

# Evaluating the appropriateness of initial febrile neutropenia treatment at an acute care hospital

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## Background

- Febrile neutropenia is a complex diagnosis with multiple potential causes<sup>1-2</sup>
- When patients are neutropenic, it is possible neutropenia alone may cause fevers, but *Pseudomonas aeruginosa* is a common pathogen in this population<sup>1-3</sup>
- These patients are also at increased risk for fungal infections<sup>1</sup>
- Risk factors for Methicillin-resistant *Staphylococcus aureus* (MRSA) include presence of chest port infection, skin and soft tissue infection, or pneumonia<sup>1</sup>
- Practicing stewardship and selecting the correct empiric regimen is challenging due to their complexity, and may result in unnecessarily broad coverage

## Objective

The purpose of this medication use evaluation (MUE) is to assess appropriate treatment of febrile neutropenia based on patient specific risk factors and identify areas for improvement. Appropriate treatment is defined by adherence to National Comprehensive Cancer Network (NCCN) Guidelines.<sup>1</sup>

## Methods

**Study Design:** Concurrent MUE

**Study Duration:** 8/1/22-11/30/22

**Inclusion Criteria:** Adult hospitalized patient with an antimicrobial order with an indication of febrile neutropenia

**Exclusion Criteria:** Patient does not meet formal definition of febrile neutropenia (temperature < 38 °C and absolute neutrophil count [ANC] ≥ 500 cells/mm<sup>3</sup>)

## Data Collection

### Patient Demographics

- Gender
- Intensive Care Unit (ICU) admission
- Infection Source
- Age
- Type of Cancer

### Risk Factors

- Multidrug-resistant organism (MDRO) history
- Liquid or solid tumor

### Patient Laboratory Values/Vitals

- Systemic Inflammatory Response (SIRS) criteria
- Absolute neutrophil count

### Antimicrobial Regimen

- Prophylaxis
- Anti-Pseudomonal agent
- Antifungal agent
- Antiviral agent
- Anti-MRSA agent
- Antianaerobic agent

### Pharmacy Intervention

- Pharmacist intervention required
- Number of interventions

## Results

**Table 1: Patients Included and Excluded**

Patients who met inclusion criteria (n)	38
Patients who met exclusion criteria of ANC ≥ 500 cells/mm <sup>3</sup> (n)	10
Patients who met exclusion criteria of temperature < 38 °C (n)	0
Total patients included in study analysis (n)	28

## Results

**Table 2: Baseline Characteristics**

Characteristics	Results	Type of Cancer	Percentage
Age in years (mean±SD)	62.5±14.8	Acute myeloid leukemia	35.7
Male sex (%)	64.3	Multiple myeloma	17.9
ICU admission (%)	17.9	Non-hodgkin lymphoma	14.3
ID provider consulted (%)	82.1	Acute lymphocytic leukemia	7.1
ANC in cells/mm <sup>3</sup> (mean±SD)	133±70.7	Myelodysplastic syndromes	7.1
G-CSF administered (%)	53.6	Lung cancer	3.6
Solid tumor (%)	21.4	Hodgkin lymphoma	3.6
Prophylactic antibiotics (%)	46.4	Osteosarcoma	3.6
Prophylactic antifungals (%)	53.6	Prostate cancer	3.6
Prophylactic antivirals (%)	50	Unknown	3.6

