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Characteristics of Prospective Audit and Feedback in a Pediatric Cardiovascular Intensive Care Unit

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Background

- Prospective audit and feedback (PAF) is considered a core component of antimicrobial stewardship programs (ASP).
- Vulnerability and complexity of critically ill patients may hinder antimicrobial reduction in the intensive care unit (ICU), an area of high antimicrobial use.
- Pediatric ICU interventions have included the implementation of computer-assisted decision support at the time of antibiotic ordering, the measurement of biomarkers at sepsis onset to identify children at low risk for bacterial infection, and institution-specific guidelines for empiric antibiotic use.
- PAF in the pediatric cardiovascular intensive care unit (CVICU) has not been previously reported.

Objectives

- Describe characteristics of PAF recommendations (PAFR) and acceptance in a pediatric CVICU after PAF implementation.
- Compare antimicrobial utilization before and after PAF implementation.

Methods

Setting

- 20-bed pediatric CVICU that serves a wide range of cardiac patients, including cardiac surgery and transplantation.
- A formal PAF program was implemented in our institution's pediatric CVICU on 12/07/15.

Prospective Audit and Feedback Program

- Audits of antimicrobials active \geq 72hr were performed by the ASP Pharmacist and reviewed with the ASP Medical Director, before being communicated to the CVICU Pharmacist.
- CVICU Pharmacist communicated PAFR to the medical team and adherence was assessed within 48 hours.

Study Cohort

- PAF audits for patients admitted to the Lucile Packard Children's Hospital CVICU between 12/07/15 – 11/30/16 were reviewed.

Study Endpoints

- PAF audits, recommendations, and recommendation acceptance were evaluated.
- Monthly days of therapy (DOT) per 1000 patient days from 06/01/15 – 11/30/16 were included for antimicrobial utilization evaluation:
 - Broad spectrum gram-negative antibiotics (GN ABX) included: ampicillin/ sulbactam, cefepime, ceftazidime, ceftriaxone, ciprofloxacin IV & PO, gentamicin, levofloxacin IV & PO, meropenem, moxifloxacin IV & PO, piperacillin/tazobactam (PIP/TAZ), tigecycline, tobramycin IV, and trimethoprim-sulfamethoxazole.
 - Broad spectrum gram-positive antibiotics (GP ABX) included: daptomycin, linezolid IV & PO, vancomycin IV.
- Mann-Whitney U was used to compare median DOT per 1000 patient days before and after implementation of PAF.

