Evaluating the Effects of CMS Sepsis Core Measure Implementation in a Community Hospital

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Background

- IRB approved
- Sepsis is the leading cause of morbidity and mortality in hospitals, accounting for 30% of deaths in the emergency department
- In 2001, Rivers et al. found that early goal-directed therapy (EGDT) led to significant mortality benefits, which ultimately prompted United States Centers for Medicare and Medicaid Services (CMS) to mandate EGDT in hospitals
- CMS core measures are intended to facilitate the broad implementation of evidence-based treatment standards, and while voluntary, non-compliance is associated with negative consequences to both quality and financial metrics for participating hospitals. However, while quality measures are implemented to ultimately improve patient care, its effects on the healthcare system can also include negative unanticipated consequences
- This study seeks to characterize the effect of the CMS sepsis core measure on sepsis identification, antimicrobial utilization, and specific prescribing patterns

Objectives

- To compare and evaluate the impact of CMS sepsis core measure by describing antibiotic utilization trends focusing on broad spectrum antibiotic for both pre- and post-Sepsis CMS Core Measures
- To describe hospital resource utilization, such as fluids and ICU length of stay before and after the implementation of CMS Core Measures
- To explore potential changes and consequences of practicing according to elements outlined by CMS Core Measures

Methods

- Study Design: Single-center, retrospective chart review

- Study Population: Adult patients ≥18 years who have a discharge diagnosis of Sepsis, Severe Sepsis, or Septic Shock, received vasopressors, and antibiotic(s) in the ED from January 2014 to December 2017