Figure 1: Anti-Pseudomonal Agents

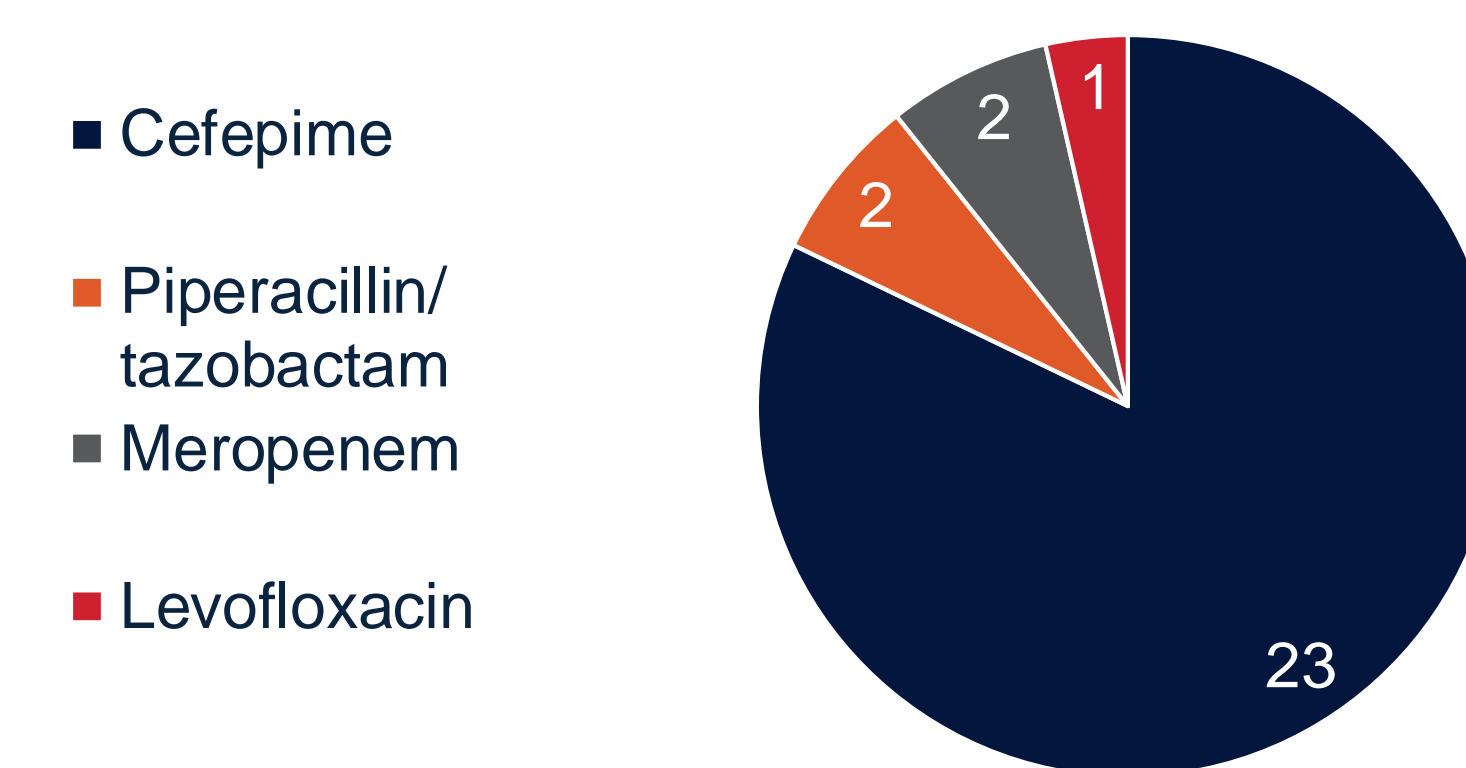


Figure 2: Antifungal Agents

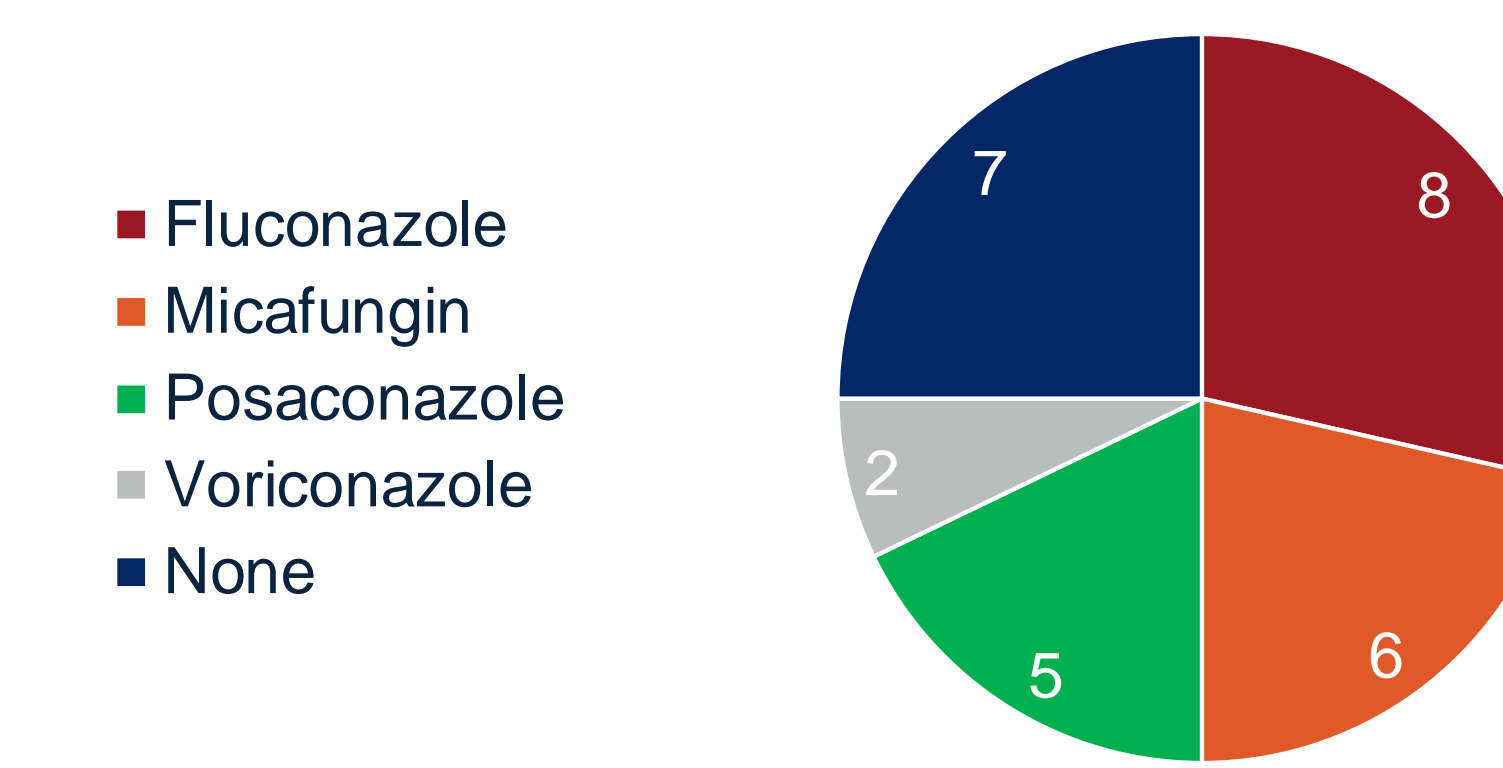


