

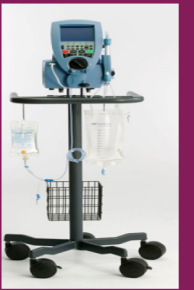
# Kidney Support in Children using Aquadex®:

## A Prospective and Retrospective Registry

### AKI & CRRT Conference

Michelle C Starr, Stuart L Goldstein, Shina Menon, David Askenazi, Alex Constantinescu,  
Robin Piazza, David M Kwiatkowski

on Behalf of the ULTRA-PEDS Registry Investigators



#### Introduction

Kidney Support therapy (KST) in small children can be technically challenging as machines designed for adult-sized patients necessitate large catheters and extracorporeal volumes.

We sought to better characterize treatment with the Aquadex SmartFlow® or FlexFlow® Systems (Nuwellis, Eden Prairie, MN) which is being used with increasing frequency in children with Acute Kidney Injury (AKI), fluid overload, or congenital kidney failure (CKF).

#### Methods and Materials

We report preliminary demographic, therapy indication, and short- and medium-term outcome data from this registry-based retrospective and prospective multicenter cohort of children receiving KST with Aquadex™.

Patients were grouped according to weight (<5, 5–10, and >10 kg).

We determined fluid balance (%FB) at KST as the difference between dry weight and weight at KST initiation. %FB is presented as median with interquartile range (IQR).

#### Results

To date, we have enrolled 82 patients (80 retrospective, 2 prospective) at 6 institutions.

Patient size ranged from <5kg (N=45), 5-10kg (N=12) and >10kg (N=25), had a variety of indications, and were treated mostly in ICUs (89%). The smallest patient was 1.3kg, and 14 patients were >20kg.

Treatment patterns and outcomes varied by patient size. In patients <5 kg, the primary disease was more likely to be kidney related (40%) while other cohorts were more heterogenous. Regardless of patient size, the most common indications for KST were AKI with fluid overload (49%), fluid overload alone (32%), and CKF (11%).

Patients <5kg had higher %FB (IQR) at initiation than 5-10 kg and >10kg [19 (5,33) vs. 13 (7,16) vs. 5 (2,25); P=0.04], lower survival to Aquadex™ therapy completion (61% vs. 92 vs. 95%), P=0.004, and lower survival to hospital discharge (51% vs. 75% vs. 86%; P=0.015).

#### Patient Characteristics

Characteristic	Overall Cohort (n=82)	Weight <5kg (n=45)	Weight 5-10kg (n=12)	Weight >10kg (n=25)
Age at first KRT	4 (0.5, 32) mo	24 (9, 60) d	8.5 (4.5, 14.5) mo	133 (59, 188) mo
Female	32 (39)	19 (42)	4 (33)	9 (36)
Primary Disease				
Kidney	24 (29)	18 (40)	2 (17)	4 (16)
Cardiac	18 (22)	11 (24)	3 (25)	4 (16)
Sepsis	6 (7)	2 (4)	1 (8)	3 (12)
BMT/Transplant	4 (5)	0	3 (25)	1 (4)
Other	30 (36)	14 (31)	3 (25)	13 (52)
Primary Indication				
Volume overload	26 (32)	10 (22)	4 (33)	12 (48)
AKI and volume overload	40 (49)	20 (44)	7 (58)	13 (52)
AKI and electrolytes	7 (9)	7 (16)	0	0
CKF	9 (11)	8 (18)	1 (9)	0
Patient treatment location				
PICU	29 (32)	10 (22)	7 (58)	12 (48)
NICU	27 (33)	26 (58)	1 (8)	0
CICU	15 (18)	7 (16)	3 (24)	5 (20)
Other ICU	2 (1)	2 (4)	0	0
HF Floor	9 (11)	0	1 (8)	8 (32)
Dry weight, kg	3.8 (2.6, 11.8)	2.8 (2.0, 3.4)	8.4 (7.5, 9.2)	27.0 (13.2, 56.5)
Weight at therapy initiation, kg	5.8 (3.3, 13.2)	3.6 (2.7, 4.4)	9.2 (7.5, 10.2)	43.3 (16.4, 58.2)
%FB at KST initiation	13 (2, 27)	19 (5, 33)	13 (7, 16)	5 (2, 24)
Days in ICU before KRT	6.3 (1.6, 23.1)	5.5 (1.7, 16.1)	11.8 (0.6, 38.8)	9.5 (1.3, 23.3)
Treatment course survival (N=75)	57 (76)	25 (61)	11 (92)	21 (95)
Hospital survival (N=75)	49 (65)	21 (51)	9 (75)	19 (86)
Kidney Outcomes among survivors (N=50)				
Renal Recovery	22 (44)	10 (48)	6 (60)	6 (32)
Discharged on Ongoing Dialysis	28 (56)	11 (52)	4 (40)	13 (58)

AKI, Acute Kidney Injury; BMT, Bone Marrow Transplant; CKF, Congenital Kidney Failure; FB, fluid balance; KST, Kidney Support Therapy; HF, heart failure; mo, months



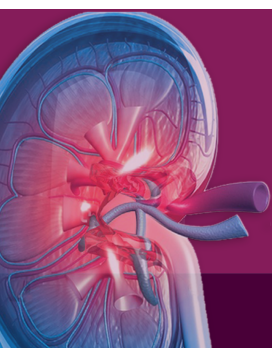
Figure 1. Current clinical sites enrolling patients as part of the ULTRA-PEDS Registry as of January 2022.

#### Conclusions

We report preliminary data from an ultrafiltration device registry describing a range of therapies for children in a variety of clinical settings. KST survival and survival to hospital discharge were superior to those reported in previous US registries.

Smaller patients were more likely to have higher %FB at initiation and worse outcomes. Further completion of this multicenter registry will aid in the understanding of treatment characteristics and outcomes in children on Aquadex™.

ULTRA-PEDS is funded by a grant from Nuwellis, Inc.



THE 27TH INTERNATIONAL CONFERENCE ON  
ADVANCES IN CRITICAL CARE NEPHROLOGY

# AKI & CRRT 2022

MARCH 7-10, 2022 SAN DIEGO, CALIFORNIA