- Data Collection & Analysis:
- A retrospective review of 200 randomly selected patients with admitting diagnosis of sepsis, severe sepsis, and septic shock from January 2013 to December 2018 were screened for inclusion.
- Medical records were reviewed for relevant demographic, diagnosis, types of antibiotics, total dose of antibiotics, and mortality upon discharge
- A total of 175 patients were included for analysis: 2014 group (n-85); 2017 group (n=90)
- Statistical analysis: student T-test and Chi-square test using GraphPad Prism
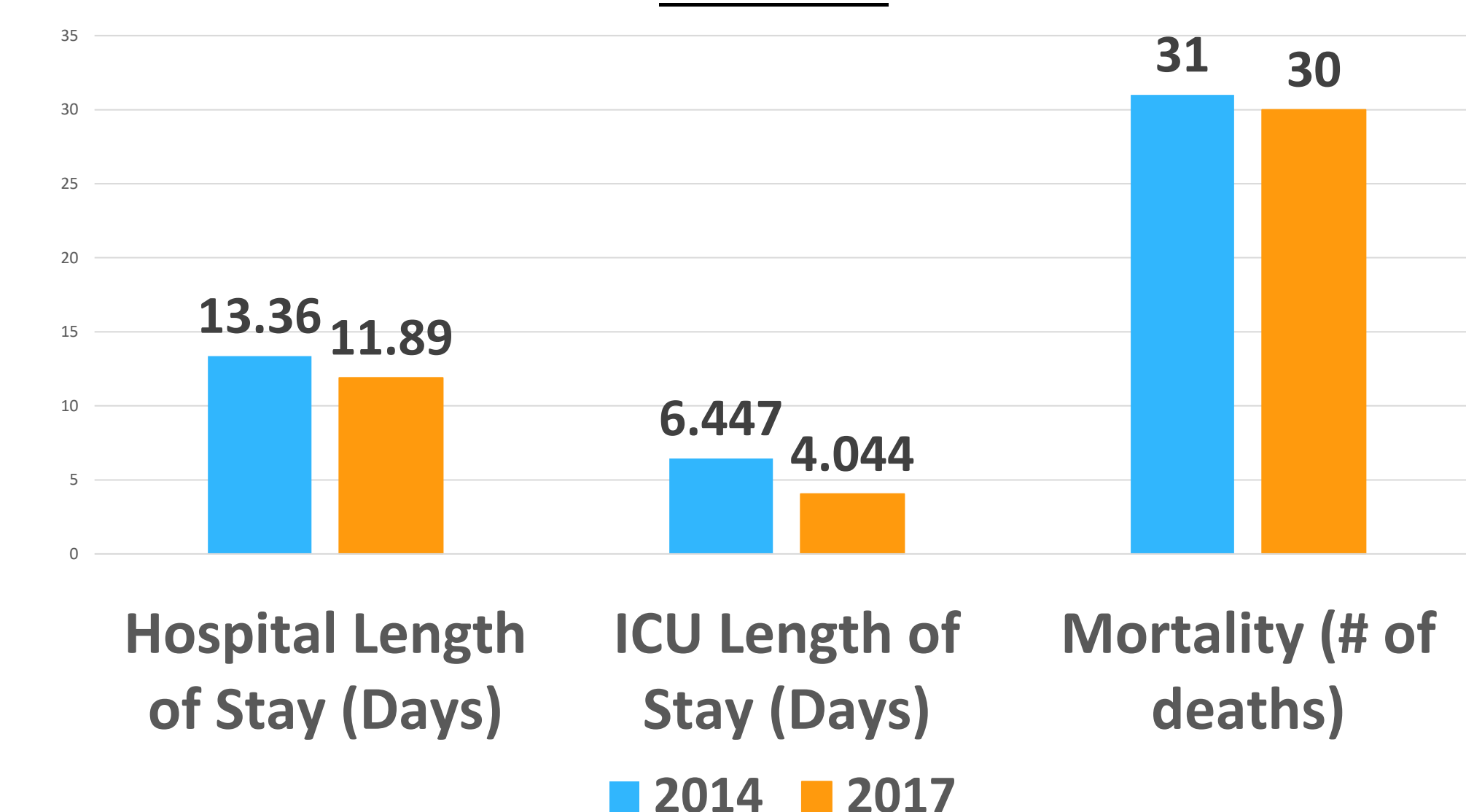
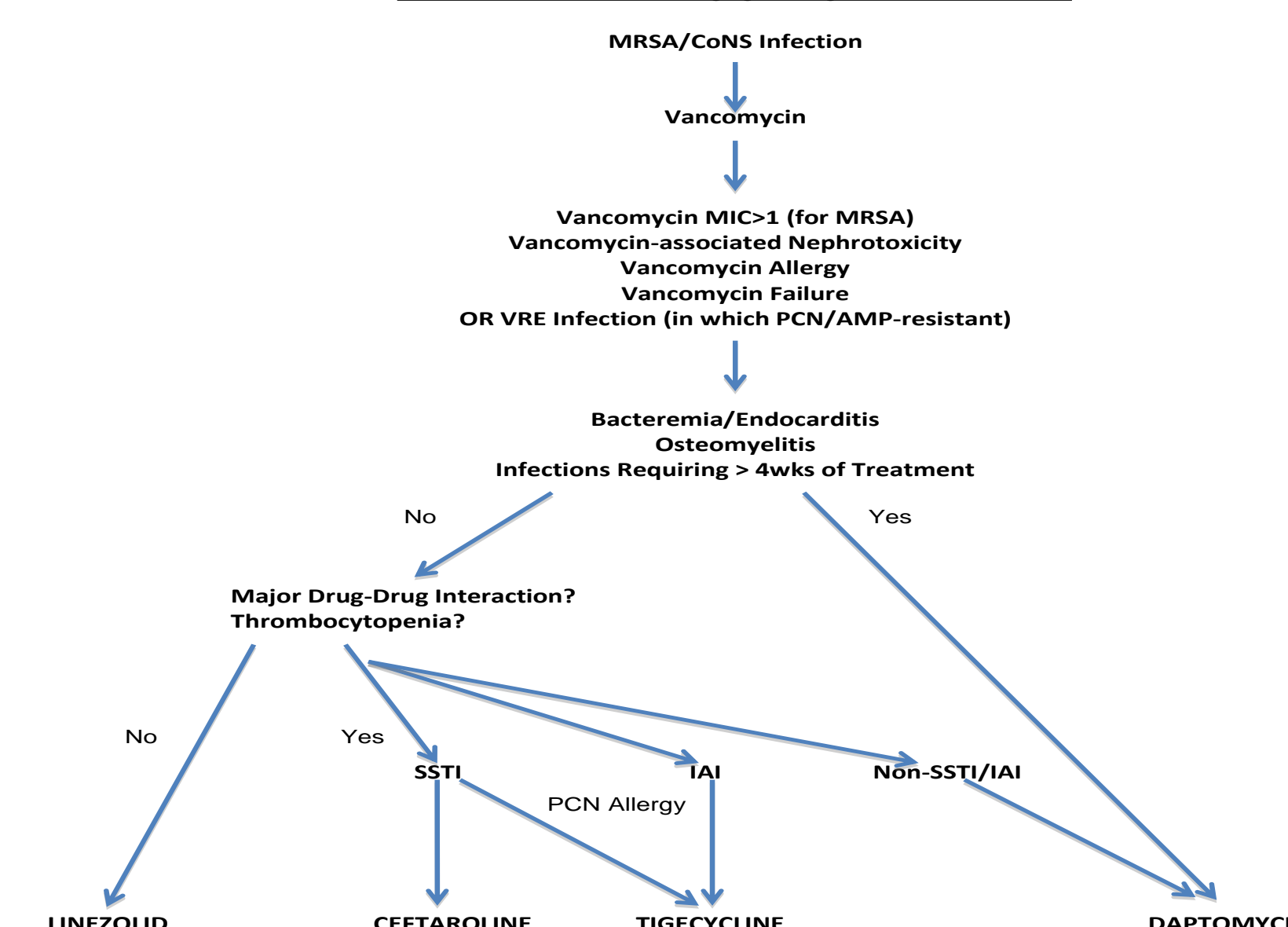## Results

