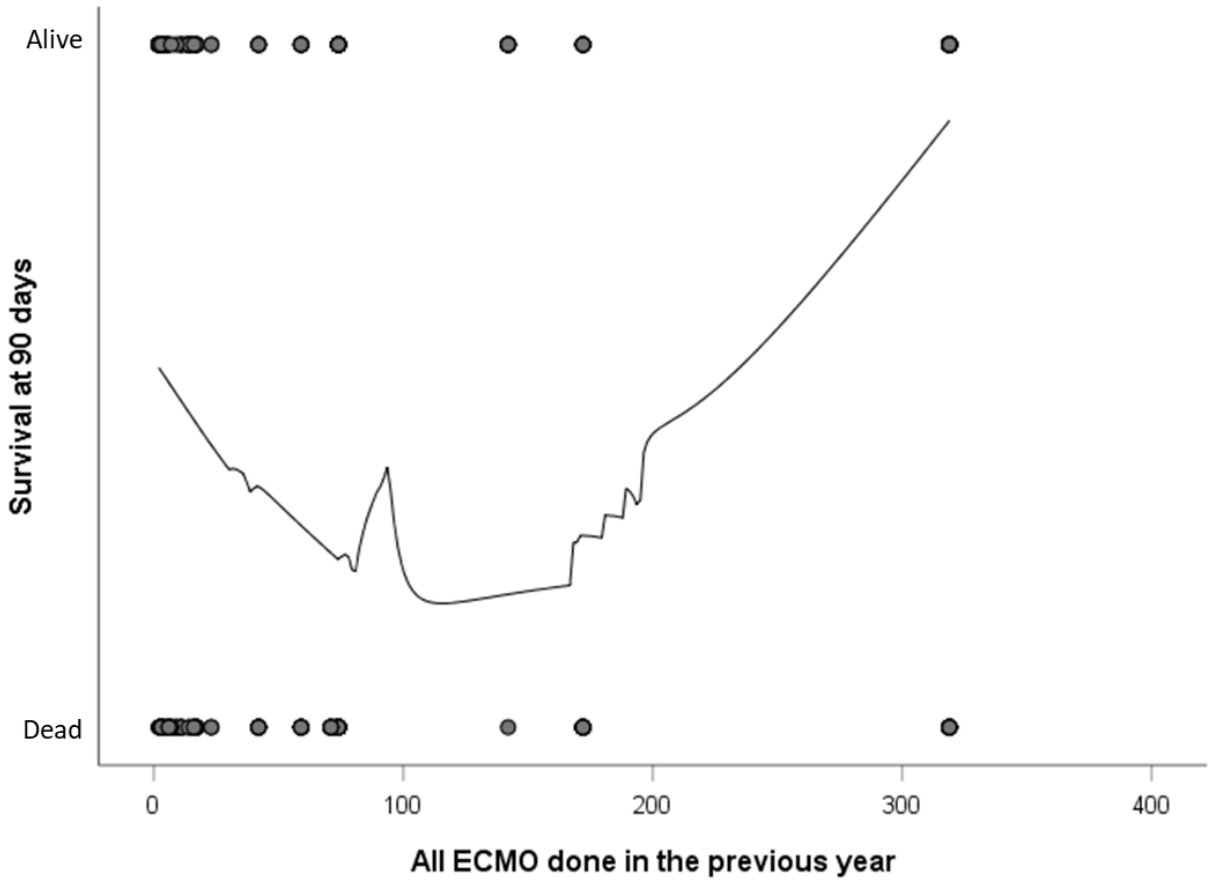
C.


