



Fluid Stewardship and the Four Rights: Pharmacy Recommendations in the Treatment of Critically Ill Adults with COVID-19

Ryan Bok, Pharm.D. Candidate; Diana Dang, Pharm.D. Candidate; W. Anthony Hawkins, Pharm.D., BCCCP; Rachel Rikard, Pharm.D. Candidate; Susan E. Smith, Pharm.D., BCCCP, BCPS

BACKGROUND

- ! Intravenous fluids (IVFs) are widely used in the intensive care unit (ICU) to maintain hydration and organ perfusion.
- ! In the past year, a significant portion of ICU patients have had coronavirus disease 2019 (COVID-19).
- ! Inappropriate use of IVFs in ICU patients can lead to volume overload, which is associated with increased hospital length of stay and mortality.

Purpose: To identify pharmacy recommendations related to the four rights of fluid stewardship in the treatment of critically ill adults with COVID-19



METHODS

- ! **Design:** IRB-approved, retrospective, single-center cohort study
- ! **Time Frame:** May 19, 2020-September 30, 2020
- ! **Setting:** Community hospital
- ! **Inclusion Criteria:**
 - ! Adult (≥ 18 years old)
 - ! COVID-19 positive
 - ! Critically ill
 - ! Followed on academic rounds
- ! All pharmacy recommendations for each patient day were reviewed for relevance to fluid stewardship and classified based on the four rights.
- ! **Statistics:** Outcomes were analyzed with descriptive statistics.

OUTCOMES

- ! **Primary:** Percentage of pharmacy recommendations relevant to fluid stewardship
- ! **Secondary:** Percentage of fluid stewardship recommendations belonging to each right

RESULTS

Table 1. Overview of Recommendations

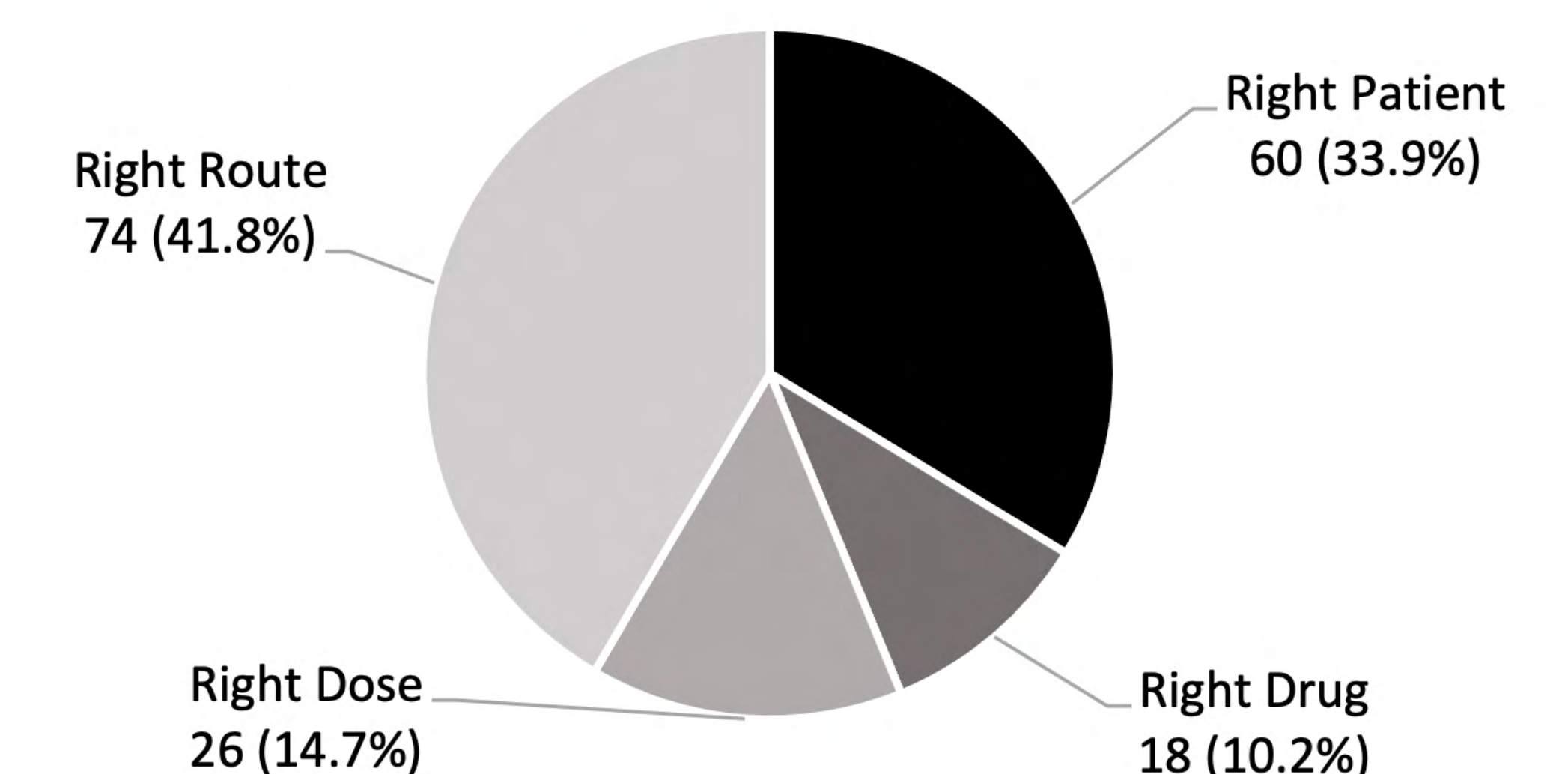
Total Patients	79
Total Patients-days	420
Total Pharmacy Recommendations	1,338
Fluid Stewardship Recommendations – n (%)	177 (13.2)

