Pharmacist-driven Fluid Stewardship Recommendations: Four Rights and ROSE Model

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BACKGROUND

- The use of intravenous fluids (IVF) is nearly ubiquitous in the intensive care unit (ICU)
- Appropriate use of IVF can have significant impact on improving patient outcomes, but it is unknown to what extent pharmacists make recommendations related to IVF
- The four rights of fluid stewardship include right patient, right drug, right route, and right dose
- The ROSE Model of fluid administration includes four stages: Rescue, Optimization, Stabilization, and Evacuation
- Proper revision of fluids with consideration for these concepts can lead to improved patient outcomes
- **Purpose:** Identify and categorize pharmacist recommendations related to the four rights of fluid stewardship and ROSE model of fluid administration
- **Hypothesis:** At least 25% of pharmacist recommendations would be related to fluid administration

OUTCOMES

Primary

- Percentage of pharmacy recommendations related to fluid stewardship

Secondary

- Number and percentage of recommendations stratified by the four rights and the ROSE model

STUDY DESIGN

- **Design**: IRB-exempt, retrospective, single-center cohort
- **Time Frame**: June 2016 through June 2019
- **Setting:** Community hospital
- **Inclusion Criteria**:
  - Adults admitted to the medical ICU and followed by the academic rounding team
- **Statistical Plan**:
  - Descriptive statistics were used for all outcomes
  - Measures of frequency (count, percent) were utilized to define results

RESULTS

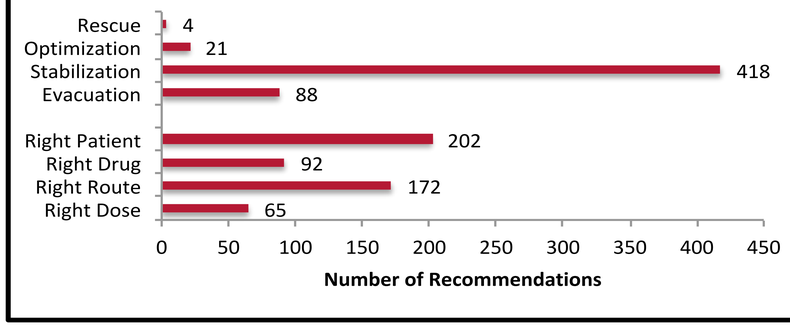
Table I.	
Number of Patients	**350**
Total Patient Days	**906**
Student Recommendations*	458 (50.6%)
Resident Recommendations*	448 (49.4%)
Total Pharmacy Recommendations	**2731**
Average per patient per day	3 (SD = 2.05)
Total Recommendations Related to FS%	**531 (18.9%)**
Average per patient per day	0.6 (SD = 0.78)
Most Common Recommendations#	
Convert route of medication from IV to non-IV route	151 (28.4%)
Discontinue maintenance IV	111 (20.9%)
Initiate enteral water (diet or feeding tube)	53 (10%)
Initiate diuretic (loop or thiazide, NOT spironolactone)	52 (9.8%)
Adjust dose of enteral fluid	29 (5.5%)

* Each patient day, recommendations were made by either a pharmacy student or resident and then classified accordingly.
% FS: Fluid Stewardship
# Categorization of each recommendation type was determined by consensus of the investigators *a priori*

Table II. Comparison of Total and Average Number of Recommendations by Learner Type

	Pharmacy Student	Pharmacy Resident
Total # of Recommendations	1362	1369
Avg # of Recommendations Per Patient Per Day	2.97	4
Total # of Recommendation Related to FS	263	268
Avg # of FS Recommendations Per Patient Per Day	0.57	1

Figure I. Recommendations Stratified by the ROSE Model and Four Rights



RESULTS CONTINUED

Figure II. Recommendations According to the Four Rights

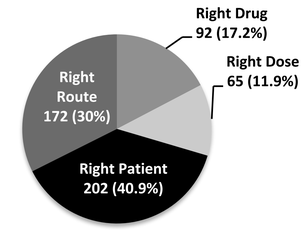
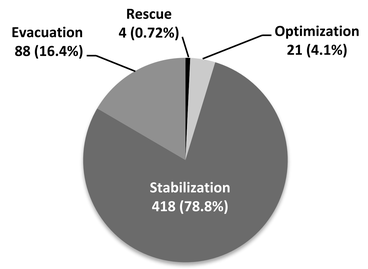


Figure III. Recommendations According to the ROSE Model



CONCLUSIONS

- Nearly 1 in 5 of all pharmacist recommendations were related to fluid stewardship
- Of all recommendations made, the majority were related to right patient or the stabilization stage
- The most common recommendation made could be qualified under right route and stabilization
- The study was limited by the potential for inaccurate classification of recommendations by a single reviewer
- The study highlights the frequency by which the pharmacist can impact fluid administration in the ICU and can be used as a model for clinical pharmacists
- Future research will consider the acceptance rate of pharmacist recommendations and the subsequent effect on patient outcomes

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