Alive
Dead
Survival at 90 days
0
10
20
30
40
Symptoms ECMO delay

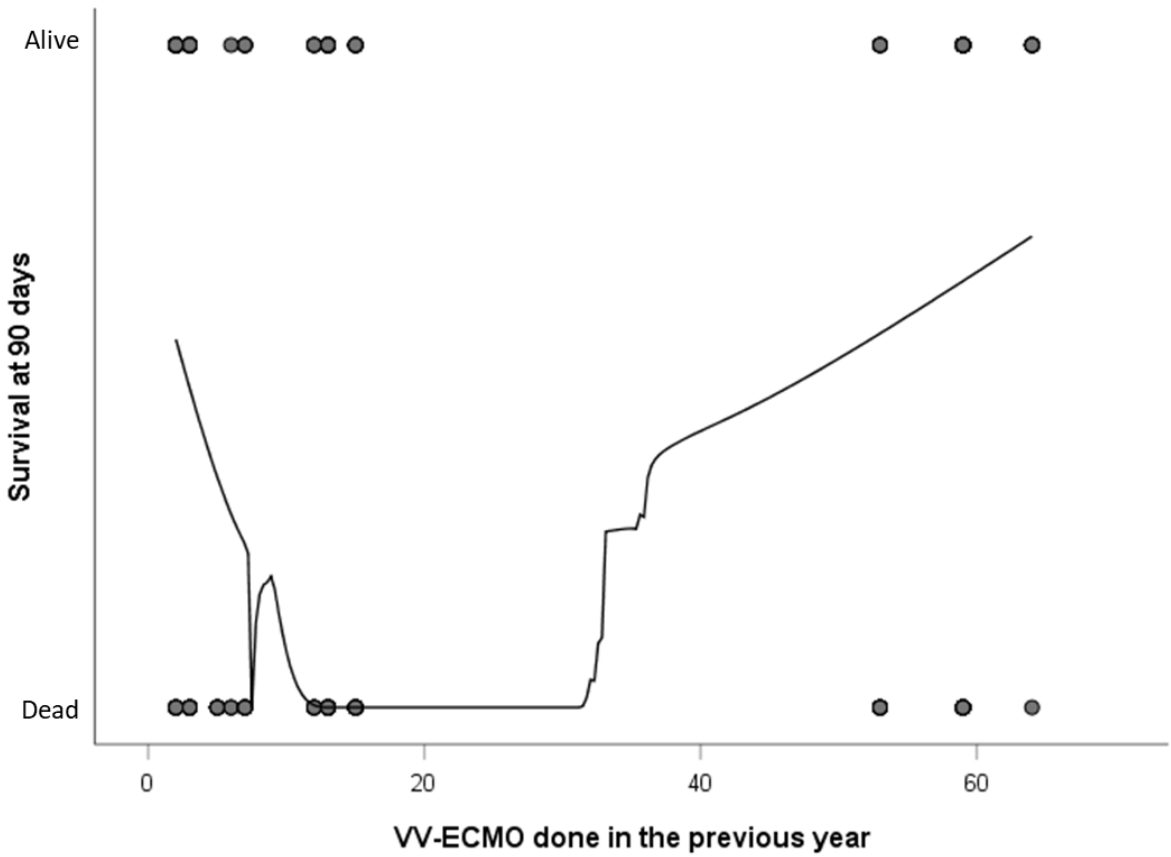
D.


