

Prognostic Factors and Outcome of Continuous Renal Replacement Therapy (CRRT) in Critically ill Pediatric Oncological Patients: An Experience from Cancer Center

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OBJECTIVE

- The incidence Acute kidney injury (AKI) is varying from 4.6 to 9.9 cases per 1000 in general pediatric patients.
- Children with severe AKI often need continuous renal replacement therapy (CRRT) due to fluid overload, electrolyte imbalance, and uremia.
- Aim of this study was to determine the indications, prognostic factors, clinical outcomes in pediatric oncological AKI patients requiring CRRT.

METHODS

- A retrospective, single-center cohort study conducted at the PICU, from August 2014 to August 2024.
- Included all pediatric oncology patients aged 1–18 years who underwent CRRT for AKI, tumor lysis syndrome, drug toxicity, or obstructive uropathy.
- Data collected regarding demographics, oncologic and renal diagnoses, clinical/lab parameters at CRRT initiation, and treatment-related factors (nephrotoxic drugs, chemotherapy, vasopressor use, anticoagulation, CRRT modality, vascular access, and CRRT duration).
- CRRT modality (CVVH, CVVHD, CVVHDF) and anticoagulation use were based on individualized clinical decisions.
- Outcomes assessed included survival status, CRRT-related complications, and cause of death.

Statistical Analysis

- Data analyzed using SPSS 27.0; normality tested via Kolmogorov–Smirnov test; nonparametric variables reported as Median (IQR);
- Mann–Whitney U test used for continuous data; Chi-square/Fisher’s exact test for categorical variables; significance set at $p \leq 0.05$.