Results

Figure 1a. Audit Recommendation Rate and Acceptance, by Antimicrobial Class

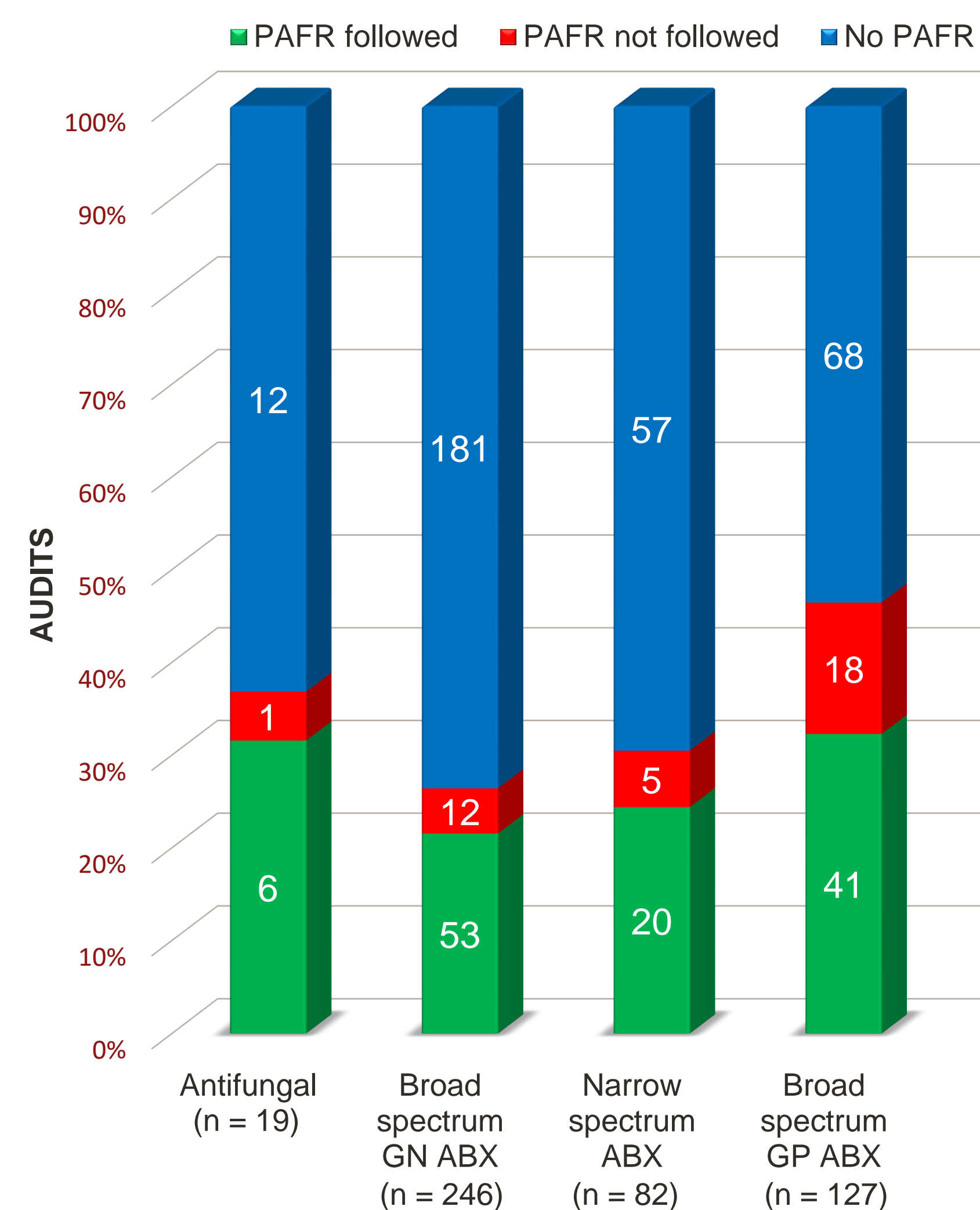