Alive
Dead
Survival at 90 days
10
20
30
40
50
60
Pre-ECMO Plateau pressure

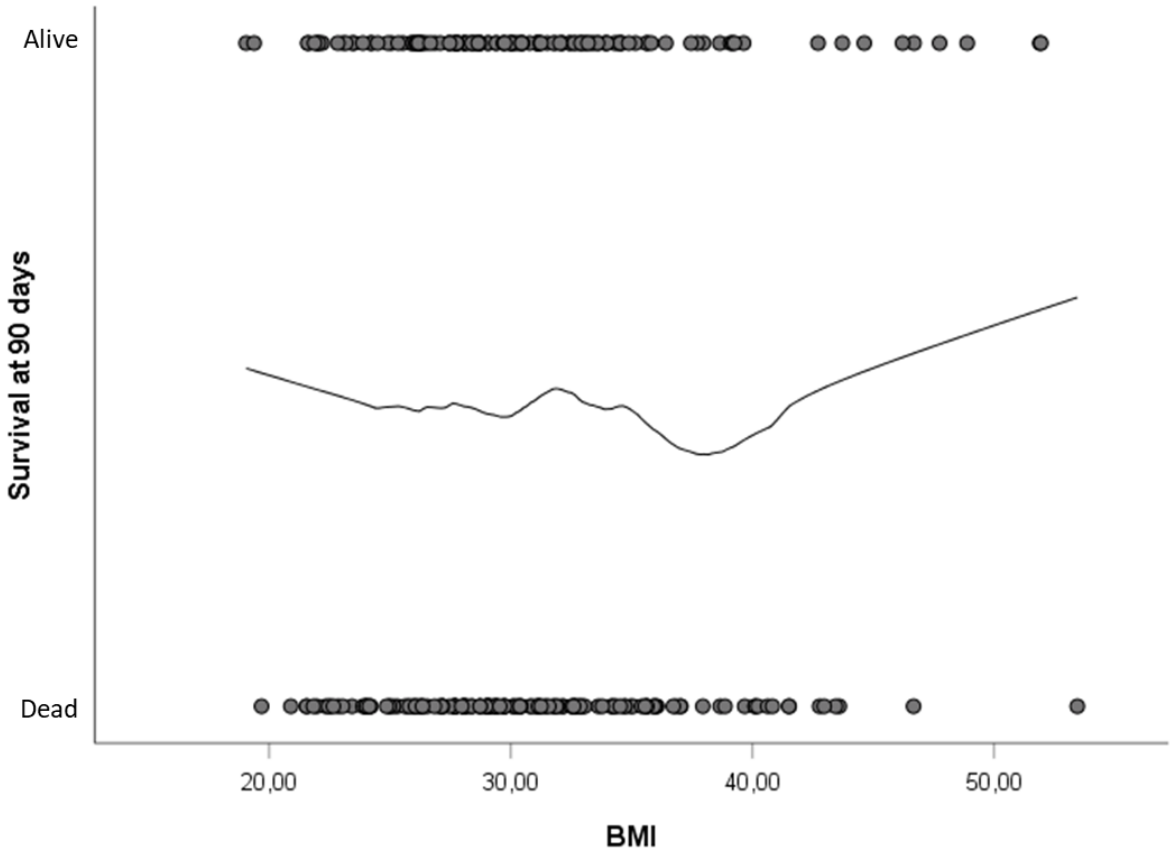
E.


Alive
Dead
Survival at 90 days
0
100
200
300
400
All ECMO done in the previous year

