ECPR Prague School, Cubex Centrum Prague, October 24–26, 2024

INFLUENCE OF STRICT SELECTION CRITERIA ON SURVIVAL WITH GOOD NEUROLOGICAL OUTCOME AFTER ECPR

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Form: poster, **theme:** influence of strict selection criteria on survival with good neurological outcome after ECPR

Purpose of the study: To analyze the influence of strict vs. extended ECPR criteria on survival with good neurological outcome. Secondarily, to evaluate the influence on organ donation.
Methods and materials: Retrospective study including all adults suffering refractory in hospital (IHCA) or out of hospital cardiac arrest (OHCA) and receiving ECPR between June 2017 and August 2024 at a tertiary center. Patients were retrospectively allocated to the strict selection criteria group if initial rhythm was shockable and low flow time ≤ 60 min; else, they were allocated to the extended criteria group. Survival with good neurological outcome was defined as a Cerebral Performance Category 1 or 2 at 3 months. Demography, comorbidities and cardiac arrest variables were compared using χ^2-test or Fisher exact test if categorical and Mann–Whitney U if continuous. Statistical significance was established at p-value < 0.05.
Results: Of the 105 patients who received ECPR (61 – 58.1% for OHCA, and 44 – 41.9% for IHCA) only 15 (14.3%) fulfilled strict criteria for cannulation. Differences between demographics, comorbidities and cardiac arrest characteristics and outcomes are detailed in **Table 1**.
Global survival with good neurological outcome was 22.9% (24 patients). Survival of patients fulfilling strict criteria was significantly higher (46.7% vs 18.9%, p = 0.01), although most survivors (17 – 70.8%) were in the group with extended criteria for ECPR. Regarding organ donation, one (6.7%) patient from the strict criteria group donated vs. 20 (25.6%) from the extended criteria group (p = 0.095).
Conclusions: Strict criteria for ECPR are associated with improved survival, but in this cohort, it excludes most survivors and organ donors.

Table 1 – Demographic, comorbidities, and cardiac arrest characteristics

	Extended (78)	Strict (15)	*p*-value
Sex (male)	67 (85.9%)	12 (80.0%)	0.064
Age (years)	56 (44–64)	52 (36–55)	0.031
Cardiovascular risk factors	76 (97.4%)	11 (12.6)	0.290
Ischemic heart disease	13 (15.3%)	2 (13.3%)	0.602
Immunosuppression	5 (6.0%)	1 (6.7%)	0.633
Cardiac arrest location (OHCA)	55 (61.1%)	6 (40%)	0.125
No flow time (min)	0 (0–1)	0 (0–0)	0.650
Low flow time (min)	65 (34–78)	35 (25–45)	< 0.001
Initial shockable rhythm	34 (37.8%)	15 (100%)	< 0.001
pH	6.86 (6.8–7)	6.98 (6.9–7.12)	0.07
Lactate	13.4 (9–16)	13 (10.8–20)	0.982
Good neurological outcome	17 (18.9%)	7 (46.7%)	0.01
Organ donors	20 (25.6%)	1 (6.7%)	0.095

CANNULATION STRATEGIES IN ECPR FOR INFANTS – A CASE DISCUSSION AND LITERATURE REVIEW

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Form: poster, **theme:** eCPR cannulation

Case: A 1-month-old infant was re-admitted to CICU with congestive cardiac failure and shock, 3 weeks following a complex RVOT patch augmentation and stent for tetralogy of Fallot. During intubation there was a PEA cardiac arrest and a pre-alerted eCPR team was activated. Surgical cannulation via right neck vessels was performed during continuous cCPR except for short interruptions of 30 seconds for cannula insertions. Full ECMO support was established at 49 minutes. Decannulation from ECMO occurred at 7 days neurologically intact. At 12-month follow-up, the child is meeting age-appropriate milestones on Bayley-III developmental assessment.
Discussion: The cannulation site for paediatric eCPR is generally guided by institutional practice and practical patient factors. Limited evidence supports cannulation site choice – neck cannulation has been associated with

improved[1–3] but also similar[4] survival compared to central cannulation. Importantly, neck cannulation facilitates continuous cardiac compressions with minimal interruptions prior to establishment of full ECMO support.
Conclusions: This case demonstrates that successful in-hospital eCPR relies on clinical teams executing basic ICU care well – anticipating deterioration, minimising interruptions to good quality cCPR, rapid deployment of ECMO and performing a standardised and rehearsed[5] unit approach for cannulation. Neck cannulation has been associated with improved survival[1–3] and may be a preferred cannulation strategy for eCPR in small children.

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FUNCTIONAL STATUS AND MEDIUM-TERM NEURODEVELOPMENTAL OUTCOMES IN NEONATES AND INFANTS AFTER SURVIVING EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR)

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Form: poster, **theme:** ECPR