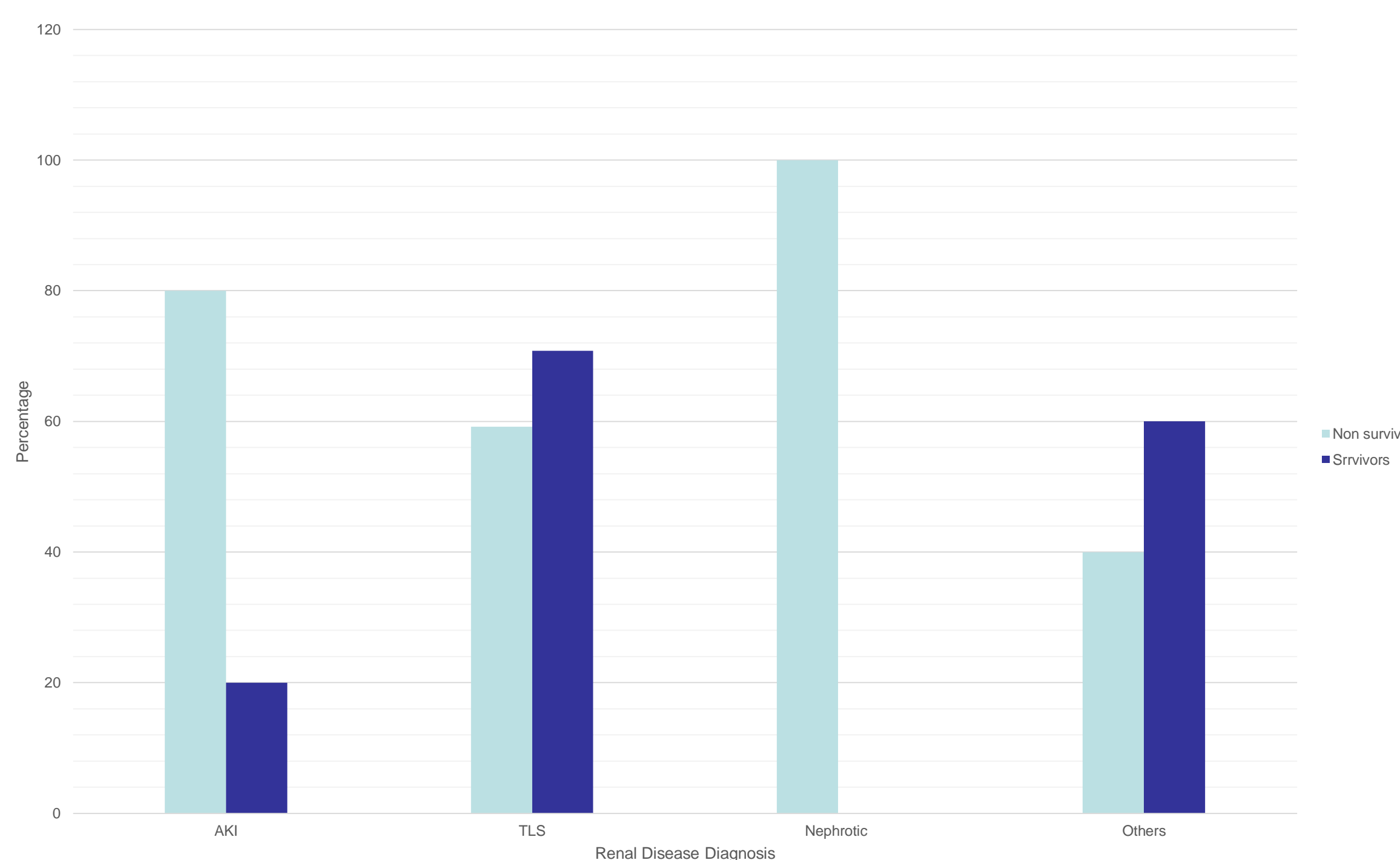
RESULTS

- Among 114 pediatric oncology patients on CRRT, 64.9% did not survive, while 35.1% survived.
- Median age (non-survivors: 4 years; survivors: 4.5 years; $p=0.532$) and gender ($p=0.838$) were not significantly associated with survival.
- Sepsis was the leading cause of death (62.2%), followed by TLS-related complications (12.6%).

Demographic and clinical characteristics

		74(64.9)	40(35.1)	114(100)	
Age		4(3)	4.5(3)	4.0(3)	0.532
Gender	Male	48(64)	27(36)	75(65.8)	0.838
	Female	26(66.7)	13(33.3)	39(34.2)	
Weight (kg)		16(8)	15(7)	15(7)	0.773
BSA (Write Unit?)		0.68(0.24)	0.63(0.3)	0.65(0.2)	0.894
Duration of Symptoms		3(10)	2.5 (5)	3(9)	0.716
Baseline Serum Creatinine		0.53(1.02)	0.6(1.4)	0.55(1.12)	0.329
pH at start		7.2(0.2)	7.3(0.1)	7.2(0.2)	0.009**
HCO3 at start		16(7.8)	17(5.77)	16.4(7.0)	0.381
Use of Nephrotoxic Drugs		14 (77.8)	4 (22.2)	18(15.7)	0.213
Need of Vasopressors		48 (88.9)	6 (11.1)	54 (47.4)	<0.001**
Chemotherapy Agent		20 (87)	3 (13)	23(20.18)	0.013

Renal Disease diagnosis



Outcomes of continuous renal replacement therapy (CRRT)

Variables		Non Survivor	Survivor	Total	P-Value
		74(64.9)	40(35.1)	114 (100)	
Creatinine at 24 hours		0.71 (1.06)	0.80 (2.01)	0.75(1.37)	0.251
Creatinine at 48 hours		0.55 (0.75)	0.75 (1.32)	0.6(0.9)	0.689
Creatinine at the end of CRRT		0.54 (0.72)	0.50 (1.30)	0.51(0.86)	0.857
Phosphate at start		7.30 (5.63)	7.00 (5.75)	7(5.65)	0.966
Phosphate at end		4.90 (2.84)	4.00 (3.21)	4.8(3.06)	0.163
CRRT associated Complications		3(100)	---	3(2.63)	NA
Cause of Mortality	Sepsis	46 (100.0)	---	46 (62.16)	NA
	TLS	9 (100.0)	---	9 (12.16)	
	Others	19 (100.0)	---	19 (25.68)	