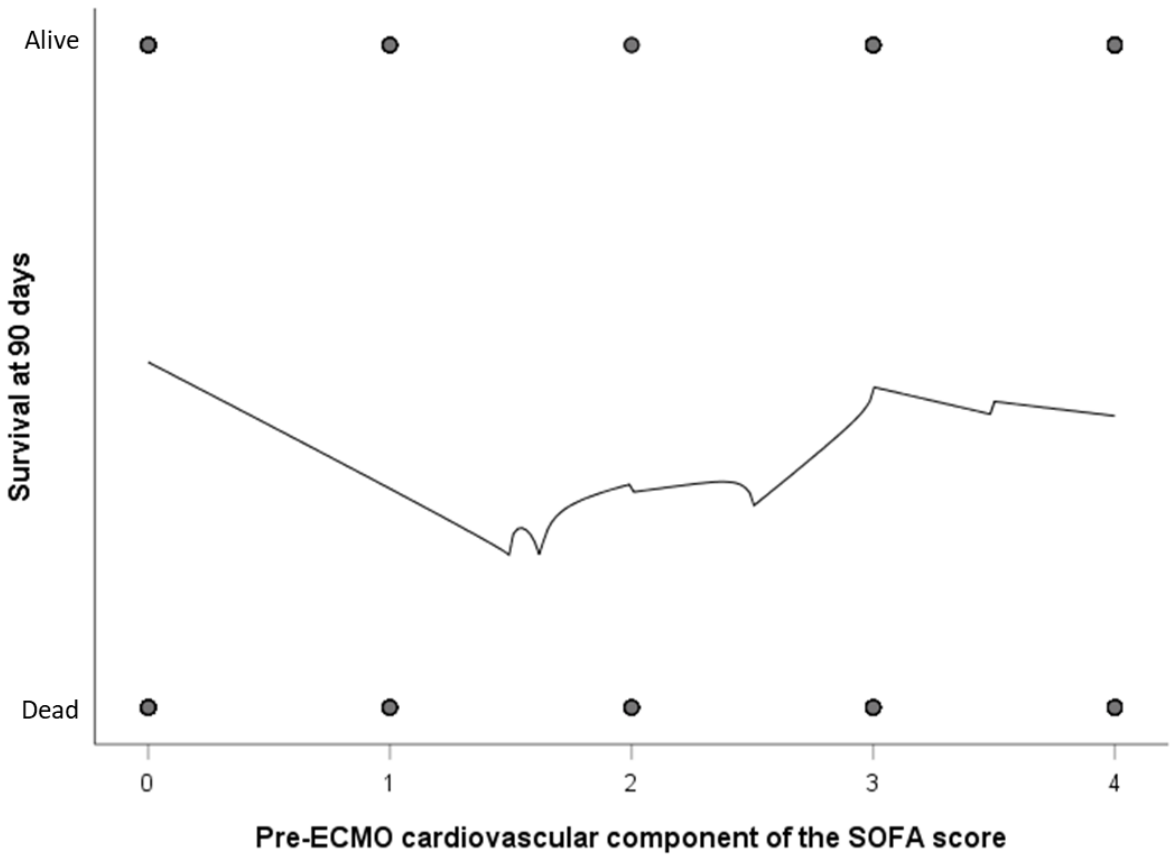
F.


Alive
Dead
Survival at 90 days
0
20
40
60
VV-ECMO done in the previous year

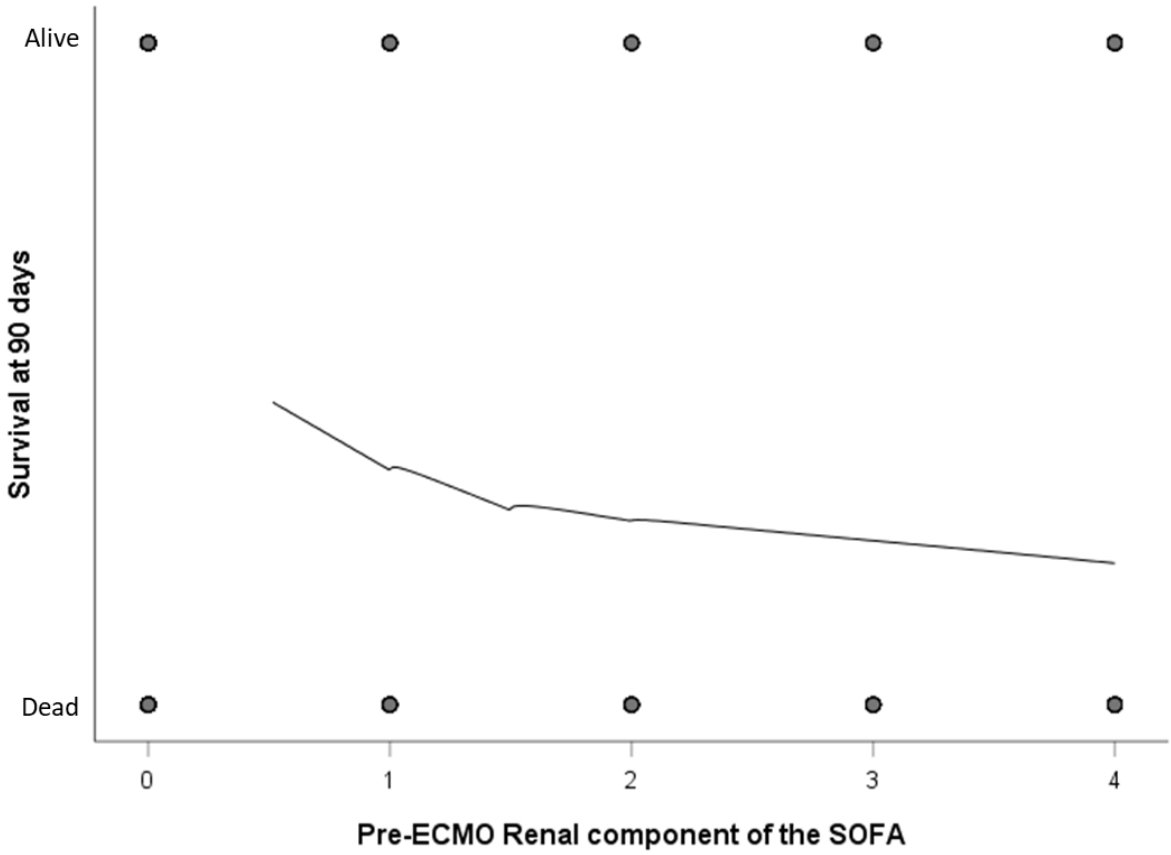
G.