Purpose of study: Young survivors of extracorporeal cardiopulmonary resuscitation (ECPR) have good health-related quality of life.[1] We describe the medium-term neurodevelopmental and functional outcomes in infants after hospital discharge.
Methods: Single-centre retrospective review of patients who survived up to 42 months after ECPR and attended ECMO recovery multidisciplinary clinic during 2018–2023 was conducted with descriptive analysis of neurological performance using Paediatric Outcome Performance Category (POPC) and neurodevelopmental outcomes.
Results: 15 neonates and infants had history of ECPR during the 6-year period, of whom 10 (67%) survived. ECMO run was at median age 20 days (range 1day–9 months), three had genetic syndromes. Diagnoses at the time of in-hospital cardiac arrest included congenital heart disease postoperative day (n = 8), cardiomyopathy associated with tachyarrhythmia (n = 1); and percutaneous epicardial pacing wire for congenital complete heart block (n = 1). Median time to flow during ECPR was 40 minutes (range 30–90). Median ECMO duration was 104 hours (range 59–168). Three patients had abnormal neuro-imaging, none had focal deficits. All children had favourable POPC 1–2 at hospital discharge.
At early 6-month review (range 4–13), incidence of minimum possible Function Status Scale (FSS = 6) indicating normal functional status in 6 domains of mental status, sensory and motor functioning, communication, feeding, and respiratory status was 40%, which increased to 75% at toddler-age review (range 2.2–3years), with improved motor function, independence from tube feeding, and at full time nursery with education health care plan. One child had ventricular assist device at age 8 months and one was lost to follow-up.
Bayley Scales of Infant and Toddler Development (BSID-III) was completed for 8 children at age 12 to 36 months (median 31), with scores for cognitive, receptive language and motor domains below normative mean in over 50%. Expressive language and gross motor domains were markedly below normative mean in over 55% of children by toddler years. Cognitive, language and motor function were delayed with median (IQR) percentile 27 (3.75–37), 23 (3–34) and 12 (1–25), respectively. New referrals for community therapies were made at clinic review.
Conclusion: After ECPR survival from neonatal to infancy, incidence of neurodevelopmental delay was high, whilst functional status improved by the time of nursery attendance. Further study on long term follow-up as part of enhancing ECPR programs should be conducted to evaluate the temporal effect of community therapy.

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ECMO ONSITE: A PREHOSPITAL ECPR PROGRAM FOR THE PAVIA PROVINCE AND A SIMULATION OF ITS POTENTIALITY

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Form: poster, **theme:** eCPR on site

Purpose of the study: Refractory out-of-hospital cardiac arrest (OHCA) is a significant issue with meager survival. eCPR is a technique that offers chances to these patients, requiring a limited time window to start the procedure (low-flow time lower than 45'). Due to the high skills needed to start eCPR is only available in specialized hospitals. The distance of the OHCA site from these facilities is the main limitation, affecting the low-flow time.
We designed a pre-hospital eCPR program and simulated its potential benefit.
Material and methods: The pre-hospital eCPR program is built on an eCPR-team that is dispatched to the OHCA when, at the emergency call, dispatching criteria are respected (18–70 y.o., witnessed cardiac arrest with bystander CPR, no trauma). The eCPR-team is sent to the event location simultaneously with a BLS and an ALS medical team with a portable ECMO system (Colibri© Eurosets, Italy).
We have analyzed six years of our cardiac arrest registry and selected patients who match dispatch criteria and have not achieved ROSC to evaluate if the pre-hospital eCPR-team could offer eCPR support to an increased number of patients and in less time. We used real arrival time on the scene of the ALS medical team and simulated the time of the eCPR-team using Google Maps routing, which decreased by 15% of the time due to the emergency drive and added 5 minutes for activation time.
Results: Out of 275 patients, the pre-hospital eCPR-team could start cannulation within 45' from OHCA in 233 patients, compared to only 66 patients who could arrive at ECMO hospital in the same time window, the median time from OHCA to cannulation start is 34' for both.
Conclusions: In our province, a pre-hospital eCPR program could more than triple the number of patients who could benefit from the eCPR technique.

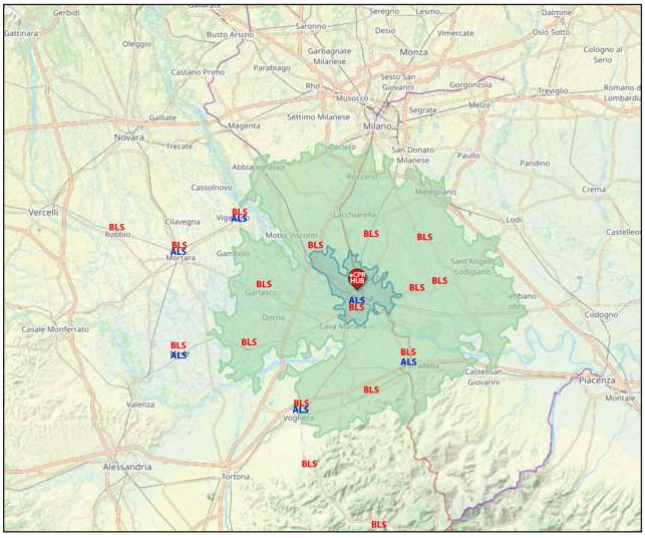

Fig. 1 – Map of the area in which OHCA patients could be eligible for in-hospital ECPR (dark green) vs estimated area of activity of the mobile eCPR-team (light green).
ALS – ALS rapid response vehicle location; BLS – BLS ambulance location; eCPR Hub – IRCCS Policlinico San Matteo ECMO center and location of the Mobile eCPR Team.