Utilization: ED initiation
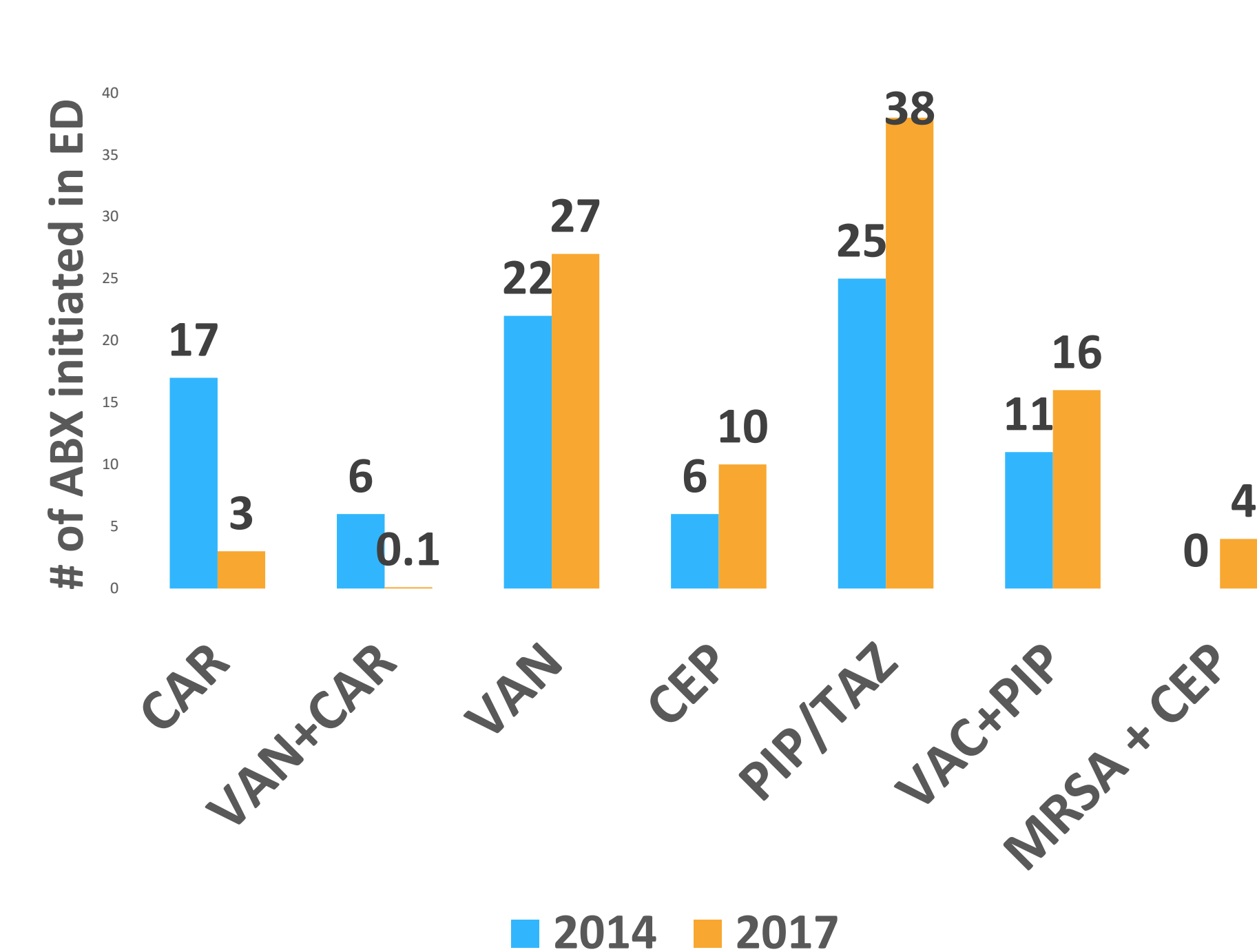