Figure 2. Audit Recommendation Rate and Acceptance, by Infectious Problem

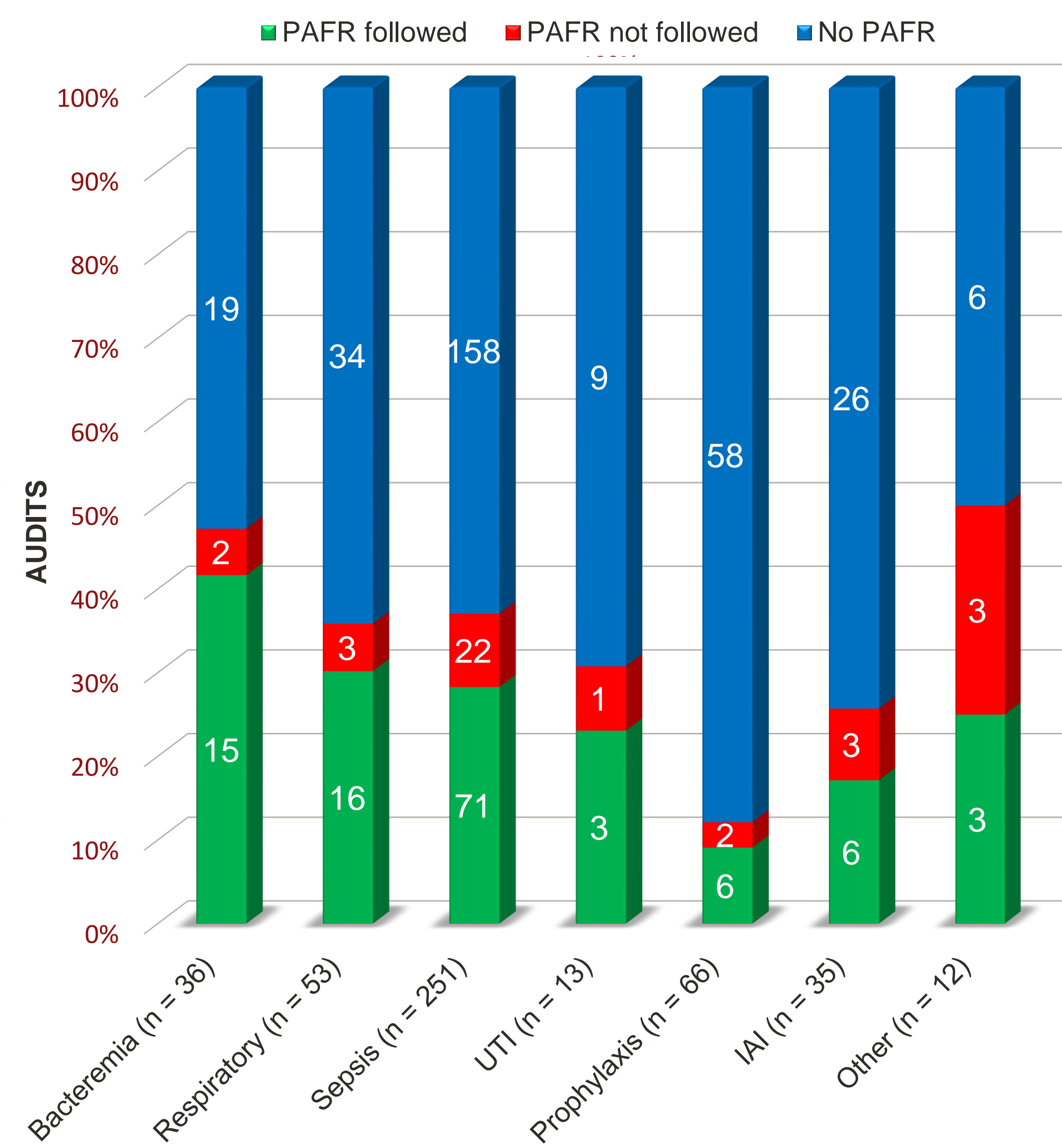