Alive
Survival at 90 days
Dead
20,00
30,00
40,00
50,00
BMI

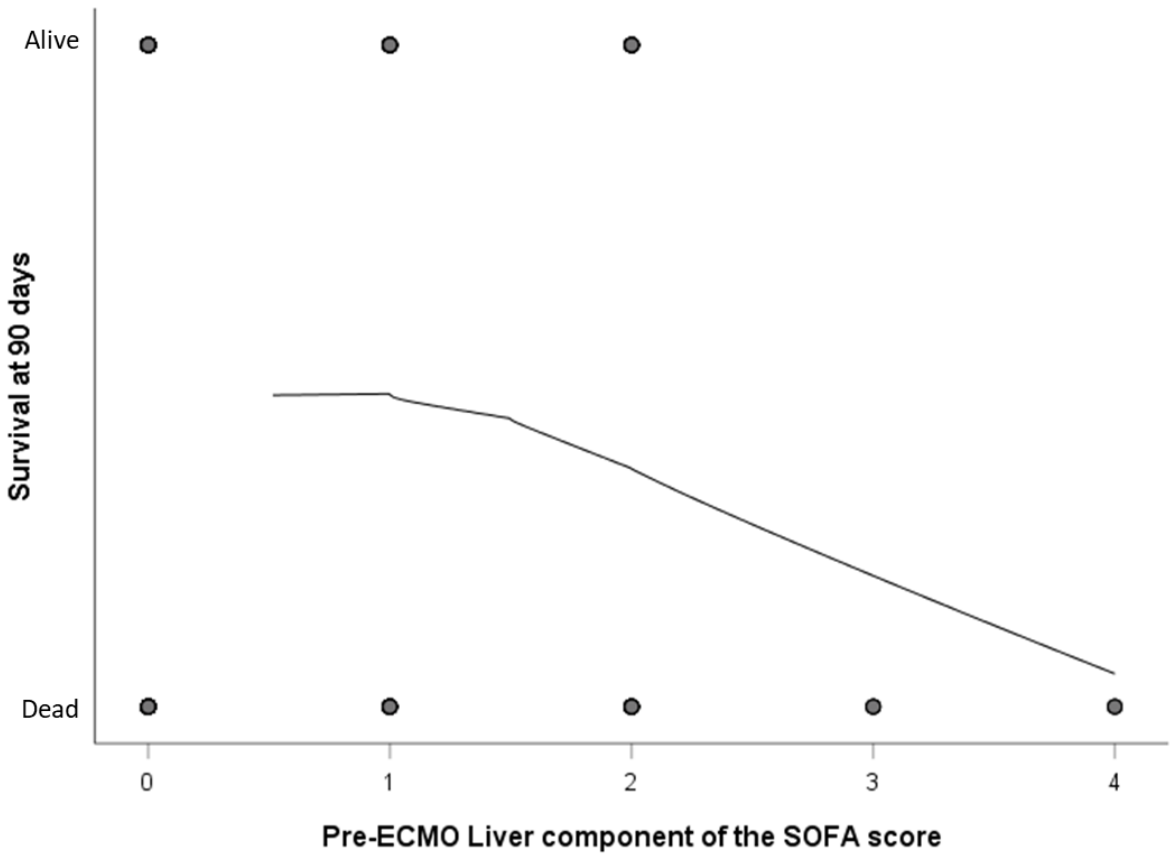
H.