CHALLENGES IN MANAGEMENT OF A COMPLEX PATIENT REQUIRING ECPR AND ECLS

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Form: poster, **theme:** ECPR in a 7-year-old boy with coarcted aorta, LV dysfunction, and arrhythmias, with suspected Takayasu's arteritis

Introduction: This was a case where the unusual presentation and strong family history of vasculitis created significant challenges for decision making and timing of escalation.
Case description: A 7-year-old boy, who was otherwise well presented acutely with recurrent syncope and was found to be in complete heart block, with a subsequent episode of pulseless VT, and then torsade de pointes with spontaneous cardioversion. His older sister was known to have Takayasu's arteritis. He was found to have LV dysfunction, cardiac enzymes that were not raised, and upper limb hypertension with a significant blood pressure gradient as compared to his lower limbs. A CT angiogram confirmed a severe narrowing of the thoracic descending

aorta beyond the origin of the left subclavian artery, without collaterals and suggestion of some inflammation raising concerns of Takayasu's arteritis. He was commenced on immunosuppressive therapy with steroids, but these were subsequently weaned off after an MRA did not show any signs of inflammation, and a normal vasculitis screen. The diagnosis was deemed more in keeping with a congenital cause.
He failed an extubation attempt and needed re-intubation for respiratory failure. He developed hypotension refractory to vasoactive therapy after induction with cardioprotective anaesthesia, with severely impaired biventricular dysfunction and subsequently went into refractory cardiac arrest. ECPR was initiated with a total low flow time of 45 mins. Stent angioplasty was subsequently performed under ECMO. The patient unfortunately went on to have a decompressive craniectomy for bilateral cerebral oedema and signs if raised ICP following a right MCA territory infarct. After a period of neuroprotection, an MRI confirmed widespread HIE, cerebral oedema and persisting tonsillar herniation, with marked cerebral dysfunction on an EEG. He underwent a compassionate extubation with parental agreement and died very shortly afterwards.
Discussion: The presentation and clinical course provided significant challenges in decision making and management of his underlying issues of hypertension, compromised cardiac function, and arrhythmias.

EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION FOR OUT-OF-HOSPITAL CARDIAC ARREST – OUTCOME BY INITIAL RHYTHM

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Form: poster, **theme:** extracorporeal cardiopulmonary resuscitation for out-of-hospital cardiac arrest – outcome by initial rhythm

Purpose of the study: The use of extracorporeal resuscitation (eCPR) in out-of-hospital cardiac arrest (OHCA) patients with an initial non-shockable rhythm (NSR) remains controversial. Consequently, this cohort is underrepresented in eCPR studies. We aimed to evaluate patient characteristics and outcomes stratified by initial rhythm in real-life cohort of patients.
Material and methods: In this single-centre retrospective study, consecutive 283 patients (median age 58 [50–65] years, 82% male) who underwent eCPR for refractory out-of-hospital cardiac arrest (RCA) from 01/2016 to 10/2023 were divided by either initial shockable rhythm (SR, n = 150) or NSR (n = 133).
Results: Except for a higher prevalence of prior coronary artery disease in SR (80% vs 56%, $p < 0.001$), other baseline characteristics were equally distributed.
No differences were found in either witnessed collapse (SR 86% vs 82%, $p = 0.4$) or bystander CPR (SR 86% vs 79%, $p = 0.087$). Mean low-flow time was not statistically significant longer in NSR ($p = 0.21$). ECMO intraprocedural parameters were similar in both cohorts.
OHCA was significantly more likely ($p < 0.001$) to be caused by primary coronary (80% vs 53%) and arrhythmogenic events (9.2% vs 8.0%) in SR and by aortic dissection (0.8% vs 8.0%) and pulmonary embolism (1.7% vs 18%) in NSR.

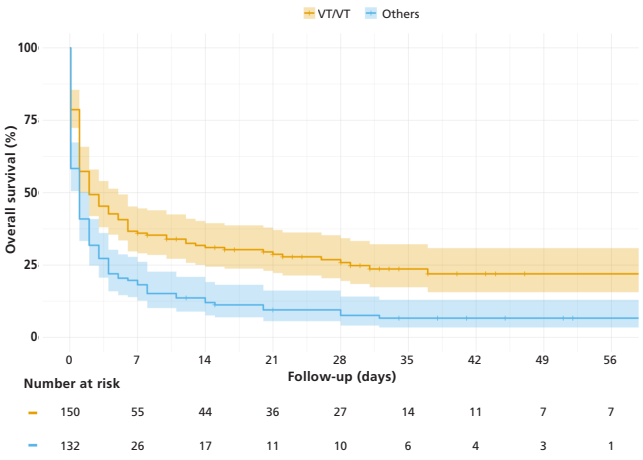

Fig. 1 – Kaplan–Meier curve: Survival-to-discharge

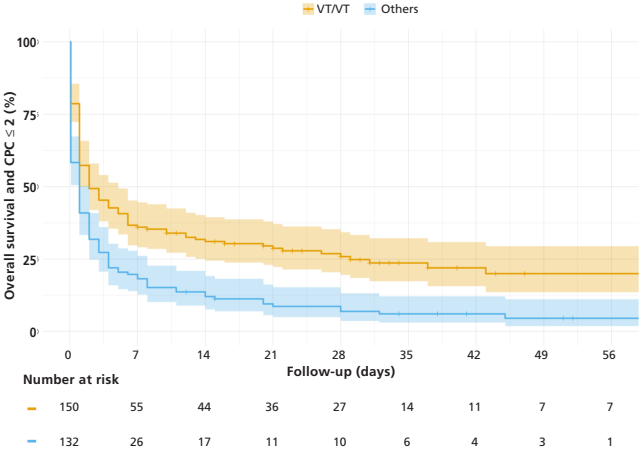

Fig. 2 – Kaplan–Meier curve: survival & CPC ≤ 2 at discharge

Survival (25% vs 8%) and favourable neurological outcome (defined by cerebral performance category ≤ 2) at discharge (18% vs 4%) were significantly higher in SR ($p < 0.001$). Notably, NSR was not found to be independently predictive of mortality and adverse neurological outcome in multivariate analyses (HR = 1.307 [0.96–1.77]). Significant favourable interactions were found for female sex and the use of suprarenine and amiodarone.
Conclusions: Based on these data, the routine use of eCPR in NSR cannot be advised. However, select patients might benefit, given the variety of underlying causes of RCA.

