



## Biweekly Case Audit with Concurrent Intensivist Feedback to Improve Antimicrobial Use in a Medical Intensive Care Unit

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#### Updated Abstract

**Background:** How best to optimize antimicrobial (AM) use in intensive care units is unclear. As part of a multimodal intervention to improve AM use in the medical intensive care unit (MICU) of our urban teaching hospital, we performed regular audits of AM recipients and concurrently discussed recommendations for improvement with attending intensivists.

**Methods:** We implemented infection management guidelines for common ICU infections, promoted daily formal review of AM indications and infection status during team rounds, and gave monthly teaching sessions for rotating MICU trainees. An attending and fellow ID physician reviewed the records of current MICU AM recipients, with guideline-based recommendations for improvement discussed with the two rotating attending intensivists in person on the first Friday of the intensivists' two-week rotations. Demographic, clinical, microbiologic and AM-related data were collected.

**Results:** We audited 155 ICU AM use cases (130 patients, 76 males, median age 56, median 2 major comorbidities each) during 16 audits conducted over 10 months. A median of 2 AMs were given per patient for a median duration of 3 days; IV vancomycin, piperacillin-tazobactam and metronidazole were used most often. There were 238 AM indications and lower respiratory infections (100) and *C. difficile* (20 empiric, 6 confirmed) were the commonest indications; infections were community-acquired in 154; microbial etiology was confirmed in 70; 55 patients were followed separately by ID consultants. AM indications were reviewer validated 85% of the time. Changes in AM regimens were recommended 54 times; de-escalating coverage, AM discontinuation (d/c) and broadening coverage were recommended 28, 15 and 11 times, respectively; recommendations were accepted 34 (63%) times. Audit discussions were uniformly collegial but were often hurried.

**Conclusion:** Our audits led to AM adjustment recommendations for 30% of patients but were only accepted about 60% of the time. Ambiguity regarding AM indications and duration were common audit barriers. The impact of this and associated interventions on antimicrobial use and resistance require further study.

### Results:

- 220 MICU cases reviewed (Table 1, Figure 1), 155 (70%) on AM; median 2 AM (INQR 1-2) and median 3 (INQR 2-7) days on any AM. (See Figure 2 for distribution of AM drugs reviewed.)
- 238 AM indications documented (Table 2, Figure 3): 154 (67%) community acquired indications (CAI); 76 (33%) hospital acquired infections (HAI); 65 ≥ 2 indications; 203 (85%) were reviewer validated AM indications (indications warranted AM therapy).
- Microbiological testing adequate for 166 (70%) AM indications; 124 (52%) had partially or fully confirmed microbial etiology at time of review.
- Changes to AM regimens were recommended 54 (35%) times and 33 (61%) of the changes were accepted (Table 3, Figure 4).
- 55 (35%) cases were followed separately by ID consultants, with whom any change recommendations were discussed before discussing with intensivists.

