Evaluation of a Rapid Hydration Protocol for Pediatric Patients on Chemotherapy

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BACKGROUND

- Chemotherapeutic regimens including ifosfamide, cyclophosphamide, high dose methotrexate (>500mg/m2), or cisplatin have a high incidence of toxicity including acute kidney injury (AKI) and hemorrhagic cystitis.
- Hydration before chemotherapy administration can be useful to assist in excretion of toxic metabolites and decrease occurrence of toxicity.
- However, this process is time consuming and cumbersome, so utilizing a rapid hydration protocol may prove to be beneficial.

OBJECTIVE

To evaluate the effectiveness and efficiency of rapid hydration for patients on high dose methotrexate (HDMTX), cisplatin, cyclophosphamide, and ifosfamide

METHODS

Study Design

- Retrospective chart review of EHR at SSM Health Cardinal Glennon Children's Hospital (CGCH) from 2019 to 2021

Inclusion Criteria

- Pediatric patients aged 1-20 years that were given chemotherapy pre-hydration for regimens including HDMTX, cyclophosphamide, ifosfamide, or cisplatin

Exclusion Criteria

- Patients that expired before completion of therapy and patients with ESRD (CrCl <15ml/min/1.73m^2)on HD

Data Analysis

- Descriptive statistics consisting of means, standard deviations, and percentiles

Hyperhydration Definitions

Extended Hydration	**Fluids administered with a rate of 125-250 mL/m^2/h over 3-8 hours**
Rapid Hydration	**Bolus of fluids with a rate 500-750 mL/m^2/h over an hour**

Study Sample

Total included, n=32
Hydration events: 134
→ **Rapid group events: 67**
→ **Extended group events: 67**

Drug	Rapid Hydration n. (%)	Standard Hydration n. (%)
cisplatin	10 (7.5)	14 (10.4)
cyclophosphamide	30 (22.4)	23 (17.2)
ifosfamide	9 (6.7)	4 (3)
HDMTX	18 (13.4)	26 (19.4)

RESULTS

Table 1: Patient Demographics

Age - years	
Mean	9.8
Standard Deviation	5.4
Median	10.0
Interquartile Range	4.8-14.8
Race – n. (%)	
African American	3 (9.4)
Asian	1 (3.1)
Caucasian	25 (78.1)
Hispanic	2 (6.3)
Prefer not to answer	1 (3.1)
Gender – n. (%)	
Female	17 (53.1)

Figure 1: Indication for Hyperhydration

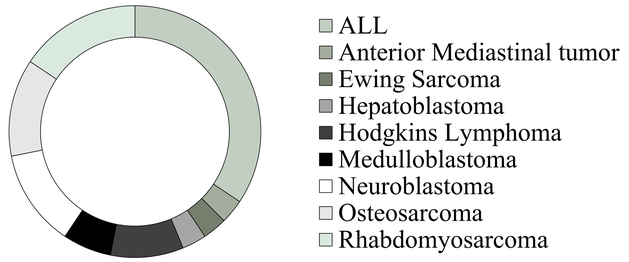

Figure 2: Length of Stay by Drug and Protocol

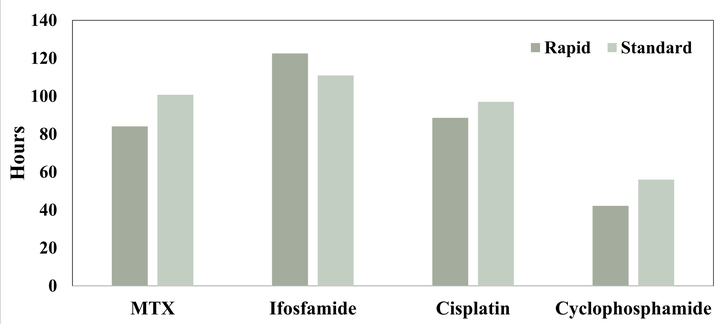

Table 2: HDMTX Information

Total number of patients with delayed clearance	**29**
Delayed Clearance (r)* – n. (%)	10 (52.6)
Delayed Clearance (s)** – n. (%)	19 (73.1)

r = rapid*, s = standard**

RESULTS

Figure 5: AKI and SCr elevations

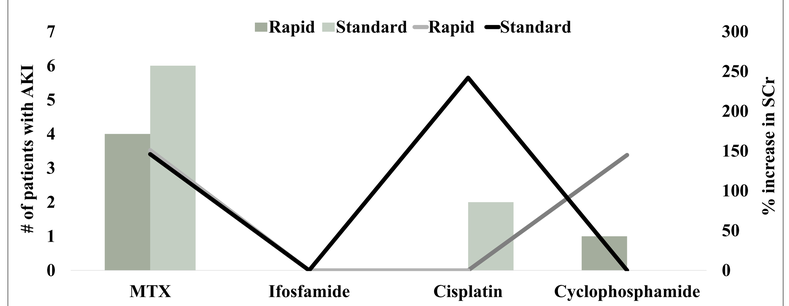

Table 4: Other Information

Triage Information	Time (h)
Time from triage to administration (r)– mean (IQR)	6.2 (5.7-6.6)
Time from triage to administration (s)– mean (IQR)	7.7 (6.4-8.6)
Adverse Drug Events	
Hemorrhagic cystitis – n. (%)	0 (0)
Urine blood positive (r) – n. (%)	3 (9.4)
Urine blood positive (s) – n. (%)	3 (9.4)

DISCUSSION

- Length of stay was on average longer in those with standard hydration at 91.2 hours as compared to 84.5 hours in the rapid group.
- Time to administration was also reduced in those that received the rapid protocol vs. standard.
- Of the AKIs that occurred, 31% were in the rapid hydration group as compared to 69% in extended hydration group.

- Limitations include small sample size (n=32), single center study, and retrospective data.

CONCLUSION

- Rapid pre-hydration resulted in expedited treatment and shorter length of stay without an apparent increase in adverse effects.
- AKI was more common in those that were treated with prolonged hyperhydration.
- More data is needed on this subject, but this study demonstrates that rapid pre-hydration is a viable alternative to traditional pre-hydration

Presented at Midyear 2021 by aroher@siue.edu