Frequency of fluid stewardship recommendations made by pharmacists in a medical intensive care unit

Critical Care Collaborative
College of Pharmacy
UNIVERSITY OF GEORGIA

D. Paul Dossett, PharmD Candidate; Susan E. Smith, PharmD, BCPS, BCCCP; Christopher M. Bland, PharmD, FCCP, FIDSA, BCPS; Charles S. Wilson, Jr., PharmD Candidate; W. Anthony Hawkins, PharmD, BCCCP, on behalf of UGAC3

BACKGROUND

- Fluids are commonly used in the intensive care unit (ICU) and can positively or negatively impact patient outcomes[1]
- Improper use of fluids as a part of therapy can lead to additional morbidity such as heart failure[2,3]
- Fluid stewardship has been conceptualized, but the pharmacist's role has not been previously described[1]
- **Purpose**: Describe the pharmacist role in fluid stewardship within a medical intensive care unit (MICU)

Figure 1. ROSE Phases of Fluid Administration

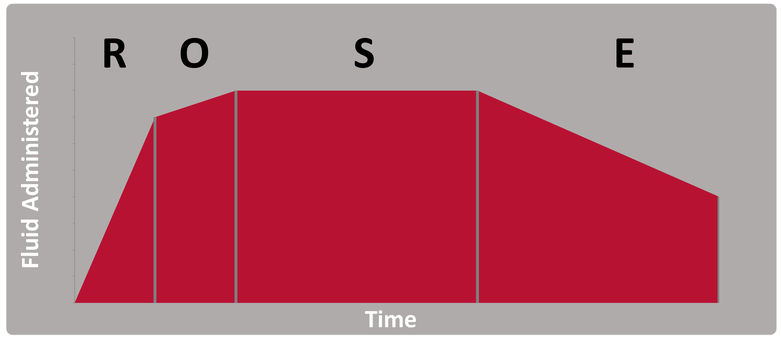


Figure 2. Patient Rights of Fluid Administration

STUDY DESIGN

- Design: IRB-approved, single center, retrospective
- Time Frame: June 2016 through June 2019
- Setting: 12 bed medical ICU of a 450-bed community teaching hospital
- Inclusion Criteria:
  - Admitted to the academic rounding service in MICU
  - > 17 years old
- Exclusion Criteria
  - Patients without documentation of pharmacy interventions
- Review pharmacy documented recommendations; recommendations were defined and agreed upon by investigators a priori
- Recommendations categorized based on two constructs
  - Patient Rights of medication safety
  - ROSE phases of fluid administration
- Descriptive statistics were used to express data

OUTCOMES

Primary

- Percentage of recommendations related to fluid stewardship per patient day

Secondary

- Characterize recommendations based on patient rights
- Characterize recommendations based on the ROSE phases of fluid administration

METHODS

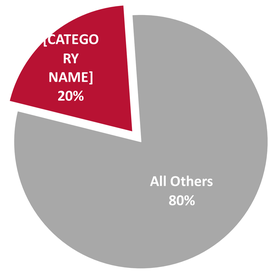
Table 1. Intervention Classifications based on Patient Rights