Figure 3. Audit Recommendation Acceptance, by Recommendation Type

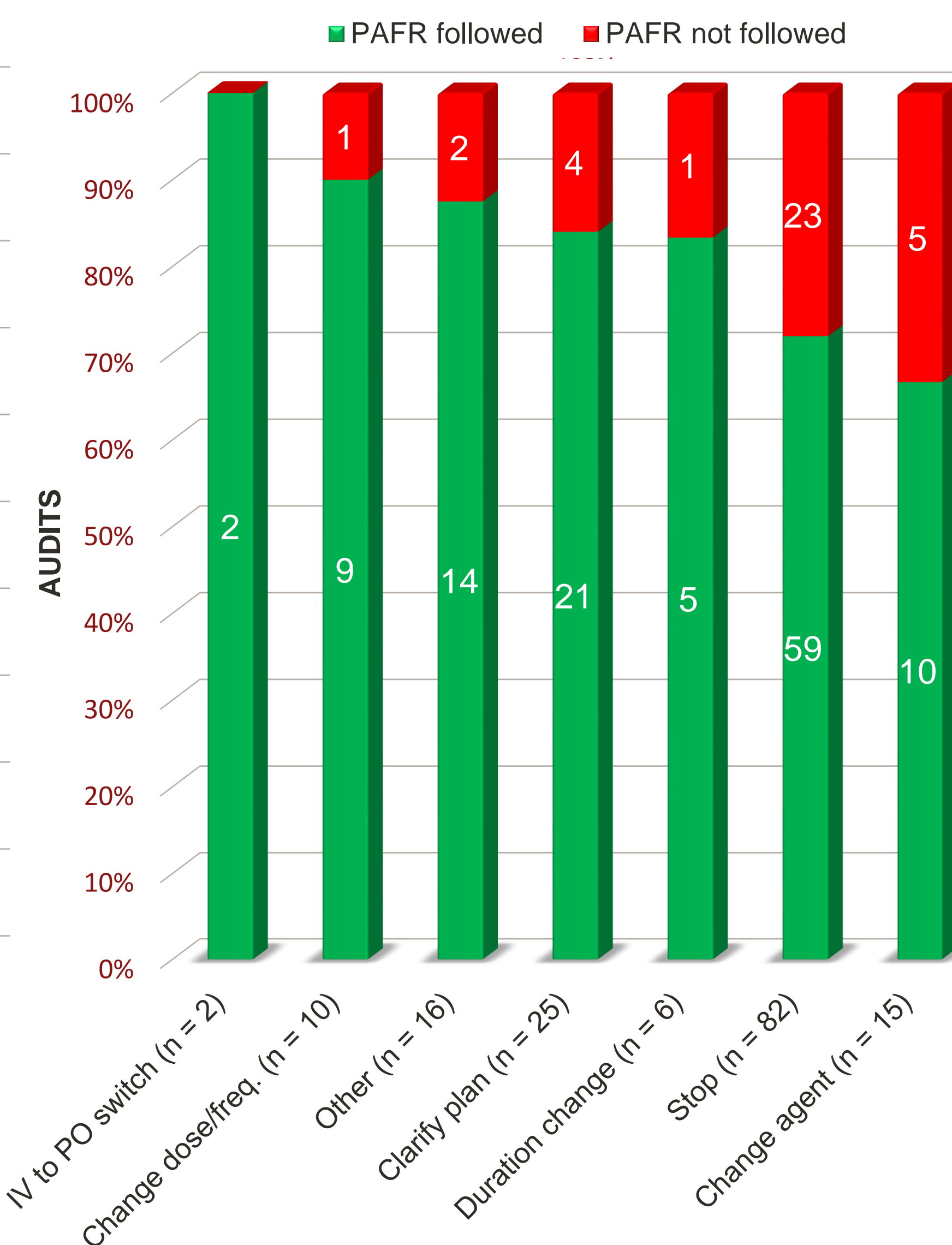


Figure 1b. Audit Recommendation