Figure 3: Appropriateness of Regimen Components

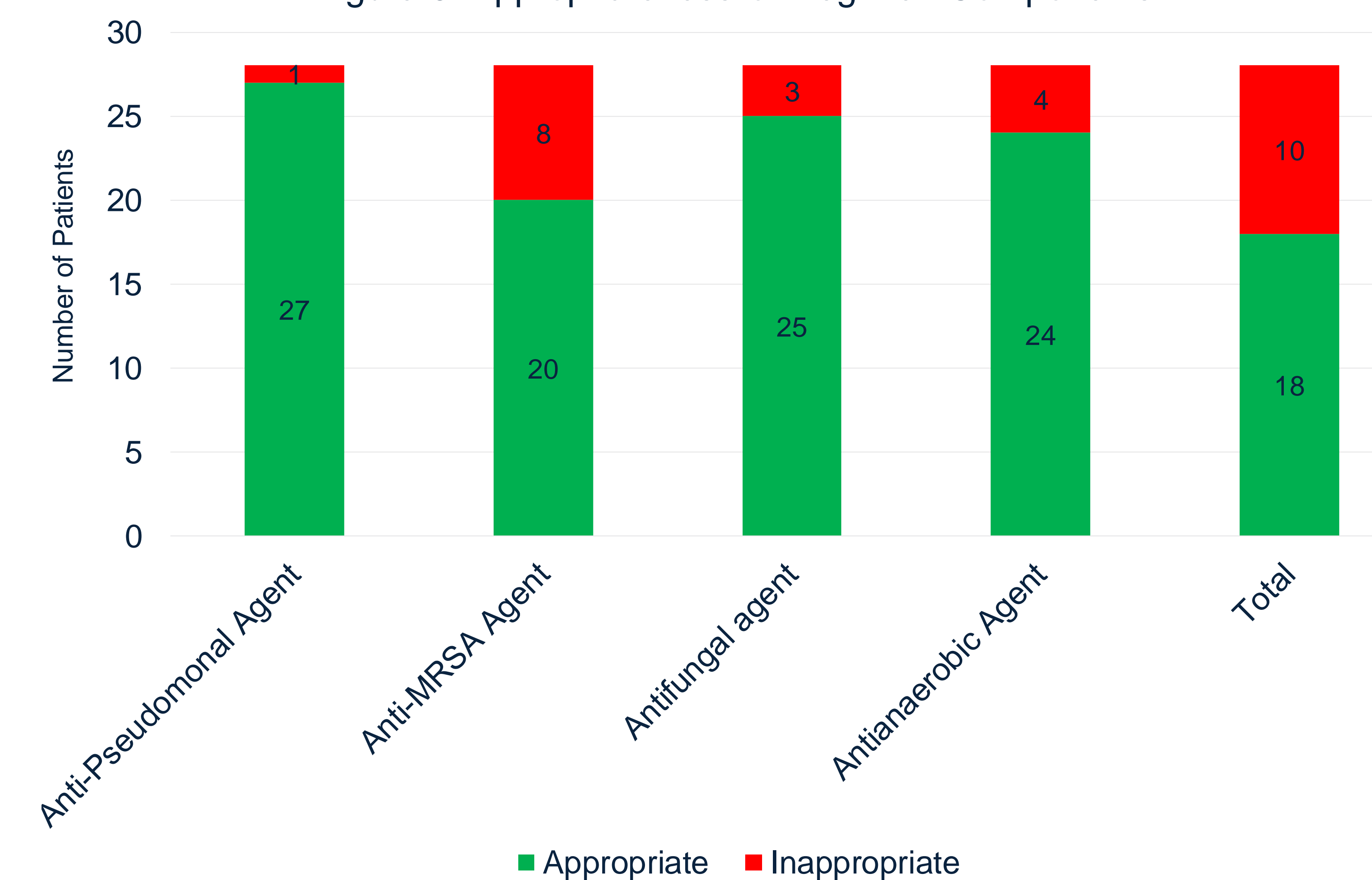
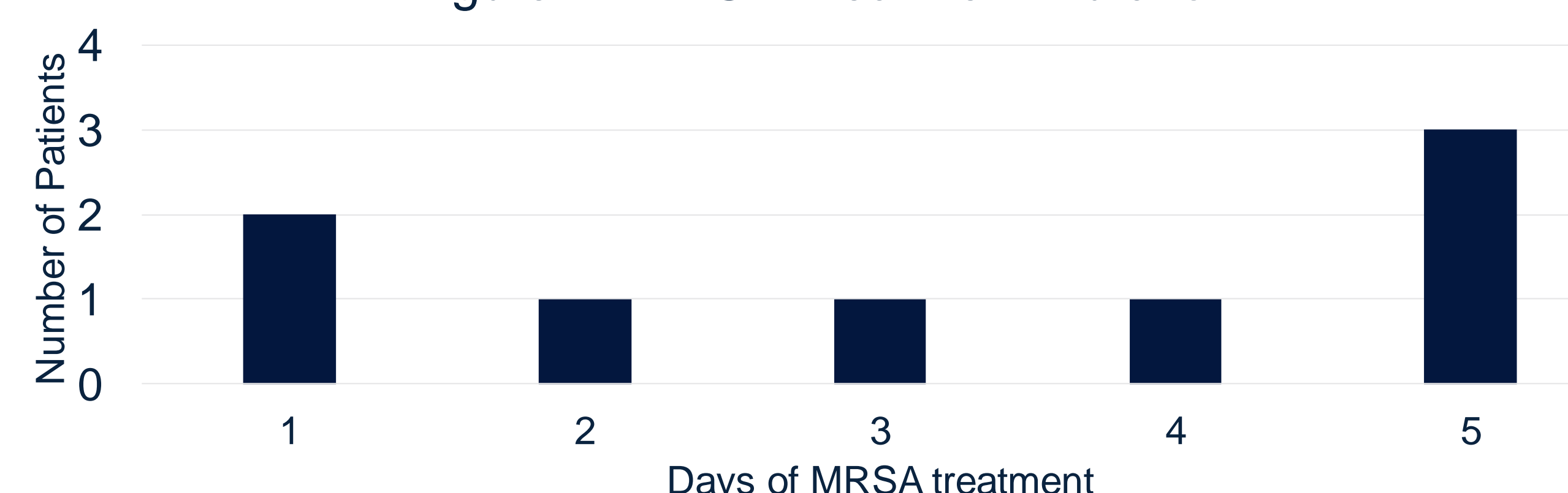