Alive
Survival at 90 days
Dead
0
1
2
3
4
Pre-ECMO cardiovascular component of the SOFA score

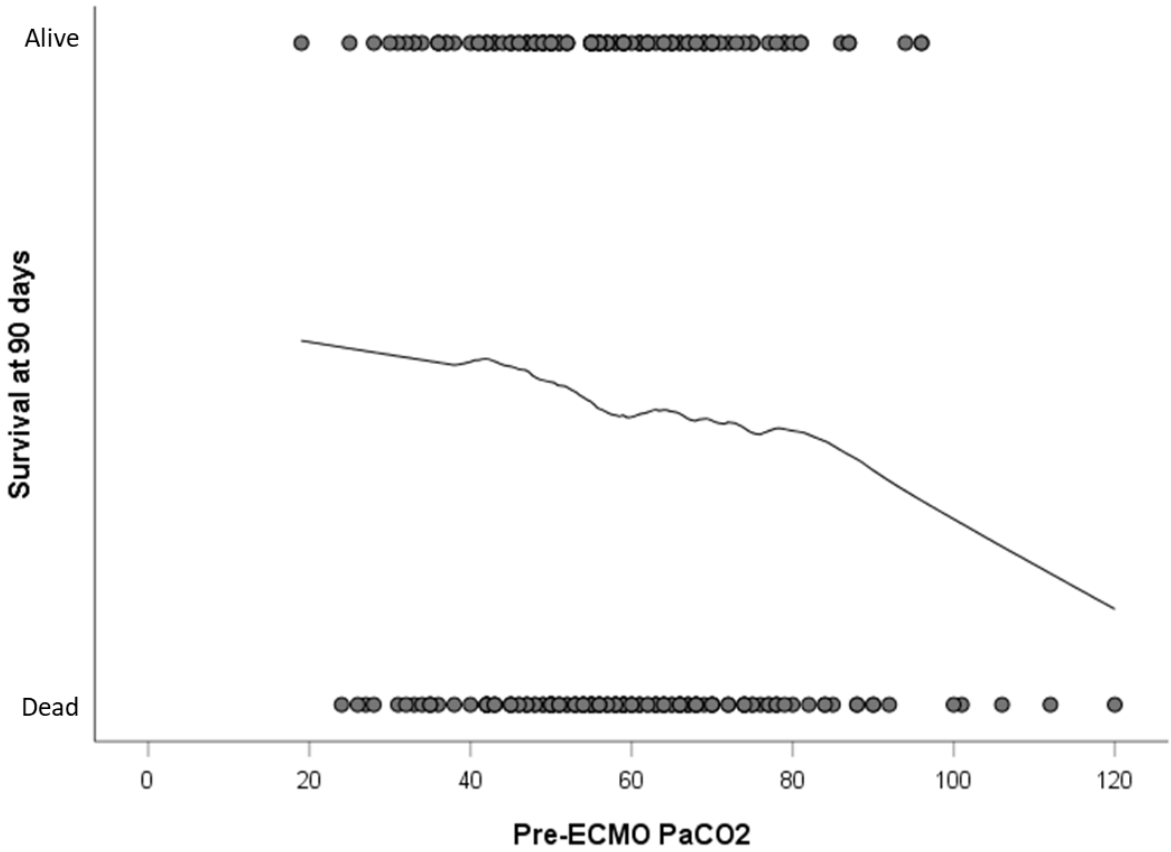
I.


