

Impact of Fluid overload and Continuous Renal Replacement Therapy Initiation Phenotypes on Outcomes: A retrospective analysis of the WE-ROCK Collaborative

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Introduction

- Acute kidney injury (AKI) and pathologic fluid overload (FO) are common in critically ill children and young adults.
- CRRT is used for the most severe form of AKI and FO, but there is significant practice heterogeneity across centers.
- Adult studies have not demonstrated no survival benefit for an accelerated vs. delayed strategy of CRRT initiation.
- Whether the interaction between and time to start of CRRT is unknown

Aim and Hypothesis

- Aim:** Determine if FO/CRRT start phenotypes are associated with 90-day mortality
- Hypothesis:** Patients with FO>10% and late CRRT start (>48h) will have worse 90-day mortality compared to early start and no FO.

Methods and Materials

- Multi-center retrospective study.
 - 32 Centers, 7 nations
- Inclusion:** Patients aged 0-25 years treated with CRRT for AKI, and/or FO from 2015-2021.
- Exclusion:** ESKD, non-AKI/FO indication, concurrent ECMO or use of PD in the same admission prior to CRRT, use of CARPEDIEM™ device.
- Primary Exposure:** Patients were delineated into 4 phenotypes of FO at CRRT start (<10% vs. ≥10%) and timing of CRRT initiation from ICU admission (early, ≤48 hours vs late: >48 hours).
- Primary Outcomes:** 90-Day mortality
- Secondary outcomes:** ICU LOS
- Analysis:** Multivariable regression was used to determined associations with outcomes.

Conclusions

- Late CRRT start, independent of FO conferred the greatest risk of 90-day mortality and increased resource utilization
- RCT's are needed to determine whether early vs. Late start with fluid thresholds impact mortality

Results

Comparison of Start and Fluid Phenotypes

Variable	Early/FO<10% (n=378)	Early/FO≥10% (n=136)	Late/FO<10% (n=193)	Late/≥10% (n=268)	P-Value
Age (years)	10.63 (2.83, 15.95)	3.57 (0.93, 10.6)	13 (5.67, 16.57)	3.66 (0.83, 12.92)	<0.001
Sepsis at ICU admission	146 (39)	82 (60)	83 (43)	135 (50)	<0.001
1 st Comorbidity					
• None	88 (23)	31 (23)	28 (15)	45 (17)	0.03
• Respiratory	39 (10)	16 (12)	28 (15)	48 (18)	0.04
• Cardiac	42 (11)	18 (13)	51 (26)	79 (29)	<0.001
• Oncologic	91 (24)	30 (22)	50 (26)	50 (19)	0.3
• Immunolog	67 (18)	20 (15)	31 (16)	35 (13)	0.4
PELOD-2 at CRRT initiation	6 (3, 9)	8 (6, 11)	6 (4, 8)	7 (5, 10)	<0.001
VIS at CRRT start	0 (0, 15)	19 (0, 38)	3 (0, 11.5)	5 (0, 17)	<0.001
%FO at CRRT initiation	2.64 (0.51, 5.72)	15.09 (12.07, 24.61)	3.78 (0.93, 6.96)	26.23 (16.57, 41.58)	<0.001
CRRT duration (days)	5 (2, 12)	7 (3, 13)	7 (3, 16)	7 (4, 17)	<0.001
ICU LOS	15 (8, 24)	22 (14, 31)	28 (16, 54)	41 (22, 68)	<0.001
90-day Mortality	117 (31)	56 (41)	85 (44)	108 (40)	0.007

Multivariable Associations with Outcomes

MORTALITY				
	WE-ROCK Registry (n=975)			
	Early CRRT/ FO<10% (n=378)	Early CRRT/ FO≥10% (n=136)	Late CRRT/ FO<10% (n=193)	Late CRRT/ FO≥10% (n=268)
90-day Mortality	(n=113)(30%)	(n=51)(38%)	(n=78)(40%)	(n=107)(40%)
aOR (95%CI)	(REF)	[1.25 (0.88-1.78)]	[1.63 (1.12-2.36)]	[1.41 (0.98-2.02)]

28-DAY ICU FREE DAYS				
	WE-ROCK Registry (n=975)			
	Early CRRT/ FO<10% (n=378)	Early CRRT/ FO≥10% (n=136)	Late CRRT/ FO<10% (n=193)	Late CRRT/ FO≥10% (n=270)
ICU Free days	6 (0, 17)	0 (0, 8)	0 (0, 2)	0 (0, 0)
Median(95%CI)	[REF]	[8.13 (1.47-12.40)]	[0 (0-1.76)]	[0 (0, 0)]



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