



# Hidden Fluids in Plain Sight: Identifying Intravenous Medication Classes Contributing to Intensive Care Unit Fluid Status

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## BACKGROUND

- Fluid stewardship is a process that promotes proper administration of intravenous (IV) fluids and medications with the goals to reduce fluid overload, improve patient outcomes, and reduce adverse events<sup>1</sup>
- Fluid overload in the intensive care unit (ICU) is correlated with increased mortality and precipitates significant complications, such as pulmonary edema and heart failure<sup>2</sup>
- Fluids, consisting of resuscitation, maintenance, and “hidden fluids”, are the most prescribed drugs in the ICU<sup>1</sup>
- Examples of hidden fluids are blood products, flushes, and IV medications<sup>1</sup>
- Literature has identified IV medications as 61% of total fluid intake in the first day of ICU admission and 40% over the first seven days<sup>3</sup>
- However, there are limited data classifying the IV medications that significantly contribute to fluid status

## OBJECTIVES

- To identify classes of IV medication that are the greatest contributors to total fluid intake
- To determine the impact of hidden fluids on daily ICU volume intake

## OUTCOMES

For the first 3 days of ICU admission:

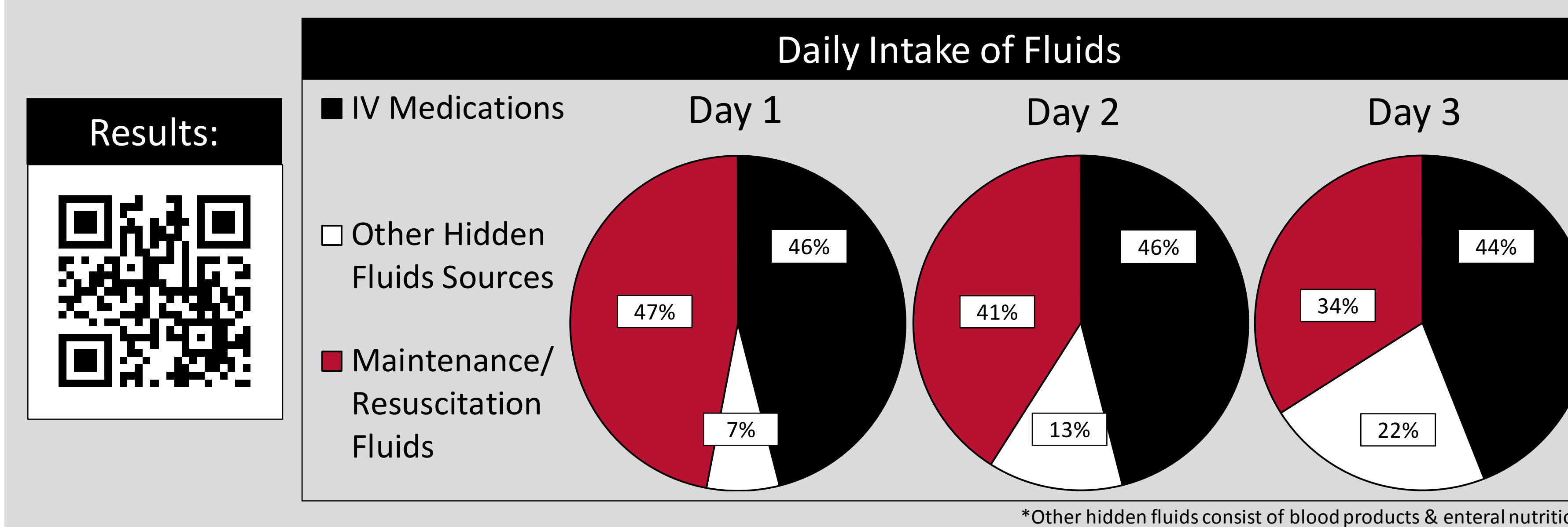
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|------------------|---|
| <b>Primary</b>   | <ul style="list-style-type: none"> <li>Identify the volume of IV medications administered</li> </ul>  |
| <b>Secondary</b> | <ul style="list-style-type: none"> <li>Characterize the frequency of IV medication administration</li> <li>Determine the proportion of total daily intake as hidden fluids</li> </ul> |

## STUDY DESIGN

- Design: IRB-approved, multicenter, retrospective, nested cohort study
- Time Frame: January 2017 through December 2018
- Sites:
  - Piedmont Athens Regional Medical Center (PARMC) – Athens, GA
  - Augusta University Medical Center (AU) – Augusta, GA
  - St. Joseph’s/Candler Health System (SJCHS) – Savannah, GA

