

Factors Associated with Major Adverse Kidney Events at 90 Days among children requiring Continuous Renal Replacement Therapy: A retrospective analysis of the Worldwide Exploration of Renal Replacement Outcomes Collaborative in Kidney Disease (WE-ROCK)



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Abstract

Study Purpose: Continuous renal replacement therapy (CRRT) is an important supportive care modality used in critically ill children, but little is known about outcomes. We aimed to characterize the factors associated with major adverse kidney events at 90 days (MAKE90).

Methods: The Worldwide Exploration of Renal Replacement Outcomes Collaborative in Kidney Disease (WE-ROCK) study is an international multicenter observational study (32 centers, 7 nations) conducted from 2018-2021 in patients aged 0-25 years treated with CRRT for acute kidney injury or fluid overload. Patients with previous dialysis dependence, ECMO use, or who received CRRT for a different indication were excluded. Successful liberation was defined as ≥ 72 hours without CRRT need within the first 28 days. The primary outcome was MAKE90: death, dialysis dependence or $\geq 25\%$ decline in estimated glomerular filtration rate from baseline. Multivariable logistic regression was used to assess the association between clinical features and MAKE90.

Results: 990 children who received CRRT were included and 627 (63%) developed MAKE90 outcomes. After adjusting for sepsis at admission and illness severity parameters at CRRT initiation (vasopressor-inotrope score, PELOD-2 score, % fluid balance), patients with cardiac comorbidity (OR 2.04) and longer CRRT duration (OR 1.23) were associated with higher odds of developing MAKE90 (Table 1). Patients with successful liberation within 28 days (OR 0.26) were associated with lower odds of MAKE90.

Conclusion: MAKE90 outcomes are common in critically ill children requiring CRRT, and highest among patients with cardiac co-morbidities and longer CRRT duration. Successful liberation within 28 days was associated with lower MAKE90 outcomes.

Introduction

- Continuous renal replacement therapy (CRRT) is an important supportive care modality used in critically ill children
- Little is known regarding outcomes for these Children
- We aimed to characterize factors associated with Major Adverse Kidney Events at 90 days (MAKE90)

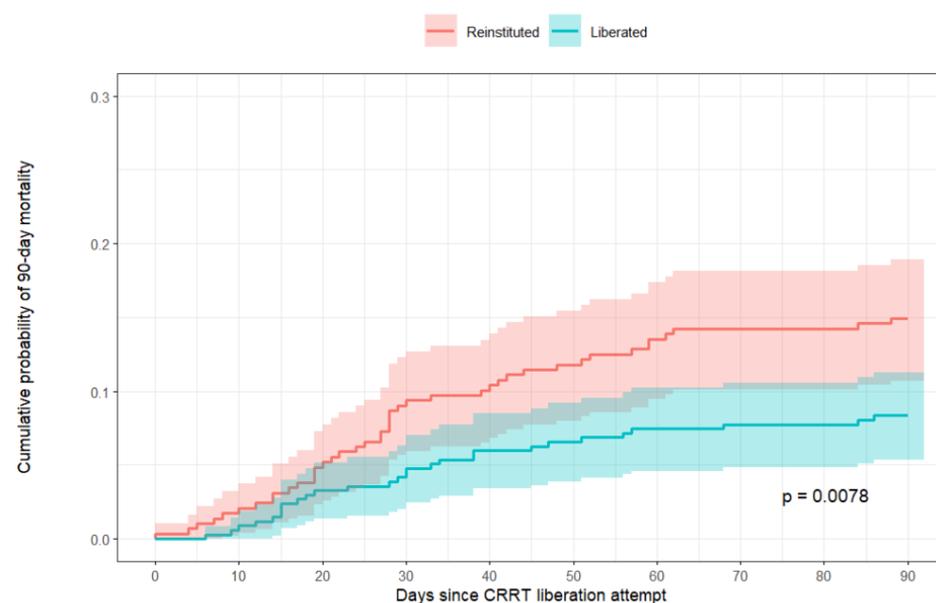
Methods and Materials

- WE-ROCK Database, included 980 patients (age 0-25 years) from 32 centers and 7 nations, who required CRRT for AKI or pathologic fluid balance from 2015-2021
- Excluded patients with prior dialysis dependence, ECMO use, or other CRRT indication
- Multivariable logistic regression model was used to estimate the odds ratio (OR) and 95% confidence interval (CI) to identify factors associated with liberation success.
- Kaplan-Meier cumulative probability of mortality was estimated for patients based on liberation success
- Primary outcome was MAKE-90: death, dialysis dependence, or $\geq 25\%$ decline in estimated glomerular filtration rate from baseline; at 90 days
- Liberated: no receipt of CRRT or other dialysis for ≥ 72 hours after discontinuing CRRT
- Reinstated: resumed CRRT or other dialysis within 72 hours after discontinuing CRRT
- Not Attempted: no attempt at CRRT liberation within first 28 days after CRRT initiation

Variable	Liberation Not Attempted (n=357)	Reinstated (n=288)	Liberated (n=335)	P value
90-Day mortality	291 (82)	47 (16)	30 (9)	<0.001
RRT Dependence	31 (46)	57 (24)	4 (1.3)	<0.001
SCr at Hospital DC	0.57 (0.36, 1.28)	0.53 (0.34, 0.90)	0.42 (0.26, 0.70)	<0.001
MAKE-90	341 (97)	176 (63)	101 (34)	<0.001
Hosp LOS (survivors only)	76 (42, 122)	44 (28, 83)	33 (23, 58)	<0.001

Results

Kaplan-Meier curve of death within 90 days based on CRRT Liberation outcome



	0	10	20	30	40	50	60	70	80	90
Reinstated	288	283	274	262	259	254	249	247	247	245
Liberated	335	333	324	321	315	313	310	309	309	307

Multivariable regression models predicting MAKE-90

Variable	Reference	Contrast	OR (95%CI)
No comorbidity	No	Yes	0.44 (0.27-0.71)
Cardiac Comorbidity	No	Yes	1.51 (1.01-2.25)
Time to CRRT admission (days)	1.0	6.0	1.06 (1.01-1.11)
Liberation pattern	Not attempted	Reinstated	0.07 (0.04-0.11)
Liberation pattern	Not attempted	Liberated	0.02 (0.01-0.03)

Odds ratio (OR) and 95% confidence intervals (CI) obtained by logistic regression accounting for the nesting of patients within centers via the Huber-White cluster sandwich estimator of variance (only significant predictors included in this table)

Conclusions

- MAKE-90 Outcomes are Common
- Patients with Cardiac Comorbidities are more likely to have MAKE-90 Outcomes
- Patients without any comorbidities are least likely to have MAKE-90 Outcomes
- Compared to patients without a liberation attempt, both patients with liberation success and CRRT reinstated were less likely to have MAKE-90 Outcomes



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