2CHEER Supplementary Appendix

Supplementary Table 1 – Arrest Details by Initial Rhythm

Variable	Shockable Rhythm (n = 18)	Non-Shockable (n=7)	p value
Demographics			
Median age (year), (IQR)	60 (43-65)	46 (33 - 64)	p = 0.357
Male, n (%)	14 (78%)	3 (43%)	p = 0.186
Body mass index (kg/m2), median (IQR)	26 (24 - 32)	26 (24 - 26)	p = 0.383
History of ischaemic heart disease, n (%)	5 (28%)	2 (28%)	p = 0.171
Arrest Data			
In hospital cardiac arrest (IHCA), n (%)	7 (39%)	7 (100%)	p = 0.006
Out of hospital cardiac arrest (OHCA), n (%)	11 (61%)	0	
Cannulation to flow time (min), median (IQR)	15 (10 - 33)	20 (11 - 35)	p = 0.735
Arrest to ECMO flow time (min), median (IQR)	62 (45 - 76)	40 (30 - 50)	p = 0.028
Time on LUCAS2 device (min), median (IQR)	48 (26 - 58)	30 (21 - 39)	p = 0.046
Angiogram	15 (83%)	3 (43%)	p = 0.093
APACHE 2	27 (20 - 34)	17 (22 - 33)	p = 0.260
ECMO run	27 (23 - 78)	87 (52 - 140)	p = 0.029
Ventilated days	3 (1 - 5)	8 (2 - 12)	p = 0.064
ICU Length of stay	3 (1 - 10)	12 (4 - 10)	p = 0.119
Hospital length of stay	4 (1 - 21)	24 (7 - 74)	p = 0.104
First lactate	11 (8 - 16)	10 (8 - 11)	p = 0.443
24 hours post cannulation lactate	2 (1 - 7)	2 (1 - 3)	p = 0.653
Arrest Aetiology			
Acute coronary syndrome	10 (56%)	2 (29%)	
Pulmonary embolism	1 (6%)	1 (14%)	
Primary arrhythmia	3 (18%)		
Myocarditis	1 (6%)		
Vasospasm	1 (6%)		
Congenital Heart Disease	1 (6%)	1 (14%)	
Unclear	1 (6%)	2 (25%)	
Anaphylaxis		1 (14%)	
Survival			
Overall survival to hospital discharge	7 (39%)	4 (57%)	
[$]CPC 1	5 (28%)	4 (57%)	p = 0.442
[$]CPC 2	2 (11%)		
Cause of Death			
Cardiac failure and MODS	3	2	
Hypoxic brain injury	5		
Embolic cerebrovascular event		1	
Intracranial haemorrhage	2		
Abdominal compartment syndrome/haemorrhage	1		

Supplementary Table 2 – Details by arrest location

Variable	IHCA (n = 14)	OHCA (11)	p value
Demographics			
Median age (year), (IQR)	46 (35 - 63)	60 (48 - 65)	p = 0.095
Male, n (%)	8 (57%)	9 (82%)	p = 0.189
Body mass index (kg/m2), median (IQR)	26 (24 - 29)	27 (26 - 32)	p = 0.312
Arrest Data			
Cannulation to flow time (min), median (IQR)	17 (12 - 17)	15 (10 - 34)	1
Arrest to ECMO flow time (min), median (IQR)	40 (31 - 53)	74 (59 - 77)	p <0.001
Time on LUCAS2 device (min), median (IQR)	28 (20 - 35)	55 (44 - 59)	p <0.001
Hospital Stay Data			
Angiogram	8 (57%)	10 (91%)	p = 0.620
Received coronary stent	5 (36%)	7 (64%)	p = 0.045
APACHE 2	23 (18 - 31)	33 (25 - 36)	p = 0.030
ECMO run (hours)	79 (33 - 153)	24 (22 - 55)	p = 0.015
ICU length of stay (days)	9 (5 - 19)	1 (1 - 3)	p = 0.012
Total Hospital length of stay (days)	19 (7 - 66)	1 (1 - 7)	p = 0.012
Ventilated days	7 (3 - 7)	2 (1 - 3)	p = 0.006
ICU Length of stay	9 (5 - 19)	1 (1 - 3)	p = 0.013
Hospital length of stay	19 (9 - 66)	1 (1 - 3)	p = 0.030
Required renal replacement therapy	7 (50%)	4 (36%)	p = 0.495
First lactate	9 (8 - 12)	12 (11 - 17)	p = 0.064
24 hours post cannulation lactate	2 (2 - 4)	3 (2 - 5)	p = 0.311
Arrest Aetiology			
Acute coronary syndrome	5 (36%)	7 (64%)	
Pulmonary embolism	2 (14%)		
Primary arrhythmia		3 (27%)	
Myocarditis	1 (7%)		p = 0.164
Vasospasm	1 (7%)		
Congenital Heart Disease	2 (14%)		
Unclear	2 (14%)	1 (9%)	
Anaphylaxis	1 (7%)		
Vascular Complications			
Surgery repair after cannulation	5 (36%)	3 (27%)	p = 0.653
Ischaemic leg	5 (36%)	2 (18%)	p = 0.332
Ischaemic leg requiring intervention	4 (29%)	1 (9%)	p = 0.723
CNS Complication			
Ischaemic stroke	1 (7%)	1 (9%)	
Cerebral bleed	2 (14%)		p = 0.402
Spinal cord infarction	1 (7%)		