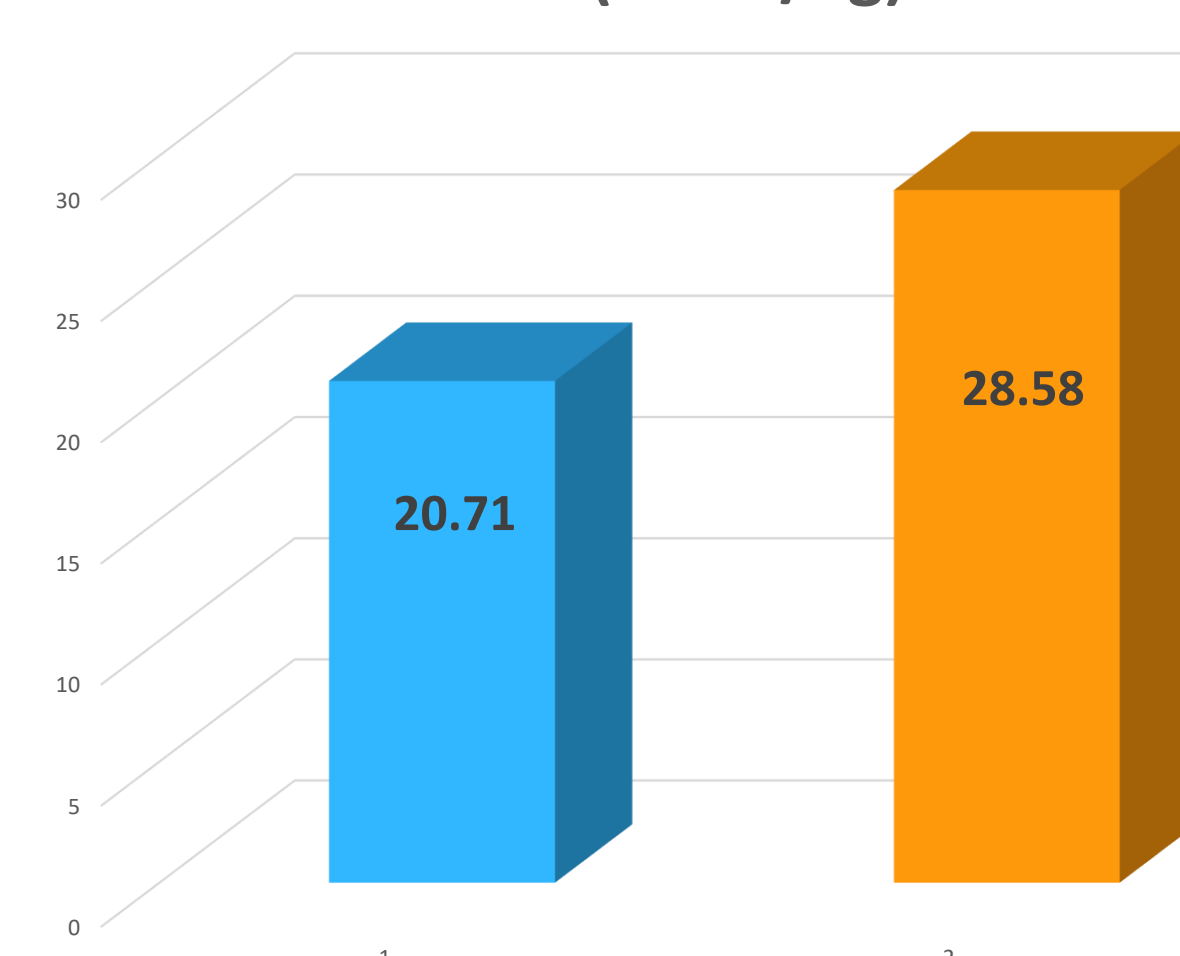### Utilization: Antibiotic Days of Therapy (DOT/ 1000 APD)
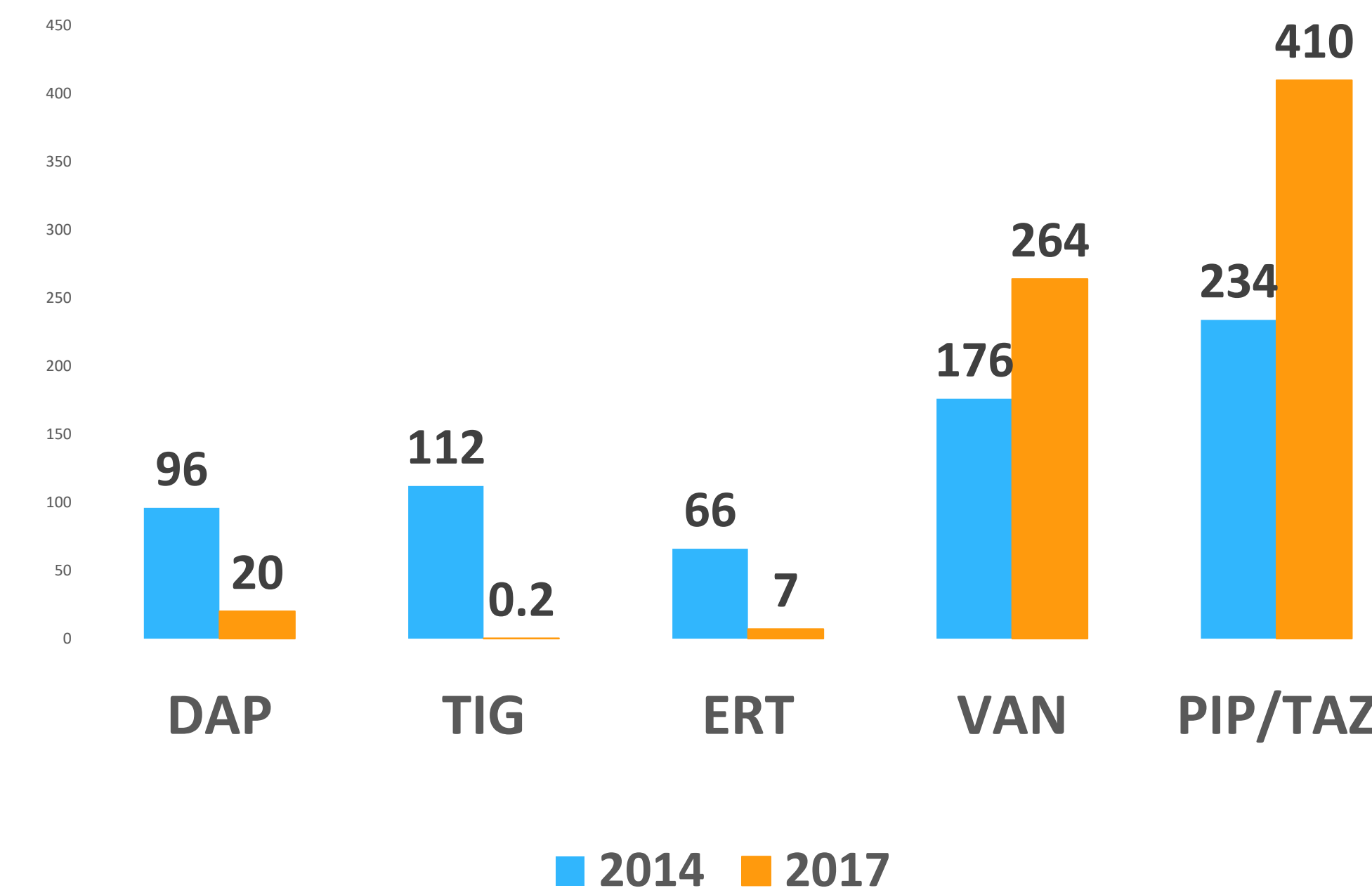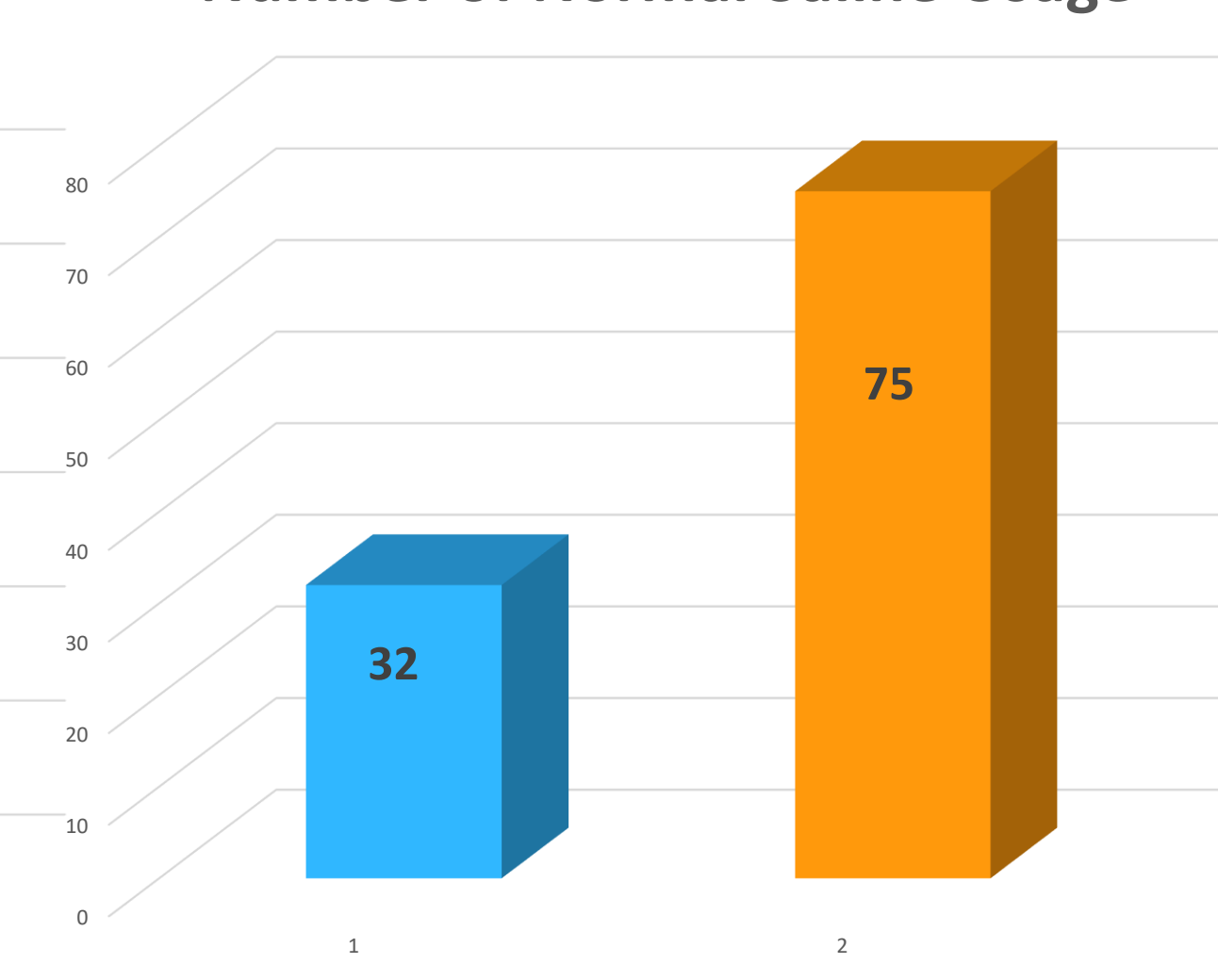

