



# 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 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 I.**

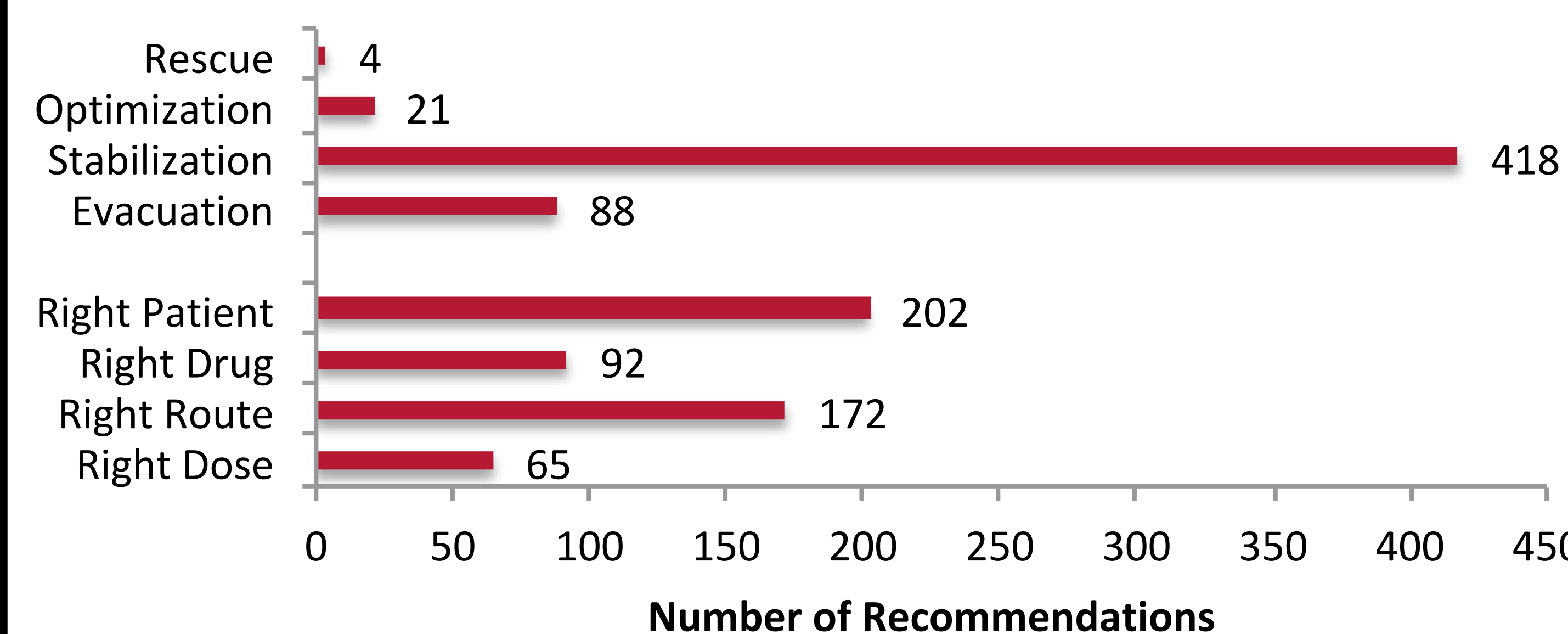
<b>Number of Patients</b>	<b>350</b>
<b>Total Patient Days</b>	<b>905</b>
Student Recommendations*	458 (50.6%)
Resident Recommendations*	447 (49.4%)
<b>Total Pharmacy Recommendations</b>	<b>2731</b>
Average per day	3
<b>Total Recommendations Related to FS<sup>%</sup></b>	<b>531 (18.9%)</b>
Average per day	0.6
<b>Most Common Recommendations<sup>#</sup></b>	
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.

<sup>%</sup> FS: Fluid Stewardship

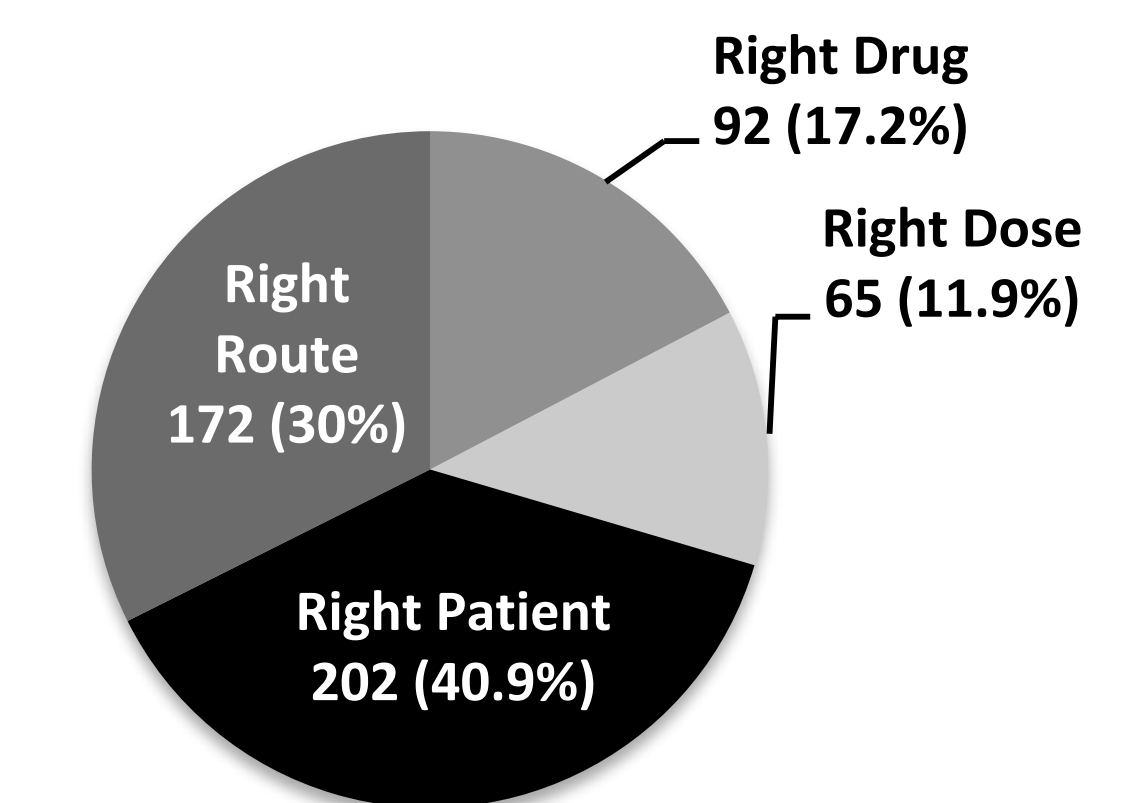
<sup>#</sup> Categorization of each recommendation type was determined by consensus of the investigators *a priori*.

