



Assessment of pharmacist-driven fluid stewardship recommendations that target hidden fluids in critically ill patients

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BACKGROUND

- Fluid stewardship focuses on managing fluids based on patient specific needs in an effort to optimize volume status and improve outcomes¹
- It has been suggested that fluid stewardship be guided by the 4 patient rights of medication safety: Right Patient, Right Drug, Right Dose, Right Route²
- One focus of fluid stewardship is the prevention of fluid overload, which is associated with organ dysfunction and death in critically ill patients¹⁻²
- Hidden fluids, defined as discrete fluids administered as part of routine care that might be unaccounted for but contribute to overall fluid balance, account for 40-60% of total volume administered in the ICU³
- Purpose:** This research aimed to characterize pharmacist-driven fluid stewardship recommendations and their relation to hidden fluids in medically critically ill adults

STUDY DESIGN

- IRB approved, single center, retrospective review
- Patients who were admitted to the medical ICU (MICU) between June 2016 and June 2019 and had pharmacy documentation in TheraDoc[®] were included
- Patients were excluded if they were less than 18 years of age or were not followed by the academic rounding team
- Documentation was reviewed for all pharmacy recommendations made on each patient day
- Recommendation Assessment:**
 - Each recommendation was assessed for relevance to fluid stewardship
 - Fluid stewardship recommendations were then stratified based on the four patient rights of fluid stewardship. Each recommendation was assessed for relevance to hidden fluids
 - All categorization was based on definitions agreed upon by the investigators a priori

ENDPOINTS

Primary

- Percentage of fluid stewardship recommendations related to hidden fluids

Secondary

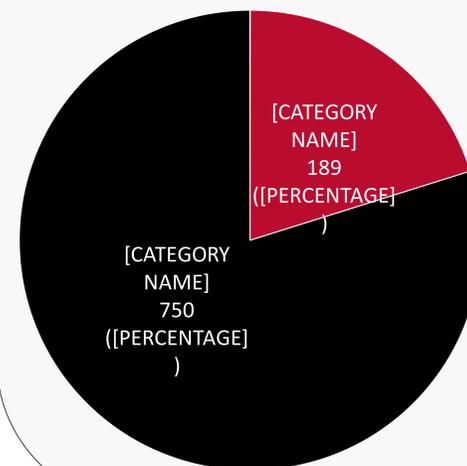
- Percentage of all recommendations that were related to fluid stewardship
- Average number of fluid stewardship recommendations per patient
- Average number of fluid stewardship recommendations per patient day
- Average number of hidden fluid recommendations per patient
- Characterization of hidden fluid recommendations according to the four patient rights

RESULTS

Figure 1. Screening and Description of Recommendations



a. Total Recommendations



b. Fluid Stewardship Recommendations

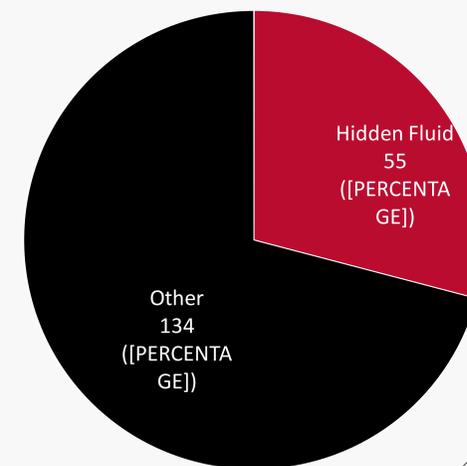


Table 1. Hidden Fluid Recommendation Examples

Right Route	Conversion from IV to PO
Right Patient	Parenteral nutrition discontinuation
	Enteral water discontinuation
Right Dose	Concentration of antibiotics, vasopressors or sodium bicarbonate
	Parenteral nutrition volume adjustment
	Enteral water volume adjustment

Figure 2. Secondary Endpoints

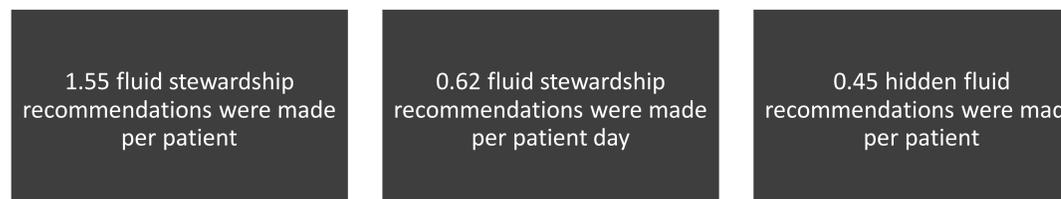
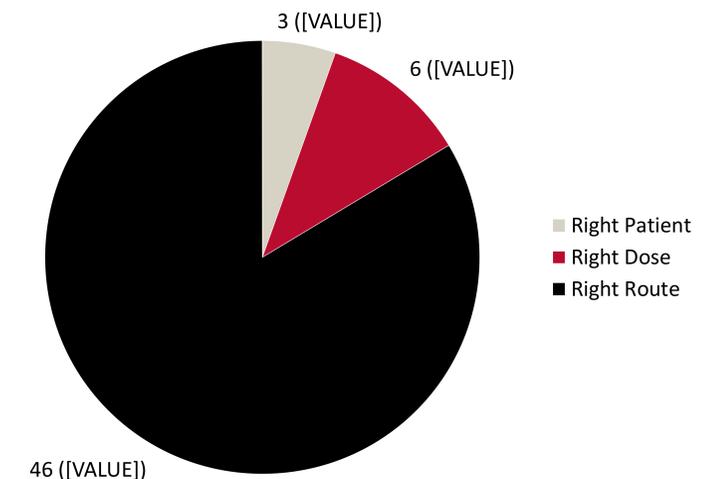


Figure 3. Characterization of Hidden Fluid Recommendations



CONCLUSIONS

- 1 in 5 recommendations made by a critical care pharmacist is related to fluid stewardship
- Almost 30% of those recommendations are related to hidden fluids
- Most hidden fluid recommendations are categorized as pertaining to the right route
- Limitations:**
 - Small sample size
 - Single center
 - Retrospective design
 - Recommendations limited to those documented by the pharmacy team
- Future research should explore the clinical impact of these pharmacist-driven recommendations on patient outcomes

REFERENCES

¹Malbrain, M.L.N.G., Regenmortel, N., Saugel, B. *et al.* Principles of fluid management and stewardship in septic shock: it is time to consider the four D's and the four phases of fluid therapy. *Ann. Intensive Care* 8, 66 (2018) doi:10.1186/s13613-018-0402-x

²Hawkins, W. Anthony, *et al.* "Fluid Stewardship During Critical Illness: A Call to Action." *Journal of Pharmacy Practice*, July 2019, doi:10.1177/0897190019853979

³Bashir, Muhammad Umair, *et al.* "Hidden Obligatory Fluid Intake in Critical Care Patients." *Journal of Intensive Care Medicine*, vol. 32, no. 3, Mar. 2017, pp. 223-227, doi:10.1177/0885066615625181.