Table 2. Types of Fluid Stewardship Recommendations (n=177)

Right Patient – n (%)	
Initiate bolus IVF not based on fluid responsiveness	11 (6.2)
Initiate maintenance IVF	1 (0.6)
Discontinue maintenance IVF	14 (7.9)
Discontinue bolus IVF not based on fluid responsiveness	1 (0.6)
Recommend to assess volume responsiveness	4 (2.3)
Initiate enteral water	8 (4.5)
Discontinue enteral water	6 (3.4)
Initiate albumin	3 (1.7)
Discontinue albumin	2 (1.1)
Initiate parenteral nutrition	5 (2.8)
Discontinue parenteral nutrition	5 (2.8)
Right Drug – n (%)	
Change type of maintenance IVF	3 (1.7)
Initiate loop or thiazide diuretic	8 (4.5)
Discontinue loop or thiazide diuretic	7 (4.0)
Right Dose – n (%)	
Change albumin concentration	1 (0.6)
Adjust dose of enteral fluid	16 (9.0)
Adjust dose of maintenance IVF	2 (1.1)
Adjust volume of parenteral nutrition	2 (1.1)
Concentrate infusions of NaHCO ₃ , vasopressors, or antibiotics	1 (0.6)
Adjust dose of loop or thiazide diuretic	4 (2.3)
Right Route – n (%)	
Convert medication route from IV to non-IV	59 (33.3)
Convert medication route from non-IV to IV	15 (8.5)

RESULTS CONTINUED

Figure 1. Fluid Stewardship Recommendations Stratified by the Four Rights



CONCLUSIONS

- ! Fluid stewardship accounted for more than 1 in 8 pharmacy recommendations for critically ill adults with COVID-19.
- ! Of the four rights, the right route accounted for the most fluid stewardship recommendations.
- ! The most common fluid stewardship recommendation was conversion of medications from an IV to non-IV route of administration.
- ! Fluid stewardship is a timely intervention that pharmacists can make in the ICU during the COVID-19 pandemic.
- ! The risk of acute respiratory distress syndrome in COVID-19 patients underscores the importance of more conservative fluid management.

Limitations: Lack of comparator group; retrospective, single-center design

Future Direction: Compare IVF recommendations for critically ill patients with and without COVID-19.

REFERENCES

Hawkins WA, Smith SE, Newsome AS, Carr JR, Bland CM, Branan TN. Fluid Stewardship During Critical Illness: A Call to Action. *J Pharm Pract.* 2020;33(6):863-873. doi:10.1177/0897190019853979