

Functional outcomes in infant survivors of continuous renal replacement therapy (CRRT)

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Introduction

- The Cardio-Renal, Pediatric Dialysis Emergency Machine (CARPEDIEM™, Bellco-Medtronic, Miranda, Italy), used in Italy since June 2013 and FDA approved in the U.S. April 2020, provides CRRT with continuous veno-venous hemodialysis (CVVHD) for infants 2.5-10 kg due to smaller filter surface area (0.16 or 0.29 m²) and extracorporeal volume (32 or 41 mL)
- Survivor functional status of neonates supported on CRRT are largely unknown
- We aimed to describe the functional status of neonatal survivors with ESKD treated with the CARPEDIEM™ system

Methods

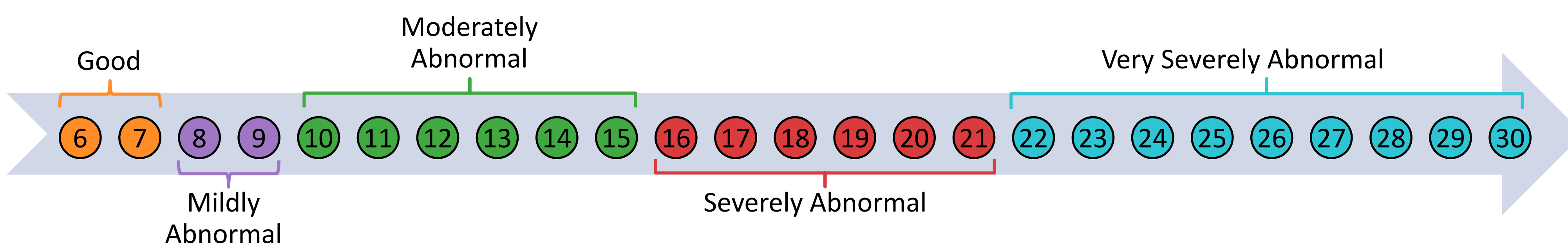
- Single center retrospective cohort of patients who received CKST using the CARPEDIEM™ system between June to December 2021 and survived to hospital discharge
- Functional outcome was determined by Functional Status Scale (FSS) at intensive care unit (ICU) admission, ICU discharge, hospital discharge, and follow-up (3 and 6 months).
- New morbidity was defined as change in FSS of at least 3.

Patient Characteristics

- 5 Neonates, 60% male
80% White, 40% Hispanic
- 80% born in-center
80% Cesarean rate
- Gestational age:
Median 35w1d [34w4d-36w0d]
- Birth weight:
Median 2.61 [2.605-2.835]
- 60% neonatal ICU
40% cardiac ICU
- Age at ICU admission:
Median 0 days [IQR 0-30]
60% admitted at birth
- Weight at ICU admission:
Median 2.61 [2.61-3.95] kg
- 100% neonatal ESKD
60% congenital anomalies of the kidney and urinary tract
- At CKST start:
100% mechanical ventilation
40% vasoactive support
- Fluid overload by weight:
Median 24% [16.8% - 31.6%]
- At discharge:
80% continuous cycling peritoneal dialysis
20% hemodialysis
- 100% G-tube dependent for primary nutrition

Functional Status Score (FSS)

Domains: Mental Status, Sensory, Communication, Motor Function, Feeding, Respiratory



CRRT Characteristics	N (%), Median
CKST Sessions:	247
• 015 Filter	179 (72%)
• 025 Filter	68 (28%)
CVVHD, 2000ml/1.73m ² /h	100%
Regional citrate anticoagulation	100%
Treatment duration (days)	46.0 [45.0-60.0]
Blood flow at start (ml/min)	20.0 [15.0-25.0]
Filter life (h)	21.6 [17.0-23.4]
EDW at CRRT start (kg)	2.6 [2.6-4.0]
Weight at CRRT start (kg)	3.3 [3.2-5.3]
Delivered Clearance (ml/kg/h)	84.8 [75.9-96.7]
Urea Clearance (ml/min)	62.7 [48.7-75.2]

Visualization Diagram for FSS Category

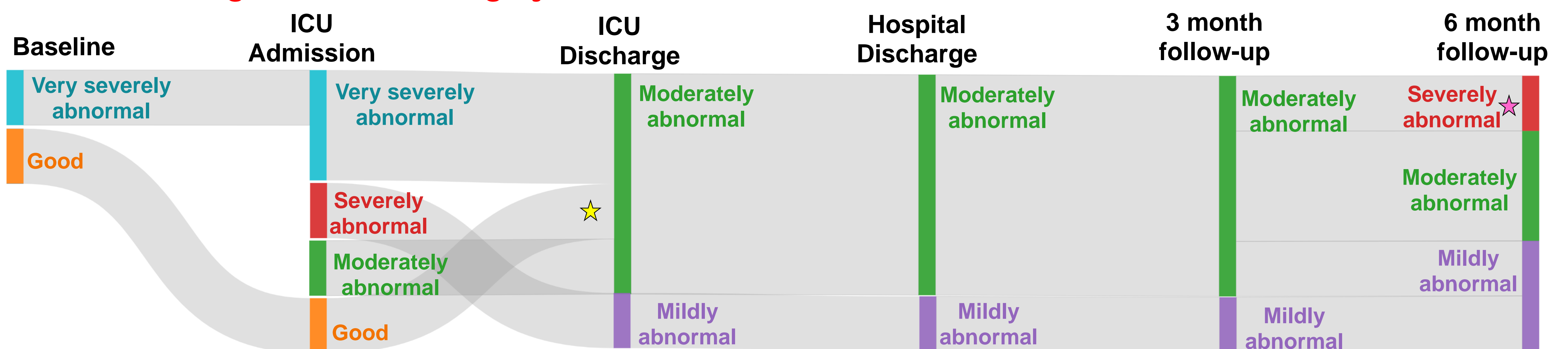


Figure 1: Sankey diagram showing change in FSS at baseline (for patients not admitted at birth), ICU admission, ICU discharge, hospital discharge, 3 month follow-up and 6 month follow-up. Colored bars represent the categories of FSS while width of the horizontal ribbons represent number of patients. Star symbol represents a new morbidity.

- ★ New morbidity occurred in 20% (1 infant) from ICU admission to discharge (FSS 6 to 11) due to worse dysfunction in communication, motor function, and feeding
 - This infant was admitted to ICU at 57 days of life.

- ★ After discharge, new morbidity occurred in 20% (1 infant) between 3 and 6 month follow up (FSS 14 to 18) due to worse dysfunction in motor functioning and feeding.
 - This infant subsequently passed away.

Conclusions

- Survivors of CRRT with the CARPEDIEM™ system were successfully transitioned to alternative kidney replacement therapy.
- Neonates with ESKD are a vulnerable population at risk of sustained impacts on functional status and need long term, global developmental follow-up.
- Larger cohort studies would be beneficial to better characterize these long-term outcomes.