Outcomes
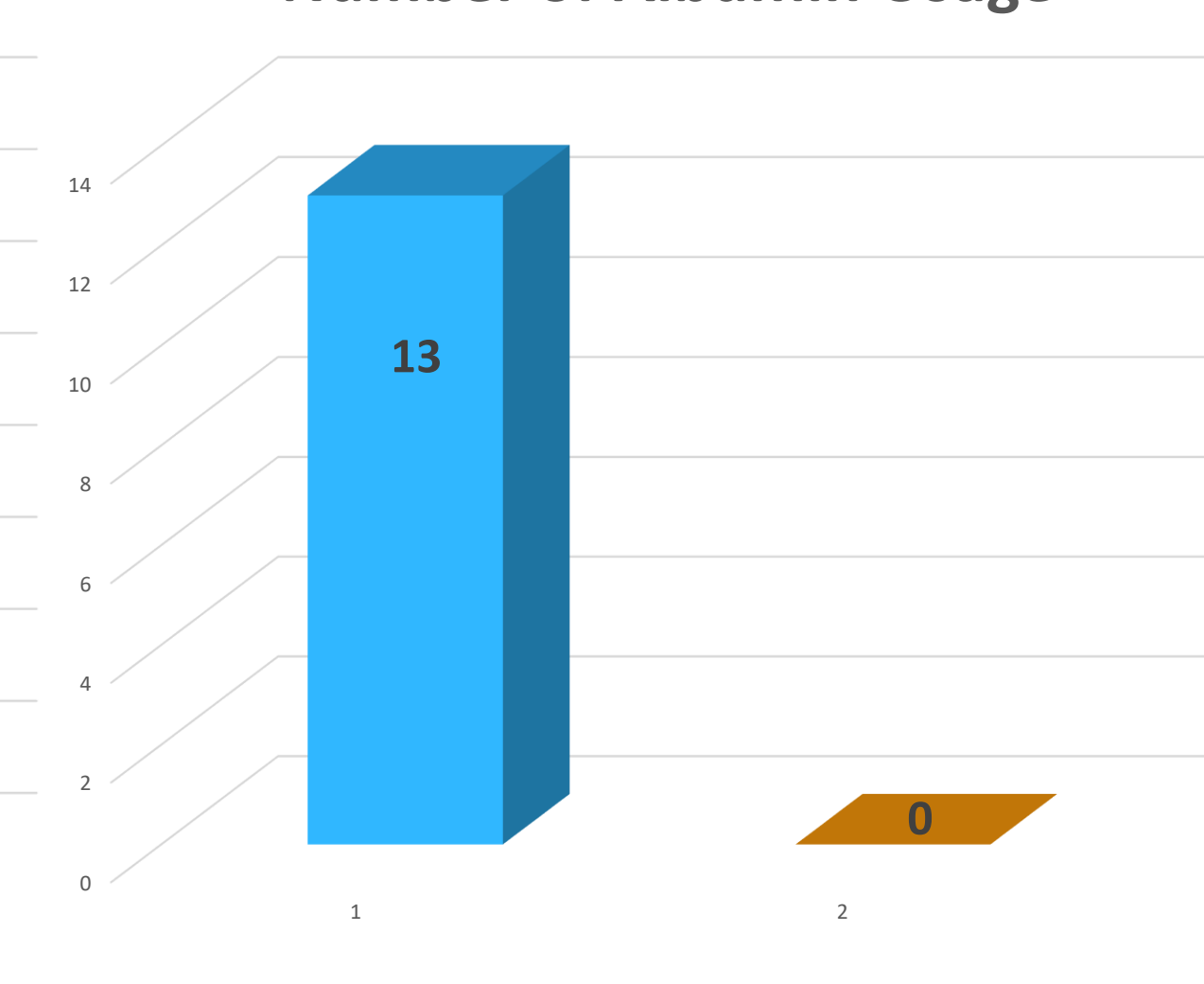

Criteria for Appropriate Use

Average Volume for bolus (30mL/kg)

Number of Normal Saline Usage

Number of Albumin Usage

*DAP use not meeting the following criteria: linezolid not acceptable d/t thrombocytopenia, PK/PD limitations, Vancomycin MRSA MIC ≥1.5, documented Vancomycin allergy, therapeutic change d/t Vancomycin-associated nephrotoxicity, therapeutic choice d/t AKI or history of AKI, bacteremia or endocarditis (MRSA) in patients having failed Vancomycin, Ceftaroline precluded d/t indication other than SSTI/allergy.

**ERT use not meeting the following criteria: treatment of documented ESBL infection without the need for Pseudomonas treatment; trial dose prior to transition to outpatient antibiotic therapy

Discussion

- Significant decreases in prescribing carbapenem and vancomycin plus carbapenem by Emergency Department (ED) physicians post-Sepsis CMS Core Measures:
  Total antibiotics: **132 vs. 149 initiations, p = 0.7399**
    - Carbapenems (17 vs. 3 , p<0.002)
    - Vancomycin + Carbapenems (6 vs. 0, p<0.0132)

- Significant decreases were realized in days of therapy (DOT) for daptomycin, tigecycline, and ertapenem post-Sepsis CMS Core Measures
  Overall DOT: **2059 vs. 2229 DOT/1000 APD, p=0.1954**
    - Daptomycin (96 vs. 20 DOT/1000 APD, p<0.0001)
    - Tigecycline (112 vs. 0 DOT/1000 APD, p<0.0001)
    - Ertapenem (66 vs. 7 DOT/1000 APD, p<0.0001)

- Significantly increased fluid bolus volume (Goal:30mL/kg), usage of normal saline instead of albumin were realized in the post-Sepsis CMS Core Measure period:
  Overall volume: **20.74 mL/kg vs. 28.58 mL/kg, p<0.0001**
  Normal Saline: **32 usages vs. 75 usages, p=0.002**
  Albumin: **13 usages vs. 0 usages, p= 0.0003**

- Significant decrease in Intensive Care Unit (ICU) length of stay were realized post-Sepsis CMS Core Measure period:
  ICU Length of Stay: **6.447 days vs. 4.044 days, p = 0.0023**

Conclusion

- No significant changes were seen in ED antibiotic prescribing behaviors regarding volume and spectrum except for carbapenem and vancomycin with carbapenem
- There was a significant positive shift in time to fluid bolus in the ED, fluid selection, and fluid volume
- There was a significant reduction in utilization of daptomycin, tigecycline, and ertapenem possibly due to initiation of antimicrobial stewardship
- Significantly decreased ICU length of stay after implementation of CMS Core Measures, possibly associated with above behavior changes
- No other significant outcomes benefits were seen (mortality, hospital length of stay)

References

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