Rate and Acceptance, by Antimicrobial

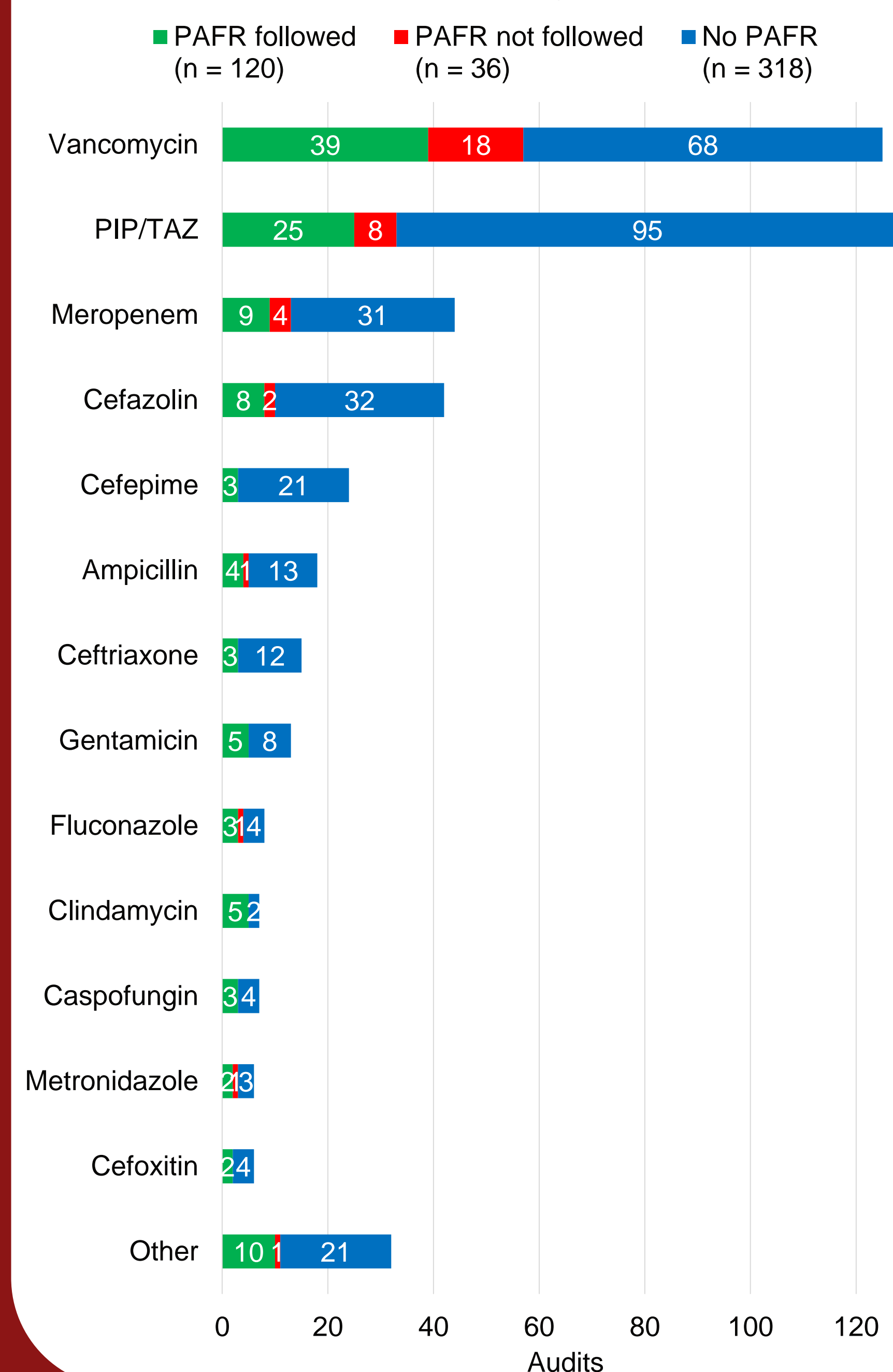
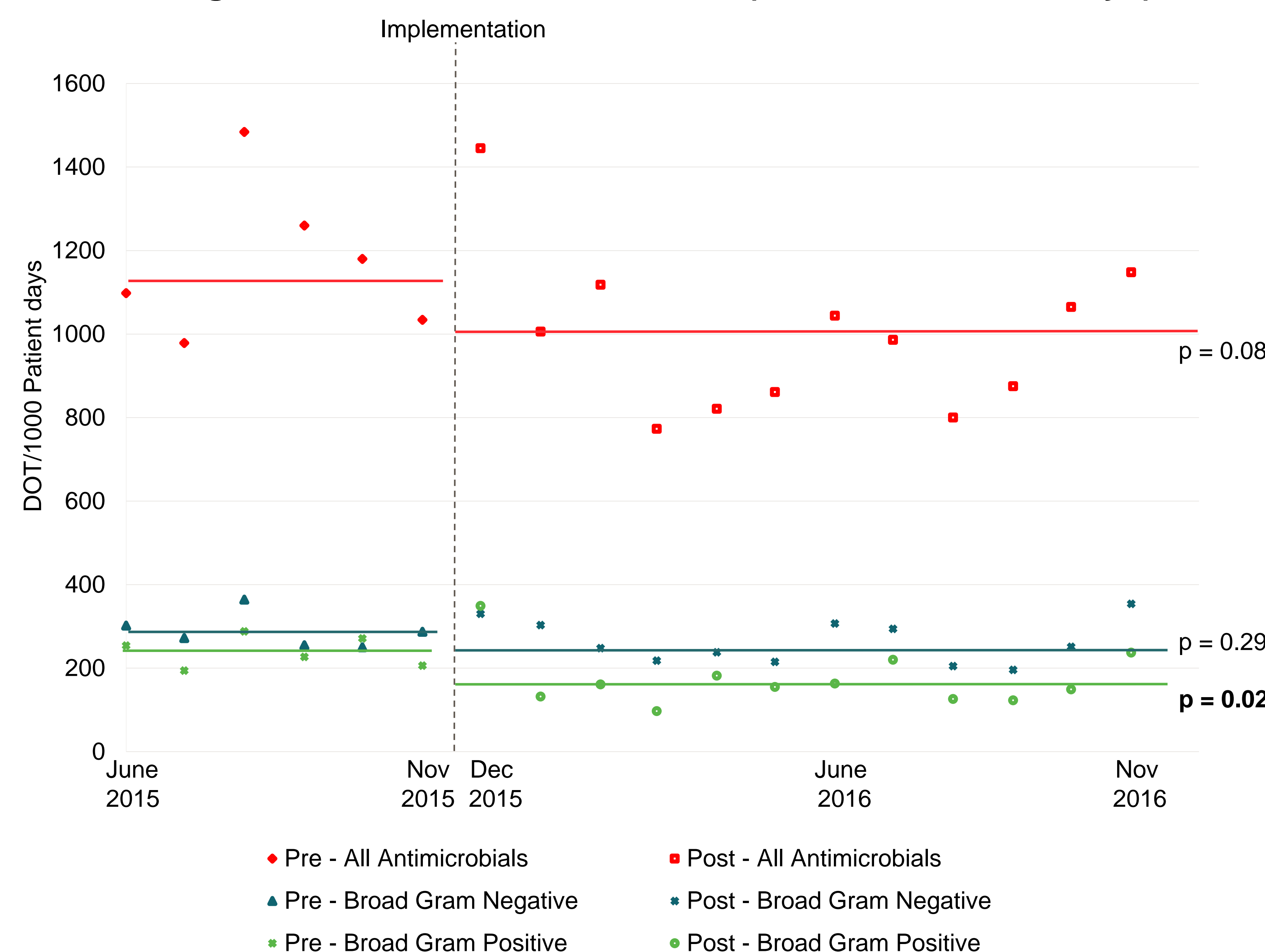