EFFECT OF DEEP HYPOTHERMIA ON SHORT-TERM NEUROLOGICAL OUTCOMES IN INFANTS WITH PROLONGED E-CPR

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Form: poster, **theme:** E-CPR in pediatrics

Purpose of the study: The role of hypothermia in neuroprotection has been widely studied, with encouraging results both in the setting of deep hypothermic arrest during BP surgery as well as in hypothermic OHCA. Post-CA controlled hypothermia however has not proven to improve neurological outcomes. We describe the neurological outcomes of a series of prolonged infant E-CPR cases in which deep hypothermia (< 32 °C core temperature) was precociously recorded.
Material and methods: Descriptive prospective case series of infants undergoing prolonged in-hospital E-CPR with sustained recorded core temperature < 32 °C since commencement of CPR. The analysis includes demographic variables together with length of E-CPR and neurological outcome.
Results: Our series include 4 patients (see **Table 1** below). Measured core temperature during E-CPR remained below 32 °C in all four. P1 and P3 experienced passive deep hypothermia, whereas P2 and P4 were actively cooled with local physical measures (protected frozen saline bags around the head). Mild hypothermia (35 °C) was maintained for 48h post-CA. Three surviving patients showed favourable neurological outcomes, with appropriate neurodevelopment as per age 2 months after CA. P4 presented with prolonged focal status epilepticus in the ischaemic cerebral infarct, leading to ECMO discontinuation given association to severe ischaemic limb sequalae and underlying complex congenital heart defect.
Conclusions: Favourable neurological outcomes are possible despite prolonged CA. Together with good quality CPR, early onset deep hypothermia may play a role favouring better neurological outcomes in neonates and small infants, where temperature drop can be rapidly achieved.

THE ROLE OF CARDIAC RHYTHM CONVERSION DURING REFRACTORY OUT-OF-HOSPITAL CARDIAC ARREST ON A PATIENT'S PROGNOSIS. POST--HOC ANALYSIS OF THE PRAGUE OHCA RANDOMIZED TRIAL

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Form: poster, **theme:** ECPR

Purpose of the study: A Prague OHCA study has demonstrated that an invasive approach (early transport to the hospital, extracorporeal cardiopulmonary resuscitation, ECPR) is a feasible and effective treatment strategy in refractory out-of-hospital cardiac arrest (OHCA). This

Table 1

Patient	Diagnosis	Age at CA (days)	Weight (kg)	Length of E-CPR (min)	Survival
1	Neonatal sepsis	5	3.7	57	Yes
2	HLHS Norwood I	43	3.6	76	Yes
3	HLHS Norwood I	19	2.8	50	Yes
4	Single ventricle Norwood I	45	3.5	60	No

post-hoc analysis study aimed to stratify the prognosis of patients according to the detailed course of heart rhythm during pre-hospital and early hospital periods.
Methods: The analysis enrolled all randomized patients with a witnessed OHCA of a presumed cardiac cause with refractory OHCA. The primary outcome was a composite of survival with Cerebral Performance in Category (CPC) 1 or 2 at 180 days.
Results: Out of the study cohort of 256 patients (median age 58 years, 17 % females), 156 (61 %) manifested VF, 45 (17%) asystole, and 55 (21%) pulseless electrical activity as an initial rhythm. Patients with an initial VF who reached a sustained or at least one episode of intermittent recovery of spontaneous circulation (ROSC) had the highest proportion reach a primary outcome: 32/44 (73 %) or 35/49 (71 %). Conversely, no patient with an initial VF and asystole as their last rhythm (24 cases) attained CPC 1 or 2 at 180 days; HR 3.44 (95% CI 1.76–6.74). Patients who experienced at least intermittent ROSC showed a higher success rate in achieving the primary outcome if randomized in the invasive compared to the standard strategy: 26 out of 34 (76%) versus 24 out of 50 (48%); $p < 0.05$.
Conclusion: Intermittent or sustained ROSC seems to be a marker for a better prognosis in OHCA patients with an initially refractory VF. Patients with at least intermittent ROSC after the initial VF and ongoing VF seem to be optimal candidates for an invasive approach. Asystole detection anytime during resuscitation is a strong negative prognostic marker irrespective of the initial rhythm.

MEDIUM-TERM NEUROFUNCTIONAL OUTCOMES FROM PARENT-REPORTED PEDI-CAT IN PAEDIATRIC SURVIVORS OF EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION

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Form: poster, **theme:** ECPR