#CPC of survivors		
#CPC 1	8 (57%)	1 (9%)
#CPC 2		2 (18%)
Cause of death		
Cardiac failure and MODS	3	2
Hypoxic brain injury		5
Embolic cerebrovascular event	1	
Intracranial haemorrhage	1	1
Abdominal compartment syndrome/haemorrhage	1	

**ICU - Intensive care unit, #CPC – Cerebral Performance Category*

Neurological evaluation and ICU supportive care

Neurological evaluation was approached in a thorough and multidisciplinary manner. The use of ECMO and sedative drugs all influence neurological assessment, and heighten the need for a rigorous and consistent approach[1].

Neurological evaluation and (if necessary) withdrawal from active intensive care support will be based on local adaptation of the approach used in a recent, large-scale, high-quality randomised controlled trial of induced hypothermia after cardiac arrest[2]. This also needs modification for patients who are on ECMO, or have recently been separated from it. All of the clinical departments involved in the care of these patients will agree to adopt these consensus guidelines prior to study commencement.

Minimum duration of active ICU support

All patients will be actively supported until at least:

1. 96 hours after cardiac arrest AND
2. 96 hours after cessation of sedative drugs AND
3. 96 hours after restoration of normothermia AND
4. 72 hours after separation from ECMO

EXCEPT in cases where there is

1. Severe myoclonus in the first 24h after admission and (in selected cases) bilateral absence of N20-peak on somatosensory evoked potentials (SSEP) OR
2. Brain death OR
3. Ethical reasons such as previously unknown information about irreversible and terminal medical conditions and advanced care directives by the patient OR
4. Multidisciplinary medical consensus that multiorgan failure due to post-cardiac arrest syndrome[3] is severe, progressive and irreversible

Sedation and analgesia

This will be managed at the discretion of the usual treating team in the usual manner.

Patients will be managed with the minimum amount of analgesia and sedation possible in order to achieve patient comfort, safe and effective ICU support including ECMO, and short term seizure control.

Patients will be managed with NO analgesics or sedatives provided the patient is:

1. free from pain, distress and agitation AND
2. all supportive therapies including ECMO can be delivered safely and effectively AND
3. there is no seizure activity

Neurological examination

This will be conducted at the end of the minimum duration of active ICU support as defined above. This will be based on clinical neurological examination, and selective use of neurophysiological tests (EEG, SSEP) in association with neurological consultation.

Withdrawal of active support

Withdrawal of active support may be recommended for any one of the following reasons:

1. Brain death
2. Persisting coma with a Glasgow Motor Score 1-2 and bilateral absence of N20-peak on median nerve SSEP
3. Persisting coma with a Glasgow Motor Score 1-2 and treatment refractory status epilepticus
4. Persisting coma with a Glasgow Motor Score 1-2 that does not improve in the following 48 hours provided metabolic, drug and other reversible factors have been ruled out

After the end of the neurological examination period, and before discharge from ICU, a consensus management plan regarding the patient's candidacy for maintaining or continuing advanced ICU supportive therapies will be documented.

Named Collaborators Sydney ECMO Research Interest Group

Besides the named members of the Sydney ECMO Research Interest Group that collaborator and contributed significantly to this study include:

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