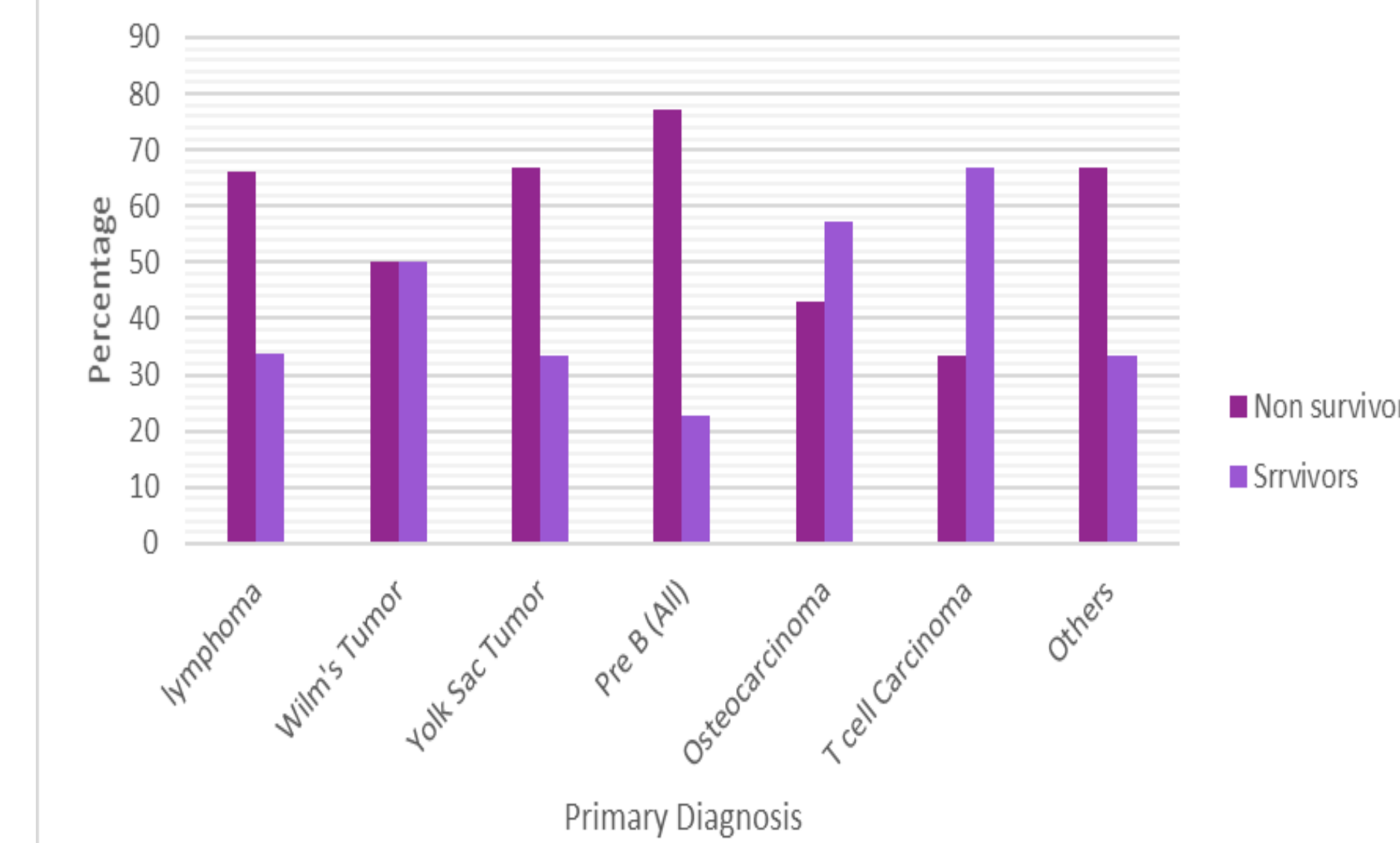
RESULTS

- Lymphoma was the most common diagnosis (51.8%), with 66.1% mortality ($p=0.528$); osteosarcoma and T-cell carcinoma showed better outcomes.
- Tumor lysis syndrome (TLS) was the most common renal diagnosis (43%) and indication for CRRT (63.2%), but not significantly associated with mortality ($p>0.1$).

CRRT specific parameters

Variables		Non Survivor	Survivor	Total	P-Value
		74(64.9)	40(35.1)	114 (100)	
Indication of	AKI	25(69.4)	11(30.6)	36(31.6)	.529
CRRT	TLS	46(63.9)	26(36.1)	72(63.2)	
	Drug Induced Toxicity	0(0.0)	1(100.0)	1(0.88)	
	Obstructive Uropathy	2(66.7)	1(33.3)	3(2.63)	
Time of Initiation of Therapy		180(300)	180(300)	180(300)	.770
Modality of	CVVH	27(71.1)	11(28.9)	38(33)	0.493
CRRT	CVVHDF	32(65.3)	17(34.7)	50(43.5)	
	CVVHD	9(50.0)	9(50.0)	18(15.7)	
	IHD	6(66.7)	3(33.3)	9(7.8)	
Duration of CRRT		28.5 (24)	48(24)	41(24)	.280
Type/Location	Femoral	25(73.5)	9(26.5)	34(29.82)	.429
of Vascular	Jugular	48(61.5)	30(38.5)	78(68.42)	
Access	Porta Cath	1(50.0)	1(50.0)	2(17.75)	
Anticoagulant Use		25(52.1)	23(47.9)	48(42.1)	.016**
Number of	0	2(66.7)	1(33.3)	3(2.7)	.756
Filters Used	1	41(63.1)	24(36.9)	65(57.01)	
	2	18(64.3)	10(35.7)	28(24.5)	
	3	7(58.3)	5(41.7)	12(10.5)	
	4	3(100.0)	0(0.0)	3(2.6)	

Primary Diagnosis



CONCLUSION

- CRRT in pediatric oncology patients was associated with a high mortality rate (64.9%)
- Findings highlight that survival is more strongly influenced by the severity of critical illness than by renal recovery markers.
- Early identification of high-risk patients and aggressive infection management may improve outcomes.

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