Purpose of study: Extracorporeal cardiopulmonary resuscitation (ECPR) in children can offer survival benefit with favourable one-year outcomes although impairments may be common.[1] Here we describe medium-term neurofunctional outcomes in paediatric survivors.
Methods: Single-centre retrospective review of children who survived up to 6 years after ECPR and attended ECMO multidisciplinary clinics during 2018–2023 was conducted, using Pediatric Evaluation of Disability Inventory-computer adaptive test (PEDI-CAT) and Paediatric Outcome Performance Category(POPC) for descriptive analysis of neurofunctional outcomes.
Results: Of the 30 patients who had ECPR during the 6-year period, 20 (baseline POPC 1–2) survived with ECMO run at median age 8 months (range 1 day–15 years). At the time of in-hospital cardiac arrest, diagnoses included post-cardiac surgery (n = 10), malignant tachyarrhythmias (n = 2), cardiomyopathy (n = 1), septic shock (n = 1), and following percutaneous interventions (n = 5) including angioplasty, valvuloplasty, epicardial pacing. Median time to flow during ECPR was 40 minutes (range 14–90). Median ECMO duration was 110 hours (range 49–298). Incidence of new moderate–severe disability (POPC 3–4) at hospital discharge was 30%, with referral to acquired brain injury rehabilitation.
At early review (median 7 months, range 1–11) incidence of favourable POPC 1–2 was 85% and normal Functional Status Scale (FSS = 6) in 6 domains (mental status, sensory and motor functioning, communication, feeding and respiratory status) was 35%. Motor (function and spasticity) and feeding improved by medium-term review (median 4 years, range 2–6) with full time attendance at mainstream school and 75% children had minimum possible FSS = 6.
18 parent-reported PEDI-CAT were completed for 14 patients. **Fig. 1** describes measures in daily activity (DA), mobility (M), social/cognitive (SC) and responsibility (R) domains with median (IQR) percentiles of 38 (24–83), 25 (7–59), 33.5 (23–62) and 39 (34–59), respectively. Low 25th percentile measures in SC and M domains were in 22% and 33% respectively of children at early review. Incidence of low percentile measures doubled at medium-term review across all domains. One clinical psychology referral was made, and all parents were offered goal-based activities advice for children and adolescent young people.
Conclusion: Paediatric ECPR survivorship with moderate neuro-disability was not uncommon. Functional status improved to ability for full school attendance, delay may emerge in later years in some developmental domains. Long-term follow-up may help to identify needs to navigate community support integration with school and home activities.

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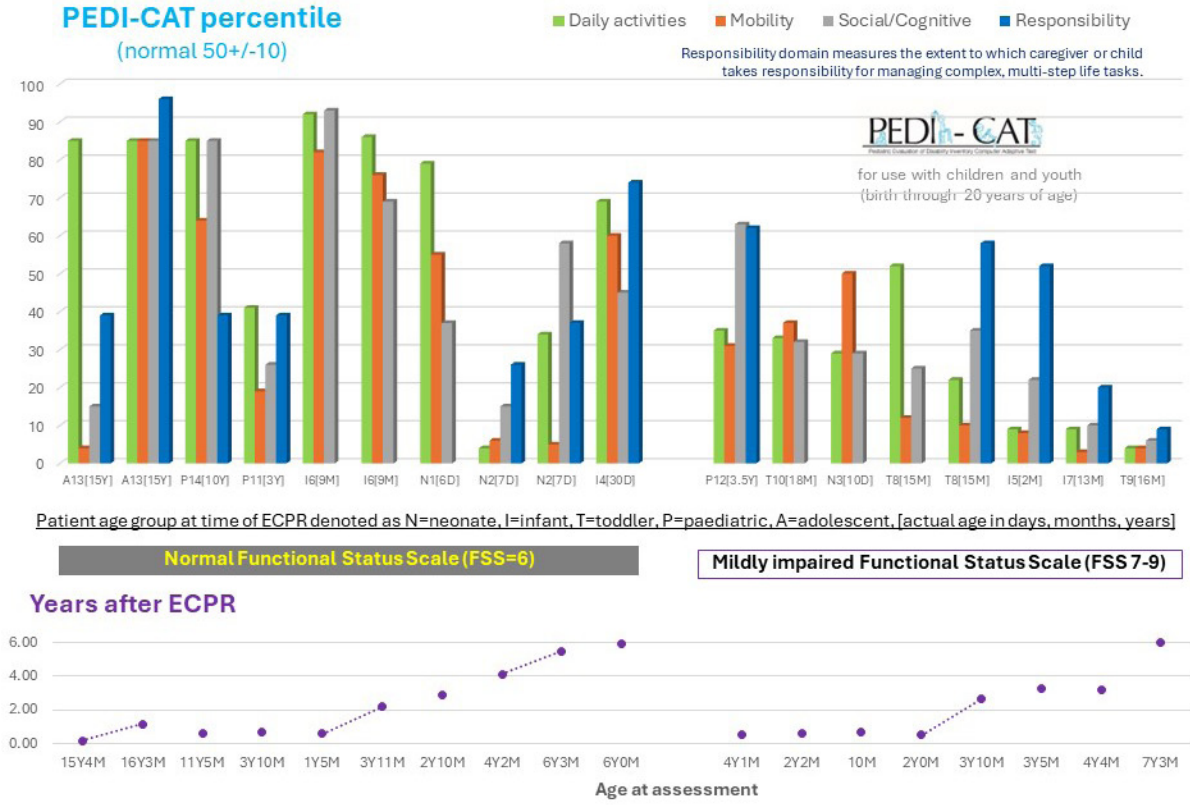

Fig. 1 – PEDI-CAT percentile graphs in daily activities, mobility, social/cognitive and responsibility domains.

ORGAN DONATION TO A FAMILY MEMBER FOLLOWING NON-SELECTIVE ECPR

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Form: poster, **theme:** ECPR selection criteria, organ donation

In cardiac arrest, initiation of ECPR is time-sensitive with delay being linked to poor outcomes. It occurs without complete clinical information. Optimal selection criteria are not known and continue to evolve with the understanding of the potential benefits. Patients who undergo ECPR and progress to brain death have shown an increase in the number of organs donated when compared to standard treatment. Importantly, recipients of these organs have demonstrated good outcomes. Here, we present a patient that normally would not have been considered a candidate for ECPR if the severity of her neurological injuries were known. However, cannulation allowed for multiple organ donations after brain death.

A 23-year-old female was transferred to our facility following a motorcycle accident. She arrived intubated, hypotensive, with refractory hypoxia, and experienced a cardiac arrest. Empiric bilateral chest tube insertion and a bedside exploratory laparotomy were performed, without improvement. ECPR cannulation was pursued with a 15F femoral arterial return cannula and 21F femoral vein drainage cannula. ROSC was achieved. She was found to have a subdural hematoma with midline shift, cerebral edema, and deemed non-survivable by neurosurgery. Brain death was declared, and her family pursued organ donation. Notably, her liver and left kidney were donated to her cousin.

