

Hospital discharge kidney dysfunction and treatment with anti-hypertensive medications after paediatric extracorporeal membrane oxygenation

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Background

- Acute kidney injury (AKI) is frequent in children treated with extracorporeal membrane oxygenation (ECMO) and is associated with short-term mortality and morbidity.
- AKI may be a risk factor for long-term chronic kidney disease (CKD) in children admitted to the PICU.
- Lack of complete recovery from AKI before discharge may be a risk factor for long-term CKD.

Objectives

In children treated with ECMO, determine

- Prevalence of kidney dysfunction and need for anti-hypertensive medication at hospital discharge.
- Associations between AKI on ECMO and other factors (e.g. ECMO duration/indication; age; oxygenation index) with kidney dysfunction and need for anti-hypertensive medication at hospital discharge.

Methods

- 6-center retrospective cohort study (Kidney Injury During Membrane Oxygenation cohort)
- Population: Children (<18 yrs old) on ECMO ≥24hrs from 2007-11.
- Exposure: AKI (based on KDIGO serum creatinine criteria) during ECMO, defined as:
 - any AKI; AKI≥Stage2 regardless of renal replacement therapy (RRT); AKI including need for RRT as a criterion, AKI ≥Stage 2 including RRT as a criterion.
- Outcomes
 - Hospital discharge kidney dysfunction defined as Serum creatinine ≥1.5X pre-ECMO baseline
 - Need for anti-hypertensive medication at discharge
- Analyses: Univariable, comparing AKI and clinical factors between patients with vs. without outcomes.

Results

Figure 1. AKI stage during ECMO



Figure 2. Kidney dysfunction at hospital discharge N=43(12.1%)



Hospital discharge kidney dysfunction is significantly associated with the presence of AKI on ECMO, but not associated with RRT treatment during ECMO.

Pulmonary 62.1%

ECPR 17% (n=60)

Cardiac 20.9% (n=74)

(n=220)

Figure 3: Antihypertensive medication at discharge N=115(33.3%).



Treatment with antihypertensive medications at hospital discharge is significantly associated with the presence of AKI on ECMO and RRT treatment during ECMO.

Other factors associated with hospital discharge kidney dysfunction and anti-hypertensive medications

- Fewer ECMO hours was associated with hospital discharge kidney dysfunction (p=0.03). VA ECMO mode was more common in patients with need for anti-hypertensive medication at hospital discharge (80.9% vs. 52.2%, p=0.001).
- Older age, oxygenation index, non-renal complications, ECMO indication, and center were all associated with both hospital discharge kidney dysfunction and need for anti-hypertensive medication at hospital discharge (all p≤0.01).

Table 1.Factors associated with hospital discharge kidney dysfunction and need for anti-

	Kidney dysfunction at discharge			Anti-hypertensive medications at discharge		
	Yes (N=43)	No (N=311)	p	Yes (N=115)	No (N=231)	p
Age, days(IQR)	141 (31,485)	12 (2,456)	0.004	183(14, 1850)	8 (1,243)	< 0.0001
RRT modality (N=127)			0.18			0.20
CRRT with device (%)	4 (21)	40 (37)		23 (40.4)	20 (29.4)	
In line filter (%)	15 (79)	68 (63)		34 (59.6)	48 (70.6)	
OI (IQR)	36.9(16.8, 47)	46.2(27.6,66.7	0.01	35.5(14.7, 57.1)	46.5(31.3,67.6)	0.001
Non renal complication (%)	43 (100)	244 (78.5)	0.001	108 (93.9)	174 (75.3)	<0.001
ECMO indication			0.01			<0.0001
Pulmonary (%)	18 (41.9)	202 (65)		38 (33)	176 (76.2)	
Cardiac (%)	15 (34.9)	59 (19)		45 (39.1)	27 (11.7)	
ECPR (%)	10 (23.2)	50 (16)		32 (27.8)	28 (12.1)	
Hours on ECMO, h (IQR)	96 (68,212)	136 (90,230)	0.03	134 (70,232)	135 (93,229)	0.3
ECMO mode			0.22			< 0.0001
VA ECMO (%)	30 (69.8)	186 (60)		93 (80.9)	120 (52.2)	
VV ECMO (%)	13 (30.2)	124 (40)		22 (19.1)	110 (47.8)	

Conclusions

- Hospital discharge kidney dysfunction and anti-hypertensive medication at hospital discharge are common after AKI during paediatric ECMO, suggesting that kidney health follow-up should be systematically considered in ECMO survivors.
- Discharge kidney outcomes are associated with AKI on ECMO and patient/treatment/illness severity factors

Implications

· Future work will determine if the relation of AKI with discharge kidney outcomes is independent of these factors.