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

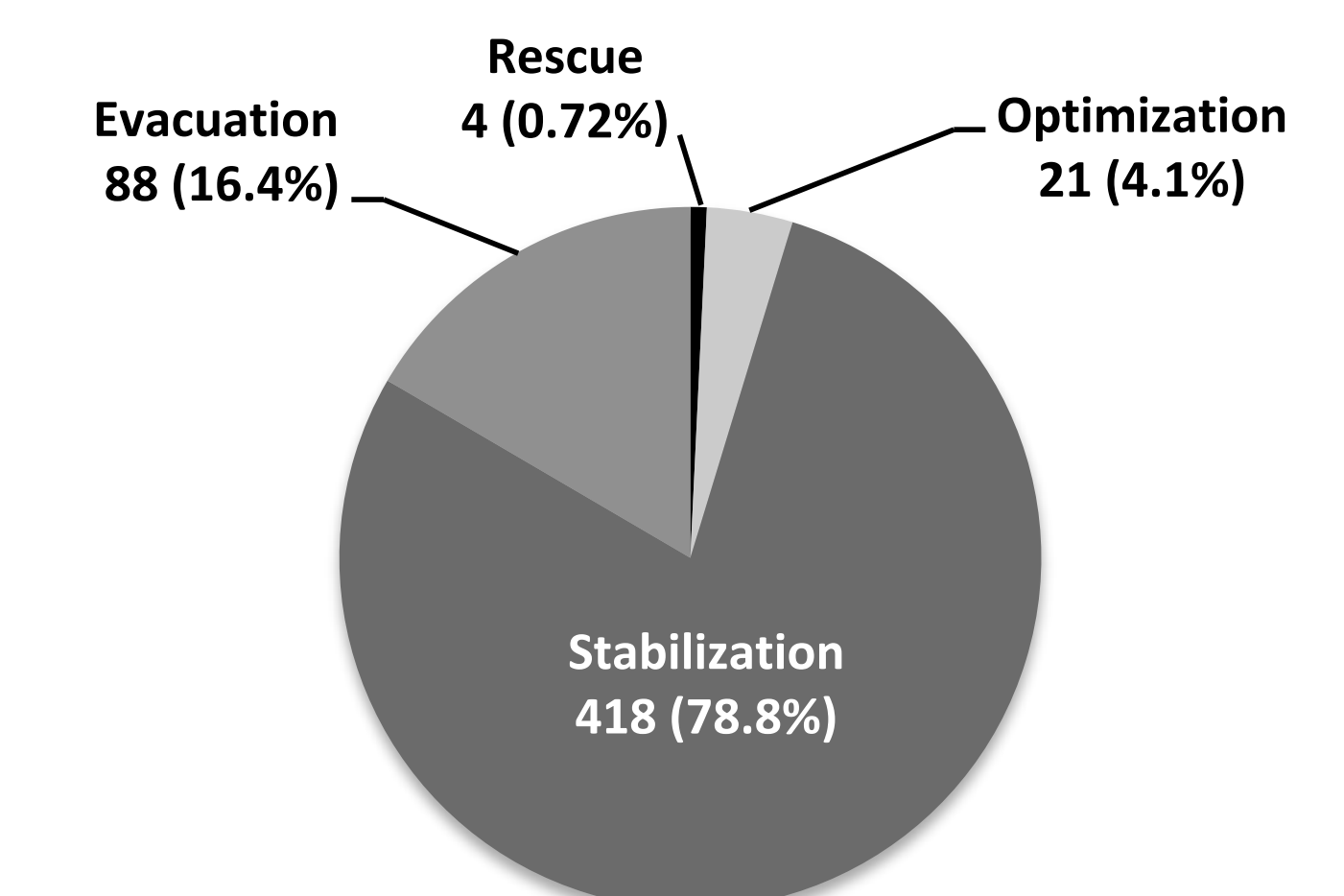


## RESULTS CONTINUED

**Figure II. Recommendations According to the Four Rights**



**Figure III. Recommendations According to the ROSE Model**



## CONCLUSIONS

- 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

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