Patient selection in ECPR remains challenging and difficult to benchmark. This patient would commonly be excluded for consideration. While she did not survive, there was clear overall benefit. With recent literature showing organ viability after ECPR, this case highlights the need for ongoing reassessment of selection criteria and evaluation of benefit. It raises the question if neurological injury should be an exclusion for ECPR.

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E-CPR IN PEDIATRIC ECMO TRANSPORT

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Form: poster, **theme:** E-CPR in paediatric transport

Purpose of the study: Distance and time to patients limits the role of primary ECMO transport in the setting of active CPR. However, severity of patients referred for primary ECMO transport, together with prolonged transport times, carries a high risk of CA immediately prior to initiation of ECMO. We aim to define the characteristics of E-CPR and outcomes in the context of paediatric primary ECMO-transport.
Material and methods: This is a prospective observational study including all cases of primary ECMO transport performed at a tertiary paediatric hospital based ECMO transport service from 2014 to 2024. Patients undergoing E-CPR were identified, and survival and outcome compared to the overall transport cohort as well as the in-house E-CPR cohort data (2014–2024).
Results: The ECMO transport cohort included 52 patients with a 75% survival rate (39/52), of which 5 fulfilled E-CPR criteria. Survival rate among E-CPR cases during transport was 60% (3/5), similar to 53% (14/30) survival rate found in our in-house E-CPR cohort. Comparing PRISM scores did not show any significant differences between transport and in-house E-CPR patients (Transport m20.68 R10-36 vs In-hospital m26 R18-31). However, duration of E-CPR was significantly shorter during transport (m 15' R13'-45') compared to in-house (m50' R15'-76').
Neurological outcomes were comparable and overall favourable in both E-CPR cohorts, with mild-moderate sequelae (CPC 1–2) in 20% (1/5) of transport and 13.3% (4/30) of in-house E-CPR patients.
Conclusions: E-CPR in the setting of ECMO transport is a frequent event with similar outcomes and shorter times of E-CPR compared to general E-CPR published data. Readiness of E-CPR teams on site at the time of CA most likely accounts for these results. Frequency of E-CPR in the setting of ECMO transport could potentially be reduced with timely referrals and shorter response times.

ORGAN DONATION AFTER CARDIAC ARREST: RESULTS OF A COORDINATED ECPR AND UNCONTROLLED DONATION AFTER CIRCULATORY DEATH (UDCD) PROGRAM

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Form: poster, **theme:** organ donation after cardiac arrest: results of a coordinated ECPR and uncontrolled donation after circulatory death (uDCD) program

Purpose of the study: To describe organ donation resulting from a single pathway ECPR and uDCD program. To analyze the causes for non-donation.
Methods and materials: Descriptive retrospective study including all adult refractory cardiac arrest patients assessed between September 2022 and September 2024 at a high-volume ECMO center with a coordinated ECPR and uDCD program for refractory in hospital (IHCA) and out of hospital (OHCA) cardiac arrest. All patients identified are evaluated and deemed candidates for ECPR or uDCD according to the criteria described in **Fig. 1**. Contraindications for donation are assessed intra-arrest and active follow up of ECPR cases is performed until prognosis is established. Variables are described using mean (interquartile range) and frequency (percentage).
Results: From a total of 180 refractory cardiac arrest cases (135 [75%] OHCA and 45 [25%] IHCA), 79 (43.9%) were deemed candidates for ECPR and 7 (3.9%) were accepted for uDCD. Three (1.7%) of the remaining candidates fulfilled criteria for uDCD but the resource was not available. In the ECPR branch, 19 patients (24.1%) survived.
In the ECPR branch, of the 60 non-survivors, 58 (96.7%) were evaluated as potential organ donors and 19 (31.7%) were utilized. Fifteen (78.9%) donated after brain death and four (21.1%) after circulatory death. In the uDCD branch, four (57.1%) were utilized.
The most common cause for non-donation was multiorgan dysfunction (21 patients [36.2%]), followed by family refusal (9 [17.3%]) and medical contraindication (7 [12.1%]). In the uDCD branch, the causes were family refusal (2 cases) and failure to initiate normothermic regional perfusion due to failure to progress the intra-aortic occlusion catheter (1 case).
Conclusions: A combined ECPR and uDCD program can lead to patient survival and organ donation. Main causes for non-donation are multiorgan dysfunction and family refusal.