Figure 1: Comorbid Conditions and Non-Infectious Diagnoses

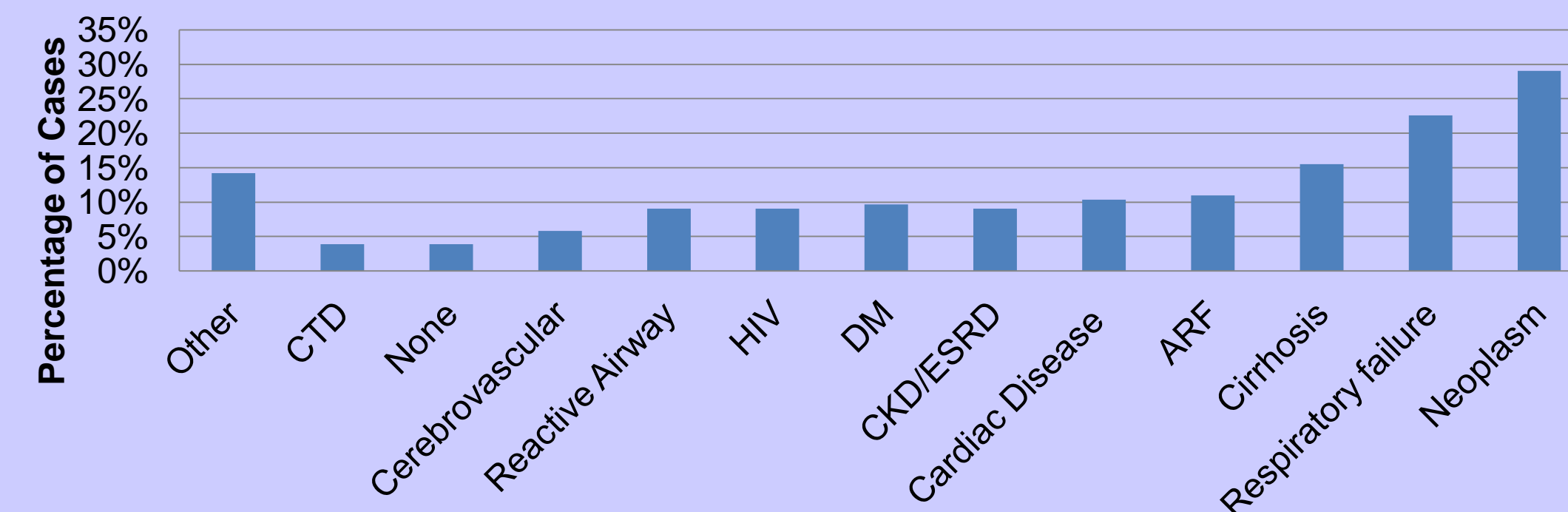


Figure 2: AM on Order at Time of Review (N=295)

