

### Results of sensitivity analysis

After excluding 70 (7.7%) patients who received ECMO after cardiotomy procedures, a total of 841 patients were examined in a sensitivity analysis (Table S1). In this subgroup, the hospital mortality in high- and low-volume centers were 273 (50.3%) and 135 (45.3%), respectively. The center volume-hospital mortality association remained insignificant (adjusted OR 0.84, 95% CI: 0.59–1.19,  $P=0.33$ ).

We re-examined volume effects in a subgroup of patients with complete APACHE IV data. The effects of center volume on hospital mortality and ICU mortality remained unchanged.

**Table S1** Sensitivity analysis – Cohort Excluding Post-Cardiotomy ECMO

	Not post-cardiotomy, N=841	Complete cohort, N=911
<b>ICU Admissions</b>		
<b>ECMO Type</b>		
V-A ECMO	236 (28.1%)	297 (32.6%)
V-V ECMO	448 (53.3%)	450 (49.4%)
ECPR	157 (18.7%)	164 (18.0%)
<b>Demographic Information</b>		
Age at Admission <sup>†</sup>	54 (42-62)	54 (42-62)
Age 65 or above	168 (20.0%)	185 (20.3%)
Male	531 (63.1%)	583 (64.0%)
<b>Comorbid conditions</b>		
Cardiovascular Diseases	7 (0.8%)	14 (1.5%)
Respiratory Diseases	22 (2.6%)	39 (4.3%)
Chronic renal failure / dialysis	24 (2.9%)	27 (3.0%)
Cirrhosis	8 (1.0%)	10 (1.1%)
Hepatic Failure	4 (0.5%)	4 (0.4%)
Metastatic Carcinoma	41 (4.9%)	44 (4.8%)
Lymphoma	11 (1.3%)	14 (1.5%)
Leukemia/Myeloma	9 (1.1%)	9 (1.0%)
Immunosuppression	34 (4.0%)	36 (4.0%)
<b>Type of ICU Admission</b>		
Elective Post-operative	13 (1.5%)	29 (3.2%)
Emergency Post-operative	26 (3.1%)	48 (5.3%)
Medical	802 (95.4%)	834 (91.5%)
<b>Principal Diagnosis</b>		
<b>V-A ECMO</b>		
Myocardial infarction	55 (23.3%)	65 (21.9%)
Myocarditis	49 (20.8%)	50 (16.8%)
Decompensated heart failure	28 (11.9%)	34 (11.4%)
Valvular heart disease	12 (5.1%)	32 (10.8%)
Resuscitated cardiac arrest	16 (6.8%)	17 (5.7%)
Septic cardiomyopathy	17 (7.2%)	18 (6.1%)
Aortic dissection	3 (1.3%)	15 (5.1%)
Pulmonary embolism	7 (3.0%)	7 (2.4%)
Cardiac tamponade	2 (0.8%)	4 (1.3%)
Refractory arrhythmia	4 (1.7%)	4 (1.3%)
Others: V-A	43 (18.2%)	51 (17.2%)
<b>V-V ECMO</b>		
Bacterial Pneumonia	190 (42.4%)	190 (42.2%)
Viral Pneumonia	105 (23.4%)	105 (23.3%)
Asthma	8 (1.8%)	8 (1.8%)
Others: V-V	145 (32.4%)	147 (32.7%)
<b>ECPR</b>		
Myocardial infarction	62 (39.5%)	63 (38.4%)
Myocarditis	19 (12.1%)	19 (11.6%)
Pulmonary embolism	9 (5.7%)	9 (5.5%)
Valvular heart disease	5 (3.2%)	7 (4.3%)
Sepsis	7 (4.5%)	7 (4.3%)
Decompensated heart failure	6 (3.8%)	6 (3.7%)
Cardiac Tamponade	5 (3.2%)	5 (3.0%)
Others: ECPR	44 (5.2%)	48 (5.3%)
<b>Outcomes</b>		
Hospital mortality	408 (48.5%)	456 (50.1%)
ICU mortality	345 (41.0%)	382 (41.9%)
28-day mortality	317 (37.7%)	359 (39.4%)
ECMO duration (days) <sup>†</sup>	5.4 (2.8-9.7)	5.4 (2.7-9.4)
ICU LOS (days) <sup>†</sup>	10.7 (5.0-21.0)	10.2 (4.8-20.1)
Hospital LOS (days) <sup>†</sup>	27.0 (10.7-56.0)	26.8 (10.7-55.6)
Heart transplantation / mechanical assistive device	19 (2.3%)	19 (2.1%)
Lung transplantation	0	0
<b>Risk Scores</b>		
CCI <sup>†,‡</sup>	1 (0-2)	1 (0-2)
CCI ≥2	184 (21.9%)	215 (23.6%)
SOFA ICU score <sup>†,§</sup>	10 (7-13)	10 (7-13)
SOFA ECMO score <sup>†,¶</sup>	9 (7-12)	10 (7-12)
APACHE IV (N) <sup>†,††</sup>	812 (97%)	881 (97%)
APACHE IV Risk of Death <sup>†</sup>	0.5 (0.2-0.9)	0.5 (0.2-0.8)
APACHE IV score <sup>†</sup>	101 (73-135)	102 (73-134)
APACHE IV Estimated LOS <sup>†</sup>	7.0 (4.6-8.8)	6.9 (4.6-8.8)

<sup>†</sup>, Presented with Median, IQR <sup>‡</sup>CCI: CCI was calculated using documented comorbidities before hospital admission. <sup>§</sup>, SOFA ICU score: SOFA score was calculated using components collected on the day of ICU admission. <sup>¶</sup>, SOFA ECMO score: SOFA score was calculated using components collected on the day of starting ECMO. <sup>††</sup>, APACHE IV: 30 (1.3%) patients were excluded from the calculation of the APACHE IV score due to missing data in one or more of the APACHE components, therefore n=881. APACHE IV, Acute Physiology and Chronic Health Evaluation IV; CCI, Charlson Comorbidity Index; ECMO, Extracorporeal Membrane Oxygenation; ECPR, Extracorporeal Cardiopulmonary Resuscitation; ICU, Intensive Care Unit; LOS, Length of Stay; SOFA, Sequential Organ Failure Assessment; V-A ECMO, Veno-arterial ECMO; V-V ECMO, Veno-venous ECMO.