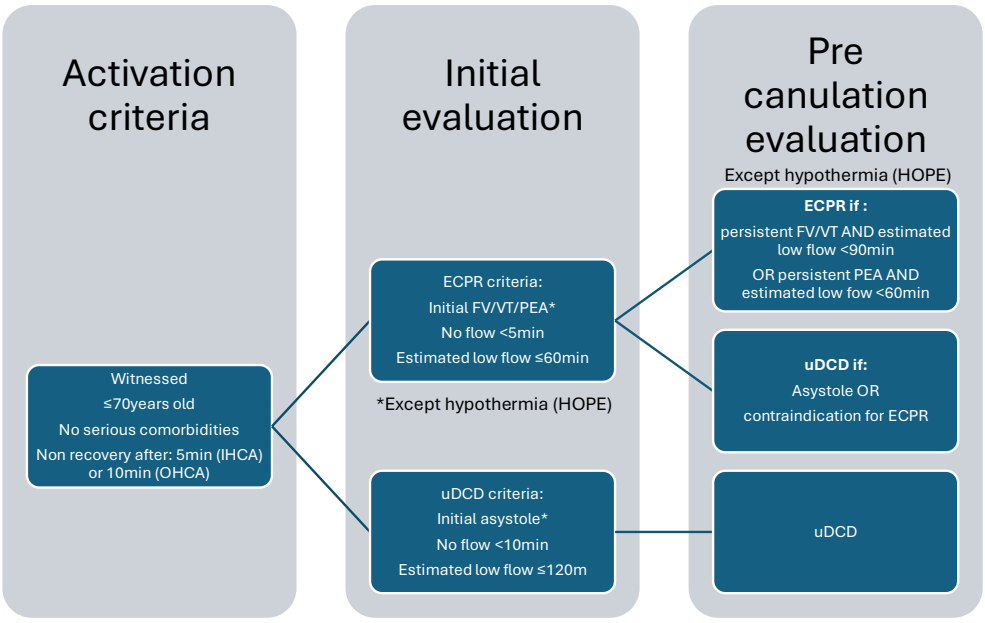

Fig. 1 – ECPR and uDCD criteria and pathway. HOPE: Hypothermia outcome prediction after Extracorporeal Life Support.

ACUTE NEUROLOGICAL COMPLICATIONS (ANC) AND OUTCOMES IN CHILDREN WHO RECEIVED EXTRACORPOREAL CARDIO-PULMONARY RESUSCITATION (ECPR) – REPORT FROM A EUROPEAN QUATERNARY CARDIAC CENTRE

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Form: poster, **theme:** paediatric ECPR

Introduction: Paediatric extracorporeal cardiopulmonary-resuscitation (ECPR) is utilized as rescue therapy where survival is the primary aim. Post-ECPR morbidity remains a challenge due to multifactorial reasons.[1] Acute neurological complications (ANCs) remain dominant factors affecting morbidity and mortality. We report ANCs in children who received E-CPR and factors associated with unfavourable outcomes.

Methods: Electronic record was reviewed of all patients who received ECPR for in-hospital cardiac arrest (CA). Variables analysed according to ELSO data collection from January 2016 to July 2024 included Paediatric Cerebral Performance Category Scale (PCPC) at hospital discharge, with favourable outcomes defined as absence of ANC and/or PCPC 1–2 and unfavourable outcomes, including death (PCPC 3–6).
Results: A total of 42 E-CPR runs in 41 patients. Median age 7 months (IQR: 0.8–36) and weight 5.15 kg (IQR: 3.3–13.2). 32/42 (76%) survived ECMO decannulation and 25/42 (59.5%) survived to hospital discharge. 8/42 (19%) had at least one episode of out-of-hospital cardiac arrest prior to PICU admission. Asystole was the most frequent rhythm (n = 18). Median time to cannulation was 41 min (IQR: 27–52).
25/42 (59%) of patients developed ANCs, of those, 15/42 (35%) developed ANC during ECMO run. 21/42 (50%) had favourable neurological outcome – no ANCs (n = 17) or PCPC 1-2 (n = 4). Of the remaining 21/42 (50%) who had unfavourable neurological outcome, 15 (35%) had moderate to severe disability (PCPC 3 and 4) and 6 died (PCPC 6). 13/42 (31%) developed stroke and 8/42 (19%) developed hypoxic ischaemic encephalopathy (HIE).
Longer time to cannulation (50 min vs 30 min, *p*: 0.01), higher pre-ECMO lactate (15 mmol/L vs 10.4 mmol/L, *p*: 0.016) and reduced lactate clearance (22.5 h vs 7 h, *p*: 0.037) were significant risk factors for developing ANCs.
Among ANCs, patients with favourable outcome had lower lactate pre-cannulation (9.9 mmol/L vs 17 mmol/L, *p*: 0.011) and faster lactate clearance (10 h vs 32 h) than unfavourable outcomes. Presence of multi-organ failure, need for renal replacement therapy, type (asystole/bradycardia/pulseless electrical activity) and place (out-of-hos-

pital) of arrest were not significant risk factors for unfavourable outcomes.
Conclusions: Incidence of ANC with unfavourable neurological outcomes (PCPC 3–6) is high (up to 50%). Longer time to ECMO cannulation, higher pre-ECMO lactate and delayed lactate clearance post-cannulation were significant risk factors associated with ANC and unfavourable neurological outcomes. Further research is needed to understand and improve neurological outcomes, including service delivery and clinical practice.

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MEASURING THE CHANGE IN $PACO_2$ IN PAEDIATRIC PATIENTS FOLLOWING INITIATION OF ECPR

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Form: poster, **theme:** post ECPR management