Figure 4. Antimicrobial Utilization (DOT/1000 Patient Days)



Discussion

- One third (156/474) of antimicrobial orders audited in the CVICU resulted in a PAFR.
- The PAFR acceptance rate was greater than 70% across all antimicrobial classes.
- The most common reason for not following a PAFR was disagreement by the medical team.
- Broad spectrum GN and GP ABX were the antimicrobials most likely to have a PAFR; however, PAFR on antifungals had the highest acceptance rate.
- Vancomycin accounted for the majority of broad spectrum GP ABX audits and piperacillin/tazobactam accounted for the majority of broad spectrum GN ABX audits. The majority of PAFR were for these antibiotics and the acceptance rate was 71%.
- Sepsis was the most common infectious problem with a PAFR (37% recommendation rate/76% acceptance) and antimicrobial discontinuation was the most common PAFR (68% of recommendations/72% acceptance).
- A decrease in median DOT per 1000 patient days was observed in the year after implementation of PAF compared to the previous 6 months (p = 0.08).
- There was a statistically significant decrease in median DOT per 1000 patients days for broad spectrum GP ABX following PAF implementation (p = 0.02).

Limitations

- Our success/failure may be related to working through the CVICU Pharmacist. PAF programs that communicate to someone other than a unit-based pharmacist may have a different experience.
- Other variables impacting antimicrobial utilization, including patient acuity and new protocol/guideline initiation, were not captured.

Conclusions

- The majority of audits with a recommendation were for vancomycin and piperacillin/tazobactam, the most common recommendation was to stop antibiotics, and the most common infectious problem was sepsis. The majority of recommendations were accepted.
- Implementation of prospective audit and feedback in a pediatric CVICU resulted in a significant reduction in broad spectrum gram-positive antibiotic utilization.
- Overall antimicrobial utilization trended downward during the study period compared to the 6 months prior to PAF implementation.

Future Initiatives

- Further evaluation of PAF recommendation type may identify potential opportunities for practice standardization.
- CVICU-specific opportunities for standardized antimicrobial utilization may include prophylaxis for extracorporeal membrane oxygenation (ECMO) and ventricular assist device (VAD) implantation.