Right Patient	Rescue	▪ Initiate bolus IVF NOT based on fluid responsiveness ▪ Discontinue bolus IVF NOT based on fluid responsiveness
	Optimization	▪ Initiate bolus IVF based on fluid responsiveness ▪ Discontinue bolus IVF based on fluid responsiveness ▪ Recommend to assess volume responsiveness (FloTrac, SVV, PPV, fluid challenge, PLR) ▪ Initiate albumin ▪ Discontinue albumin
	Stabilization	▪ Initiate maintenance IVF ▪ Discontinue maintenance IVF ▪ Initiate enteral water (diet or feeding tube) ▪ Discontinue enteral water (diet or feeding tube) ▪ Initiate parenteral nutrition (Clinimix, TPN, PPN) ▪ Discontinue parenteral nutrition (Clinimix, TPN, PPN)
Right Route	Optimization	▪ Change type of bolus IVF (crystalloid to colloid, colloid to crystalloid, different type of crystalloid, etc) ▪ Change the fluid that HCO3 is diluted in (D5W->sterile water or vis versa)
	Stabilization	▪ Change type of maintenance IVF (crystalloid to colloid, colloid to crystalloid, different type of crystalloid, etc)
	Evacuation	▪ Initiate diuretic (loop or thiazide; NOT spironolactone) ▪ Discontinue diuretic (loop or thiazide; NOT spironolactone) ▪ Initiate spironolactone (ONLY if cirrhosis/liver disease/ascites) ▪ Discontinue spironolactone (ONLY if cirrhosis/liver disease/ascites) ▪ Adjust dose spironolactone (ONLY if cirrhosis/liver disease/ascites)
Right Drug	Stabilization	▪ Convert mIVF to enteral fluid or oral diet ▪ Convert parenteral nutrition (Clinimix, TPN, PPN) to enteral route ▪ Convert route of medication from IV to non-IV route (PO, feed tube, subcutaneous). Could be direct conversion (IV Pepcid to PO Pepcid) or indirect conversion (Ampicillin/Sulbactam to Amoxicillin/Clavulanic Acid or Heparin to Apixaban)
Right Dose	Optimization	▪ Change albumin concentration (5% -> 25% or vis versa) ▪ Add stop date/time for bolus IVF ▪ Concentrate infusions of sodium HCO3, vasopressors, or antibiotics
	Stabilization	▪ Adjust dose of enteral fluid ▪ Adjust dose of mIVF ▪ Adjust volume of parenteral nutrition ▪ Add stop date/time for mIVF
	Evacuation	▪ Adjust dose of diuretic (loop or thiazide; NOT spironolactone) ▪ Adjust timing of diuretic administration (loop or thiazide; NOT spironolactone)

All authors have nothing to disclose.

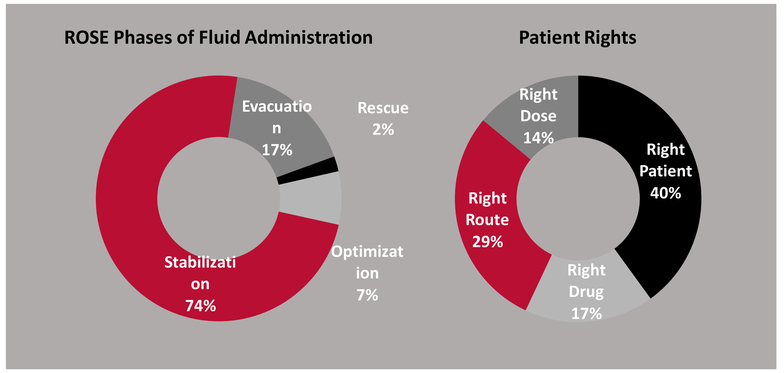
RESULTS

Figure 3. Percentage of Fluid Stewardship Interventions



- Pharmacists make more than three recommendations and one fluid recommendation per day
- 0.6 fluid recommendations per patient day
- 939 pharmacist recommendations
  - 122 patients
  - 307 patient days
- 189 were related to fluid stewardship

Figure 4. Interventions broken down by constructs



CONCLUSIONS

- One out of every five pharmacist recommendations are related to fluid stewardship
- Recommendations related to stabilization and right patient comprise the majority of pharmacist fluid recommendations
- The impact of these recommendations on patient outcomes in the medical MICU warrants future studies

REFERENCES

1. Hawkins, W. A., Smith, S. E., Newsome, A. S., Carr, J. R., Bland, C. M., & Branan, T. N. (2019). Fluid Stewardship During Critical Illness: A Call to Action. Journal of Pharmacy Practice. https://doi.org/10.1177/0897190019853979

2. Malbrain, M. L. N. G., Regenmortel, N. V., Saugel, B., Tavernier, B. D., Gaal, P.-J. V., Joannes-Boyau, O., … Monnet, X. (2018). 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. Annals of Intensive Care, 8(1). doi: 10.1186/s13613-018-0402-x

3. Malbrain, M. L. N. G., Regenmortel, N. V., Saugel, B., Tavernier, B. D., Gaal, P.-J. V., Joannes-Boyau, O., … Monnet, X. (2018). 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. *Annals of Intensive Care*, *8*(1). doi: 10.1186/s13613-018-0402-x