Study purpose: Extracorporeal cardiopulmonary resuscitation (ECPR) is a lifesaving intervention following refractory cardiac arrest. Guidelines emphasise the importance of optimal acute phase ECMO (extra corporeal membrane oxygenation) management following cannulation to improve patient morbidity.[1] Hypocapnia and hypercapnia influence cerebral blood flow and studies show that rapid changes in $PaCO_2$ can increase the risk of acute brain injury.[2,3] We conducted this study to assess how $PaCO_2$ changes during the initiation of ECPR in our centre.
Methods: This is a single-centre retrospective cohort study of patients receiving in-hospital ECPR in a tertiary cardiac paediatric intensive care centre in the UK. We included all patients receiving ECPR during a five-year period from January 2019 to December 2023. Blood gas data were reviewed, and values recorded prior to initiation of ECPR; immediately following cannulation; and then at intervals of one hour and six hours on ECMO.
Results: A total of 38 patients received ECPR during the five-year study period. Most patients (26/38) were post-cardiotomy (69%). At the time of cannulation, median $PaCO_2$ was 6.42 KPa (IQR 4.88–9.10 KPa). The median $PaCO_2$ was 4.38 KPa (IQR 3.62–4.97 KPa) at one hour; 5.02 KPa (IQR 4.38–5.58 KPa) and 5.10 KPa (IQR 4.20–5.60 KPa) at six hours.
The median change in $PaCO_2$ from prior to cannulation to one hour on ECMO was 3.46 KPa (IQR 1.37–5.14 KPa) and median reduction in $PaCO_2$ from highest $PaCO_2$ recorded before cannulation to lowest $PaCO_2$ in the first six hours on ECMO was 5.01 KPa (IQR 3.36–7.84 KPa).
Conclusion: This study showed that control of $PaCO_2$ in these patients is difficult and greater attention is required to optimising the degree and rate of change in $PaCO_2$ levels which may be protective against acute brain injury. Real-time, inline monitoring may be crucial to facilitate closer physiological management. Further analysis is required to assess the neurological impacts for this cohort of children.

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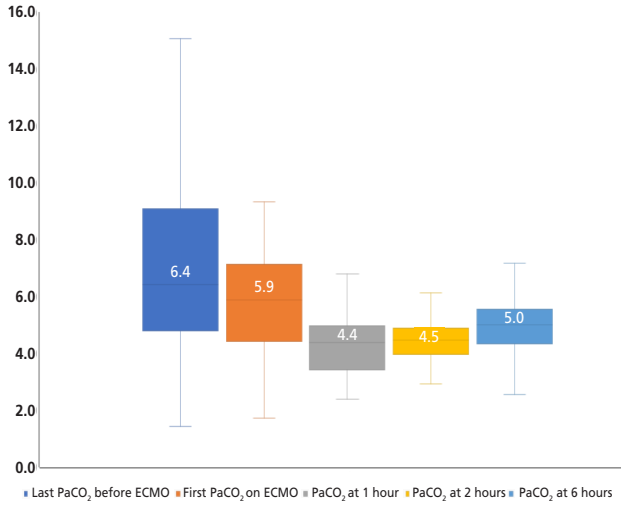

Fig. 1 – Change in $PaCO_2$ after eCPR

PERIOPERATIVE USE OF ENOXAPARIN AS AN ALTERNATIVE ANTICOAGULATION STRATEGY FOR ECMO IN LUNG TRANSPLANTATION

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Form: poster, **theme:** ECMO anticoagulation

Objectives: Lung transplantation remains the only therapeutic option for patients with end-stage lung disease. In selected cases, patients can be connected to extracorporeal membrane oxygenation (ECMO) as a bridge to lung

transplantation (BTT). However, ECMO carries a risk of thrombosis, necessitating anticoagulation therapy. While unfractionated heparin (UFH) is commonly used, the choice of anticoagulation during ECMO is controversial and varies between institutions. One alternative is low molecular weight heparin (LMWH) – specifically Enoxaparin, which is administered intravenously via continuous infusion and monitored through the anti-Xa assay.

Methods: At our center, we have implemented continuous infusion of Enoxaparin for ECMO anticoagulation, including cases of lung ECMO BTT, for an extended period. This anticoagulation method is also maintained intraoperatively during the lung transplant without additional UFH. The efficacy of LMWH is monitored using the anti-Xa assay, activated partial thromboplastin time (APTT), and APTT ratio. The therapeutic range for anti-Xa is kept between 0.3 and 0.7, with an ideal target value around 0.5.

Results: We analyzed data from three patients who received Enoxaparin for anticoagulation as part of ECMO BTT. Enoxaparin was administered via continuous infusion at a median dose of 500 IU/hour, with a median body weight-adjusted dose of 9.2 IU/kg/hour. Adequate prevention of thrombosis was demonstrated with anti-Xa levels maintained between 0.3 and 0.7. No thrombotic or bleeding complications occurred during the preoperative or intraoperative periods with LMWH (Enoxaparin) anticoagulation.

Conclusions: Although our study involves a relatively small sample size, it suggests that LMWH (Enoxaparin) can serve as a viable alternative to UFH for anticoagulation in ECMO BTT. Enoxaparin is easily monitored using the anti-Xa assay and does not increase the risk of thrombotic or bleeding complications.

SUDDEN CARDIAC ARREST LEADING TO TRAUMA AND SUCCESSFUL ECPR: COMPREHENSIVE MANAGEMENT AND LONG-TERM OUTCOMES IN A 41-YEAR--OLD INTENSIVIST WITH TOTAL LAD OCCLUSION

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Form: poster, **theme:** ECPR

04/10/2023 Early in the morning. A 41-year-old intensivist drives to his hospital. He has no significant medical history. That day he suffers vague thoracic discomfort, leading to a sudden cardiac arrest (SCA) while driving. Following a car crash, immediate bystander CPR, advanced life support, and veno-arterial extracorporeal membrane oxygenation (VA-ECMO) resulted in successful resuscitation. The patient required extensive post-resuscitation management, including percutaneous coronary intervention (PCI) for a total occlusion of the left anterior descending artery (LAD), management of multiple traumatic injuries, and treatment of complications such as ventilator-associated pneumonia, septic shock, and critical illness polyneuropathy. Long-term follow-up revealed several significant sequelae, including left ventricular thrombus, diffuse cerebral microbleeds, and neuromuscular deficits.

The patient showed successful recovery and was transferred to cardiology for rehabilitation at day 27.

Day 41 transfer to the rehabilitation unit and discharge home four months and 13 days after cardiac arrest.