**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 is comprised of four stages: Rescue, Optimization, Stabilization, and Evacuation.

**Purpose:** Identify and categorize pharmacist recommendations related to the four rights of fluid stewardship and ROSE model of fluid administration.

**Hypothesis:** A significant number 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 stages of the ROSE model

**STUDY DESIGN**

- **Design:** IRB-exempt, retrospective, single-center cohort study
- **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>
<thead>
<tr>
<th>Number of Patients</th>
<th>350</th>
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<table>
<thead>
<tr>
<th>Total Patient Days</th>
<th>905</th>
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<table>
<thead>
<tr>
<th>Student Recommendations</th>
<th>458 (50.6%)</th>
</tr>
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<tbody>
<tr>
<td>Resident Recommendations</td>
<td>447 (49.4%)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Total Pharmacy Recommendations</th>
<th>2731</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Average per day</th>
<th>3</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Total Recommendations Related to FS (%)</th>
<th>531 (18.9%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average per day</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**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 pharmacy resident and then classified accordingly.

% FS: Fluid Stewardship

# Categorization of each recommendation type was determined by consensus of the investigators a priori.

**RESULTS CONTINUED**

![Figure II. Recommendations According to the Four Rights](image)

- **Right Drug**
  - Right Route: 65 (21.9%)
  - Right Dose: 45 (15.9%)
  - Right Patient: 202 (68.5%)
  - Evacuation: 86 (29.4%)

![Figure III. Recommendations According to the ROSE Model](image)

**CONCLUSIONS**

- Almost one-fifth of all pharmacist recommendations were related to fluid stewardship.
- Of all recommendations made, the majority were classified as being related to right patient or utilized for stabilization. The most common recommendation could be qualified under right route and stabilization.
- The study was limited by the opportunity 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 look at the acceptance rate of recommendations and subsequent effect on patient outcomes.

**REFERENCES**