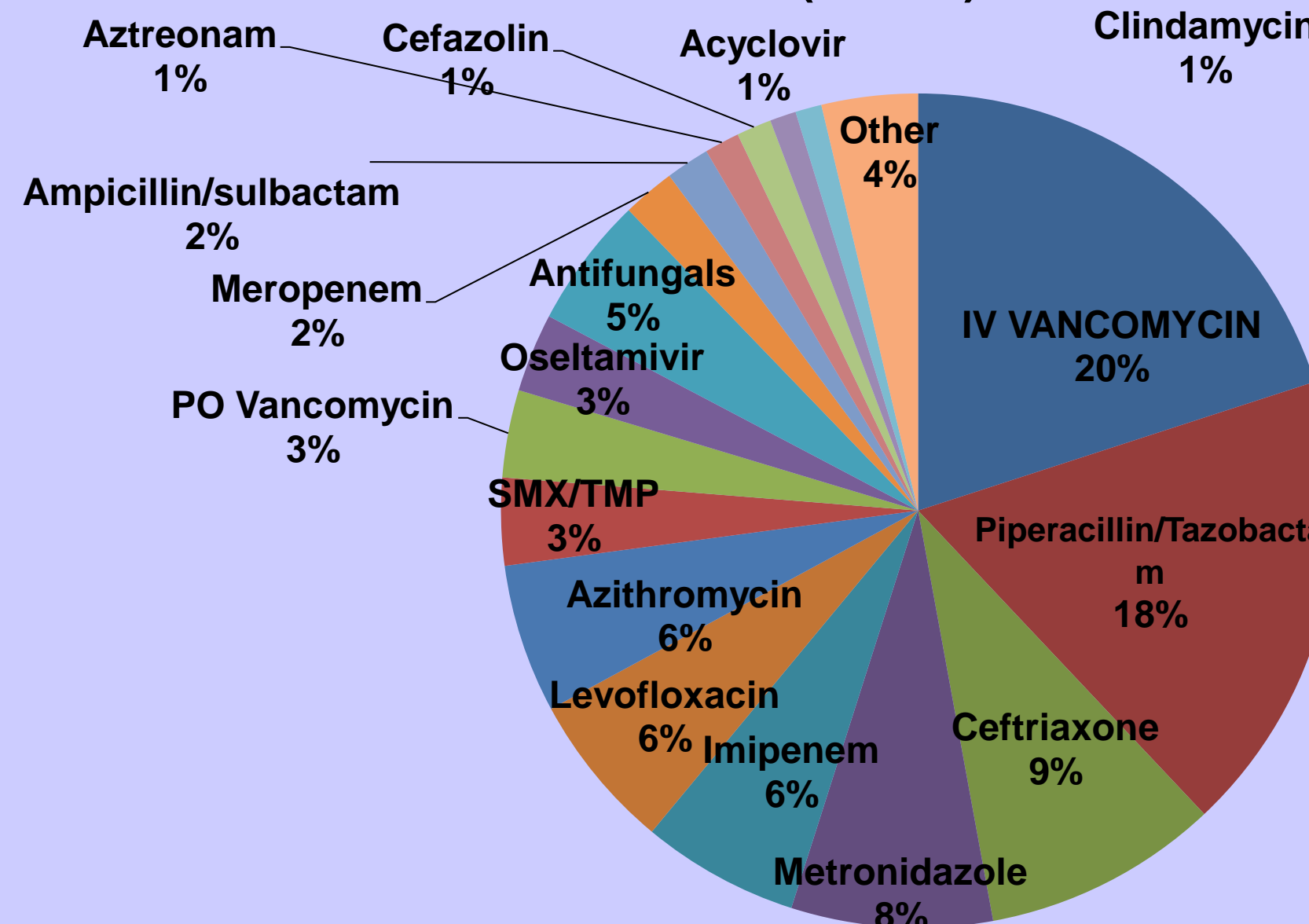


Figure 3: Treatment Indications (N= 230)

