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Introduction

- Neonatal acute kidney injury prevalence is reported as high as 45% and independently associated with increased morbidity and mortality
- Neonatal dialysis is extremely challenging and limiting through peritoneal dialysis (PD) or hemodialysis or hemofiltration with "off label" use of adult devices
- The Cardio-Renal, Pediatric Dialysis Emergency Machine (Carpediem) machine was approved in the United States for extracorporeal continuous kidney support therapy (CKST) for infants weighing 2.5 to 10kg, offering filter surface area of 0.16 or 0.29 m² and extracorporeal volume of 32 or 41mL

Methods and Materials

- Single center retrospective cohort of neonatal CKST with the Carpediem system between June 1, 2021, and November 30, 2021

Results

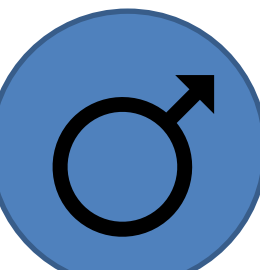


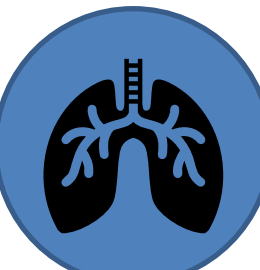


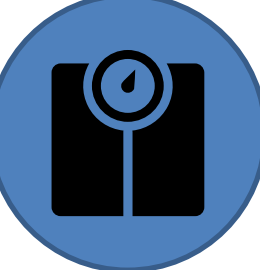


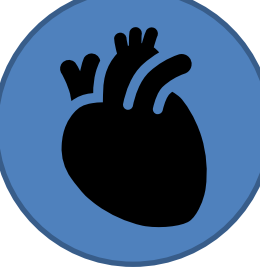
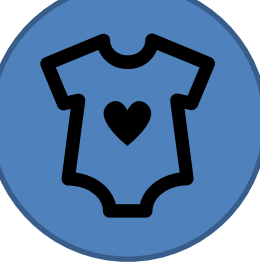
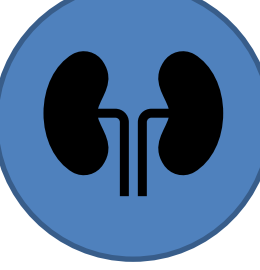

-  7 Neonates
57% male
-  Maternal comorbidities:
29% chronic hypertension
14% type II diabetes
-  71% born in-center
57% Cesarean rate
-  Mechanical ventilation:
Median 35d (range 6-134d)
-  29% extremely low gestational age (<28w)
-  29% required vasoactive support at CKST start
-  Birth weight:
median 2555g
(range 675g - 3945g)
-  29% confirmed genetic mutation (WT1, PKHD1)
-  APGAR 1 min:
median 4 (IQR 2.25-6.5)
APGAR 5 min:
median 7.5 (IQR 7-8)
-  57% congenital heart disease (14% cyanotic)
-  71% neonatal ICU
29% cardiac ICU
-  43% congenital anomalies of the kidney and urinary tract
 - 14% lower urinary tract obstruction
 - 29% renal dysplasia
-  Age at admission:
median 0d (range 0-78d)

Table 1. Clinical Comorbidities

Clinical Comorbidities	% Overall	% Prior to CKST
Intracranial hemorrhage	57%	43%
Thrombus	57%	29%
Seizures	29%	0%
Sepsis (culture positive)	29%	0%

Neonatal Illness Severity Score

The Score for Neonatal Acute Physiology II (SNAP-II) measures mortality risk due to physiologic instability

- Designed as admission score but has been used at later time points and sequentially
- SNAP-II selected given 29% with limited data for first 24 hours of life

Table 2. SNAP-II Score

Timing	Median
Admission	5 (IQR 5-16.5)
CRRT start	21 (IQR 2.5-28.5)
CRRT stop	34 (IQR 22.5-46)

- Summative score out of 115
- Includes mean arterial pressure, temperature, P/F ratio, lowest pH, seizures, and urine output
- SNAP-II > 30 suggests 3.5x increased risk of mortality

Table 3. CKST Characteristics

CKST Characteristics	%
Continuous venovenous hemodialysis	100%
Starting clearance 2000 ml/1.73m ² /h	100%
015 Filter	67%
025 Filter	17%
Indication for CKST	
• Fluid overload (FO)	57%
• Neonatal ESKD	43%
Vascular access at CKST start	
• 8 Fr	43%
• 7.5 Fr	43%
• 7 Fr	14%
Anticoagulation with regional citrate	100%
Median weight at CKST start (grams)	3290 (range 2770-5760)
Median FO by weight at CKST start	23% (IQR 16.5-33.5%)
Median number of catheters per patient	2 (range 1-6)
Median prescribed blood flow (ml/kg/min)	6.3 (IQR 5.9-9.1)
Median effluent dose prescribed (ml/kg/h)	94.4 (IQR 90.9-102.2)
Median effluent urea to BUN ratio	63% (IQR 62.4-63.8)
Median days on CKST with Carpediem	25 (range 3-58)
Average circuit life (h)	17.5 (range 8.0-20.9)
Adverse events	
• Dialysis catheter-associated thrombus	14%
• Non-dialysis catheter-associated thrombus	14%
Survival and transition to PD	57%

Conclusions

- CKST can be performed successfully using the Carpediem system, including low birth weight neonates
- This platform can successfully support neonatal ESKD before other modalities can be used, such as PD