Alive
Survival at 90 days
Dead
0
1
2
3
4
Pre-ECMO Renal component of the SOFA

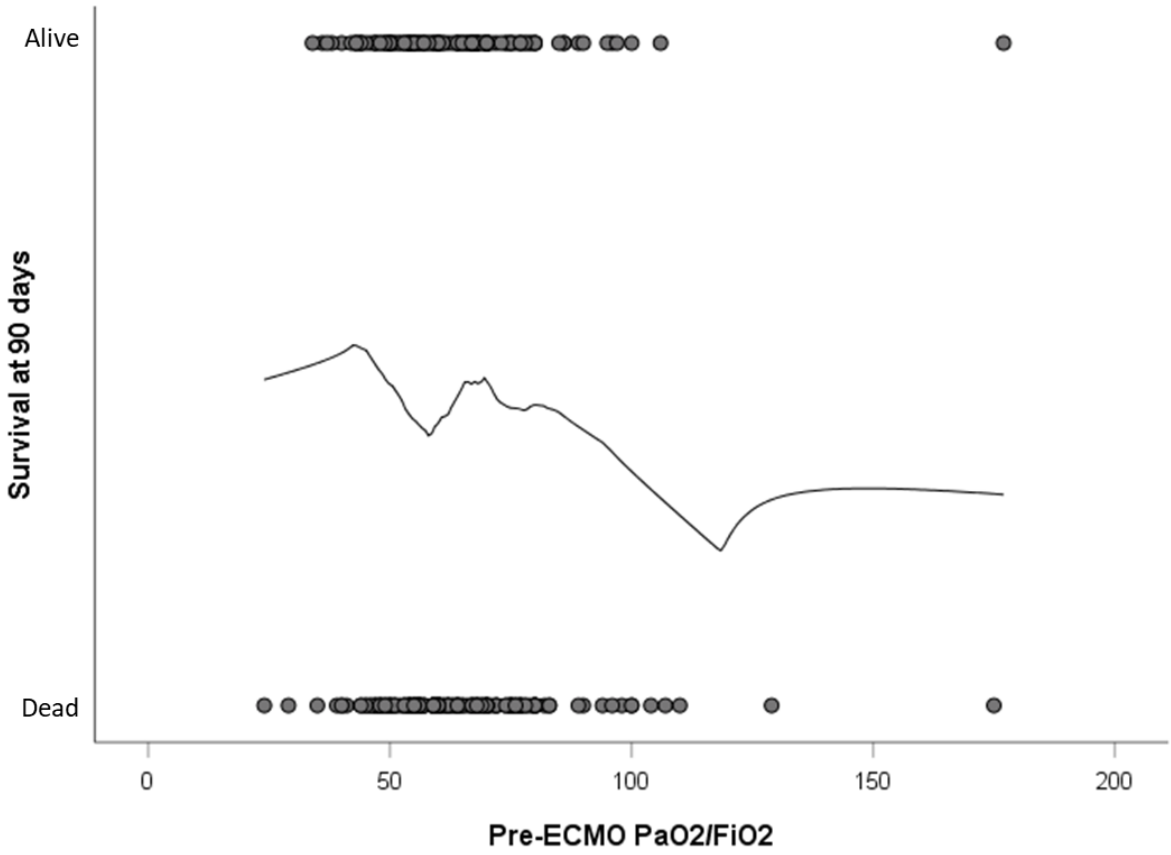
J.


Alive
Survival at 90 days
Dead
0
1
2
3
4
Pre-ECMO Liver component of the SOFA score

K.


Alive
Survival at 90 days
Dead
0
20
40
60
80
100
120
Pre-ECMO PaCO2

L.


Alive
Survival at 90 days
Dead
0
50
100
150
200
Pre-ECMO PaO2/FiO2