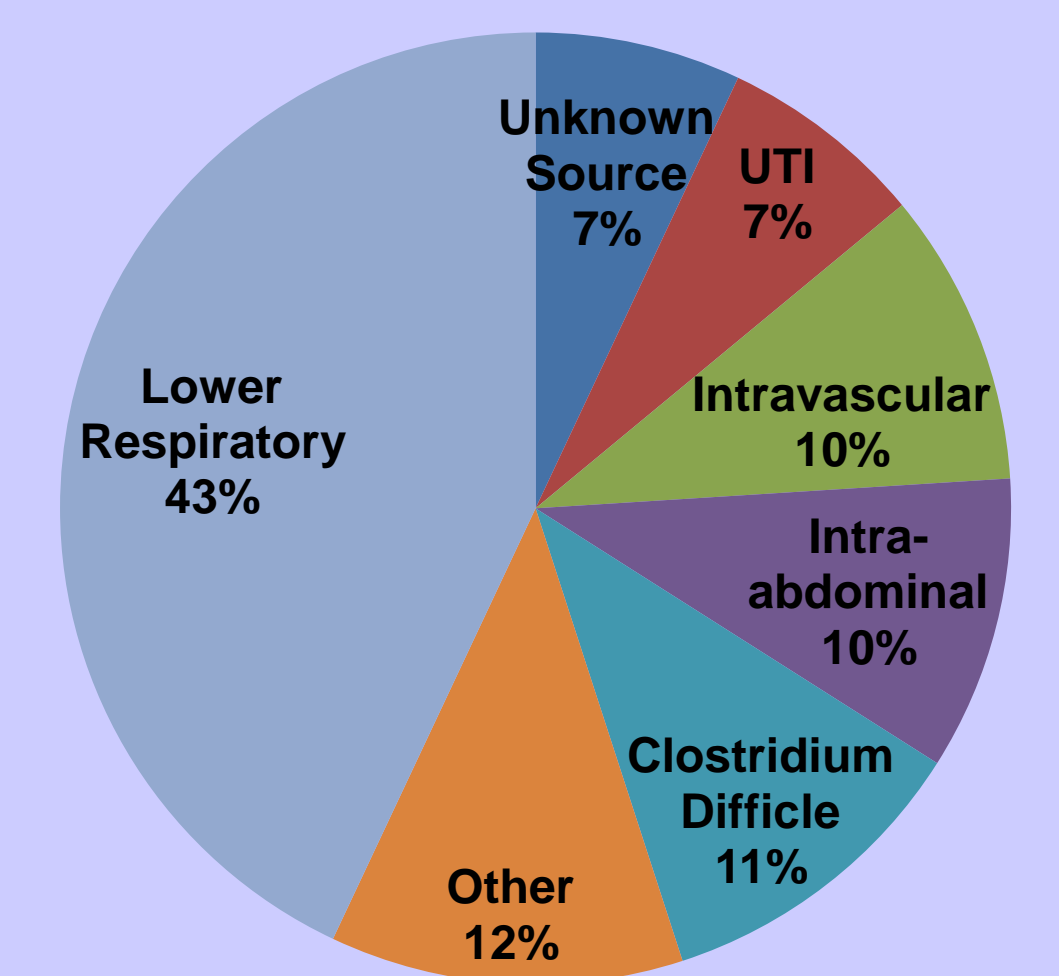
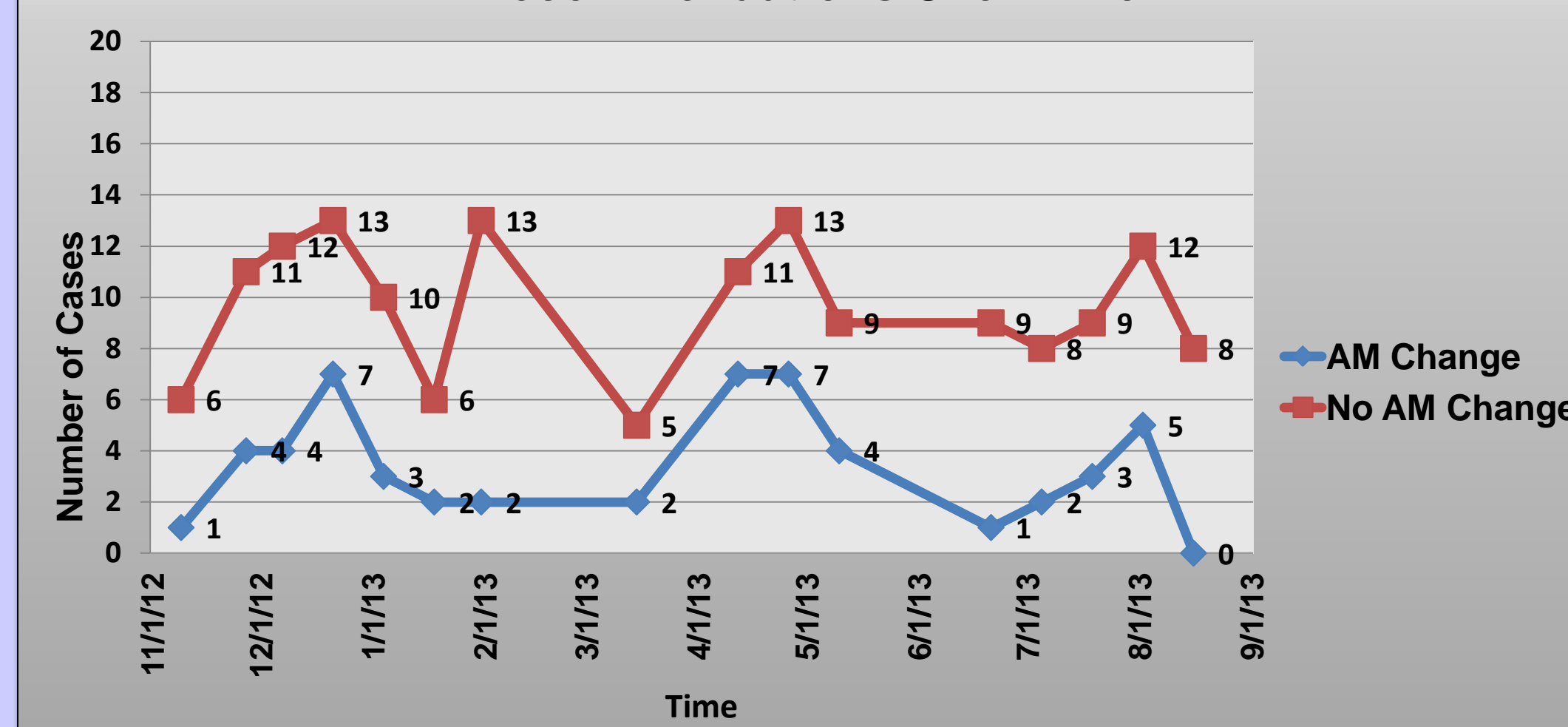