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>Adults ≥ 18 years old</li> <li>ICU admission</li> <li>ICU length of stay ≥ 4 days</li> </ul>	<ul style="list-style-type: none"> <li>Pregnant females</li> <li>Patients receiving TPN</li> <li>Patients with ESRD</li> <li>Patients with DNR or DNI status at time of admission</li> <li>Patients transferred from another hospital</li> <li>Patients with a specific indication for maintenance IV fluids (i.e. DKA)</li> </ul>

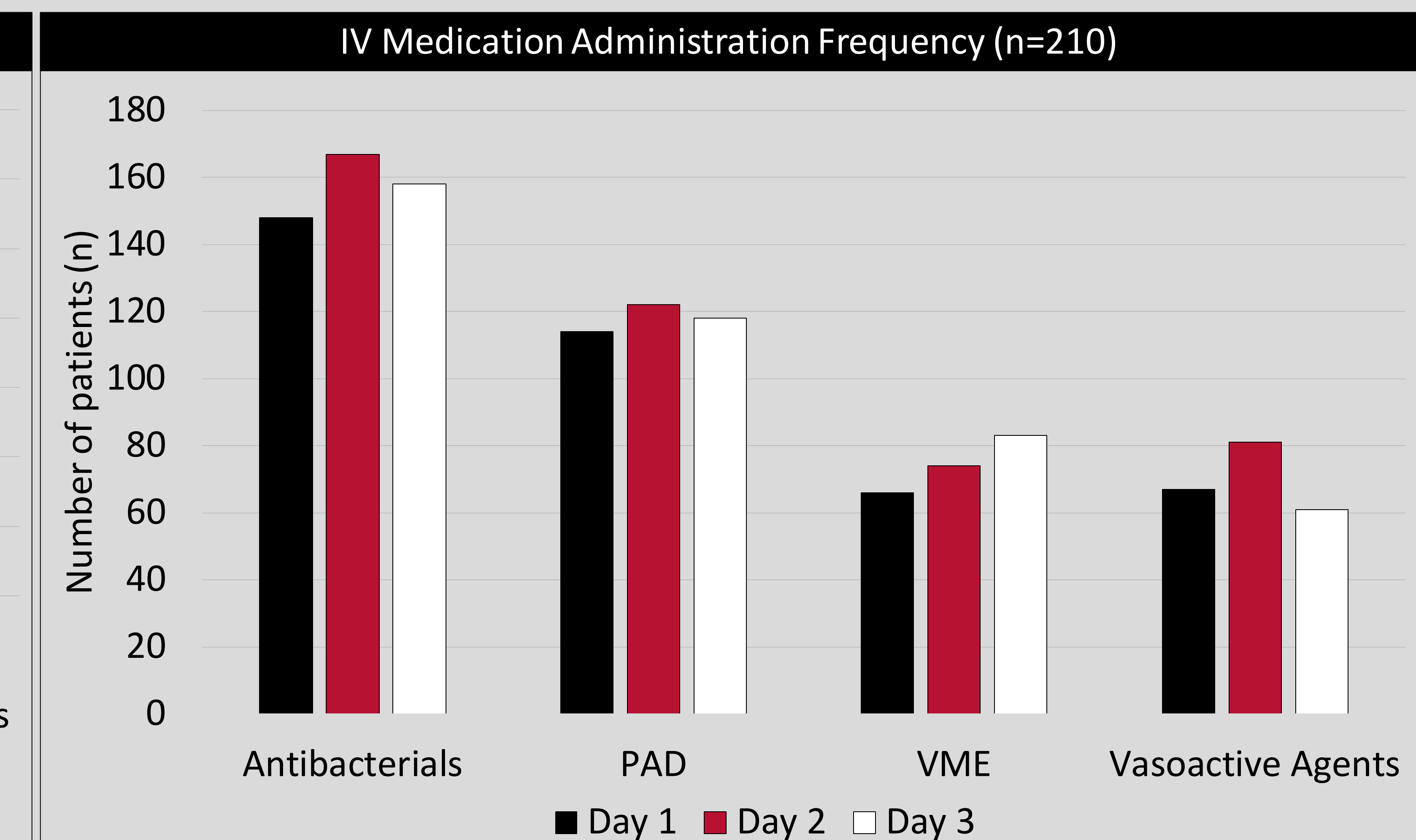
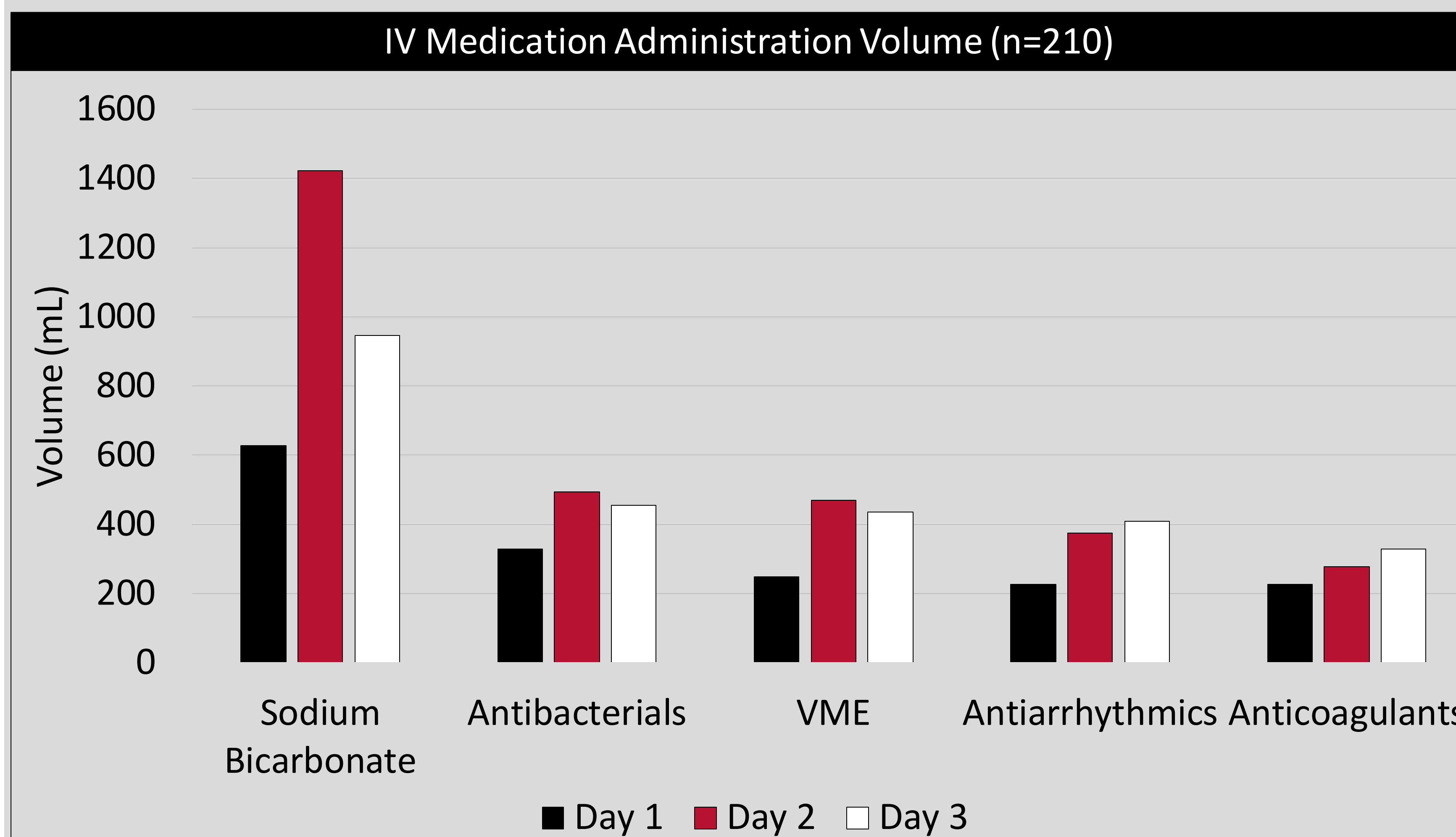
## RESULTS & CONCLUSIONS



**Hidden fluid volumes increase but IV medication volume remain constant during ICU stay**

**Antibacterials are the greatest contributors to ICU fluid status**

**Fluid stewardship with IV medications may significantly reduce ICU volume intake**



\*PAD = Pain/Agitation/Delirium agents & VME = Vitamins/Minerals/Electrolytes

## DISCUSSION

- Healthcare providers should be aware of fluid status when prescribing, verifying, and administering ICU IV medications
- Study limitations
  - Data were collected over the course of 3 calendar days, not 72 hours, from ICU admission
  - Reliance on accurate charting
  - Sodium bicarbonate can be classified as a fluid or an IV medication
  - Most patients were in a Medical ICU (95%)
- Future directions
  - Antibacterials and VME were top culprits for both volume and frequency: delineating the degree that agents in each class contribute to fluid status
  - Fluid stewardship: identifying patients who clinically benefit from targeted IV medication minimization
  - Evaluating the impact of fluid stewardship education on prescribing practices

## REFERENCES

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