Figure 4: MRSA Treatment Duration



## Discussion

Ten of 28 patients analyzed received an empiric regimen not consistent with guideline recommendations

- 8 patients had vancomycin (all MRSA agents were vancomycin) initiated without documentation of other sources of infection aside from febrile neutropenia
  - Ordered indications were neutropenic fever (2) and sepsis (6)
  - Length of treatment is shown in Figure 4, although half were discontinued prior to or at 3 days of treatment, others were continued to 5 days
- 3 patients were treated with broadened antifungal treatment
  - These 3 patients were also treated with vancomycin and additional anaerobic coverage
  - Antifungal treatment was differentiated from prophylaxis by determining whether antifungal coverage was broadened without a valid reason, such as prolonged QTc or a drug interaction
- 5 patients were treated with unnecessary anaerobic coverage
  - Anaerobic coverage was typically not selected unless anti-Pseudomonal agents such as piperacillin-tazobactam or meropenem were selected, which were classified as appropriate
- Pharmacy interventions were attempted on 4 of these regimens
  - 3 of the 4 attempted interventions were successful

Nine patients had positive cultures

- 7 patients had positive blood cultures
  - 6 of 7 blood cultures were gram-negative bacteria
- 2 patients had positive wound cultures
  - Both of these were MRSA

## Conclusion

- Providers typically selected appropriate anti-Pseudomonal agents for febrile neutropenia
- Providers also frequently prescribed vancomycin without a valid indication
- There may be benefit from additional education about appropriate timing and sources of infection to consider initiation of anti-MRSA agents
- Antifungal agents and antianaerobic agents were prescribed appropriately a majority of the time
- Education regarding when vancomycin and antifungal treatment is recommended in febrile neutropenia in the form of a facility-specific febrile neutropenia guidance may help improve management

## References

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