Figure 4: Case Reviews and AM Change Recommendations Over Time



	Total # cases in MICU at time of Audits N (%)	Cases on AM N (%)	Cases NOT on AM N (%)
Total Number	220	155 (70)	65 (30)
Total Patients	195	130	65
Male	117 (60)	76 (58)	41 (63)
Female	78 (40)	54 (42)	24 (37)
Median Age	53 (INQR 43-61)	56 (INQR 48-62)	51 (INQR41-60)
Race/Ethnicity	---	---	---
African American	101 (52)	70 (54)	31 (48)
Caucasian	49 (25)	31 (24)	18 (28)
Hispanic	26 (13)	16 (12)	10 (15)
Other	19 (10)	13 (10)	6 (9)

	Total = N (%)
Total AM Indications	238
Prophylaxis	8
Treatment	230
CAI	154 (67)
HAI	76 (33)
Reviewer Validation of Indications	238
Indications Validated by Reviewer	203 (85)
Indications Invalidated by Reviewer	35 (15)

	N (%)	Accepted	Rejected
Total cases reviewed	155 (100)	---	---
AM changes recommended	54 (35)	34 (63)	20 (37)
De-escalate regimen	28 (18)	19 (68)	9 (32)
Add or broaden AM	11 (7)	5 (45)	6 (55)
Discontinue All AM	15 (10)	10 (67)	5 (33)

### Introduction

Many patients in intensive care units are exposed to antimicrobials (AM) and antimicrobial resistance is high. The patients are critically ill and the source of the infection and microbial etiology are often unknown.

Antimicrobial stewardship interventions are aimed at making the correct diagnosis with appropriate microbiological specimens, use of the right AM at the right dose and for the right duration, and de-escalating AM when culture data or clinical picture warrants. How best to improve AM use in intensive care units (ICUs) is unclear.

### Objectives

- To characterize the clinical epidemiology and appropriateness of AM use in the medical intensive care unit (MICU) of an urban teaching hospital.
- To improve AM use in our MICU through a program of physician education and regular post-prescriptive review and feedback.

### Methods

- Presentation to pulmonary/critical care physicians on ICU AM.
- Monthly lectures to trainees in the medical intensive care unit.
- Between 11/9/2012 -- 8/16/2013, an attending and fellow ID physician reviewed electronic records of current MICU AM recipients on the first Friday of the intensivists' two-week rotations, with recommendations for improvement discussed with the attending intensivists.
- Patient medical charts and electronic medical records were reviewed for basic demographic information, underlying diseases, AM data, documented indications for AM use, microbiological data, other diagnostic data (radiological, surgical, pathological).
- AM use based on indication documented were validated based on ID attending and fellow's judgment and hospital infection guidelines.

### Limitations:

- Post-prescriptive review was infrequent
- Program impact on AM use, resistance not yet measured
- Single center study without blinding
- Limited time for intensivist case discussion, rapid turnover of MICU staff, patients

### Conclusions:

- Our MICU patients had a high prevalence of reviewer-validated AM indications and microbiologically confirmed infections.
- Opportunities for AM improvement were frequent (35%) nonetheless.
- Optimal education methods and schedule/ personnel for post-prescriptive review need clarification.

### Acknowledgements:

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