IMPACT OF ANTIBIOTIC SUSCEPTIBILITY REPORTING ON BROAD SPECTRUM ANTIBIOTIC USE IN SERRATIA AND MORGANELLA BACTEREMIA

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INTRODUCTION

The increase in antibiotic resistance coupled with the scarcity of new drug development highlights the necessity of antimicrobial stewardship strategies to guide antibiotic de-escalation when appropriate. Retrospective data suggests non-inferior outcomes with carbapenem-sparing regimens in AmpC-beta-lactamase producing *Serratia marcescens* and *Morganella morganii* bacteremia[1,2]. To minimize broad spectrum antibiotic use, our microbiology laboratory has recently changed the antibiotic susceptibility reporting for AmpC-beta-lactamase-producing *Serratia marcescens* and *Morganella morganii* in blood cultures to include narrow spectrum 3rd generation cephalosporins, ceftazidime and ceftriaxone respectively.

Aim

To evaluate the impact of antibiotic susceptibility reporting changes on broad spectrum antibiotic use

Objectives

Primary objective

To assess the change in broad spectrum antibiotics use following change in antibiotic susceptibility reporting

Secondary objectives

1) To compare the treatment outcomes between pre- and post change of antibiotic susceptibility reporting
2) To evaluate the impact of broad spectrum antibiotic use on treatment outcomes

METHODOLOGY

We retrospectively reviewed all adult patients with *Serratia marcescens* or *Morganella morganii* in blood culture 2 years pre- and post-change of susceptibility reporting from Feb'13 - Feb'17.

Exclusion criteria	1) more than 1 pathogen found in blood culture 2) no antibiotic treatment given 3) death within 48 hours of positive blood culture
Outcome measures	**Primary Outcome** Rate of broad spectrum antibiotics use as definitive therapy ■ **Broad spectrum antibiotics:** Carbapenems, Piperacillin/tazobactam, Cefepime, Ciprofloxacin ■ **Narrow spectrum antibiotics:** 3rd gen cephalosporins, Co-trimoxazole, Gentamicin **Secondary Outcomes** ■ In-hospital mortality ■ Clinical response ■ Microbiologic success (microbiologic eradication/presumed eradication)

References

1. Choi et al, Antimicrob Agents Chemother **52**:995-1000
2. Chow et al, Ann Intern Med **115**:585-590

RESULTS

All patients with *Serratia marcescens* or *Morganella morganii* in blood culture (Feb 2013 - Feb 2017) **Screened 112 patients**

Excluded
> 1 pathogen found in the blood culture (n=26)
Patients who died within 48 hours of positive blood culture (n=7)
Not treating (n=2)
Incomplete data (n=1)

Patient cohort pre-change of reporting before 16 Feb 2015 **N = 30**

Patient cohort post-change of reporting after 16 Feb 2015 **N = 46**

Baseline demographics and clinical characteristics

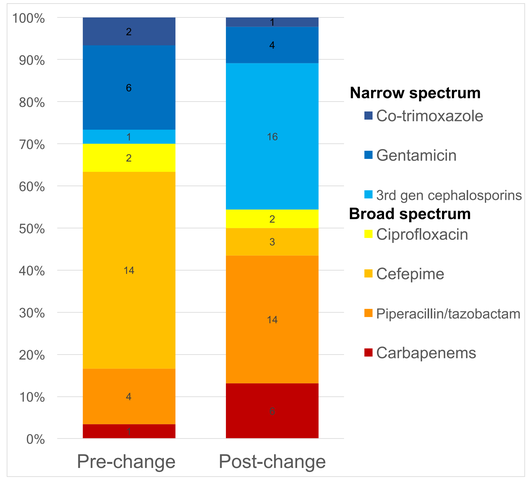
Characteristics	Pre-change (n=30)	Post-change (n=46)	p-value
Age, median (IQR)	70 (64 – 79)	65 (55 – 77)	0.204
Male sex	20 (66.7)	27 (58.7)	0.484
Initiation of antibiotics in ICU	4 (13.3)	14 (30.4)	0.087
Charlson's comorbidity index, median (IQR)	3 (1 – 5)	3 (1 - 5)	0.915
Pitt bacteremia score, median (IQR)	1 (0 – 2)	1 (0 – 2)	0.965
Length of hospital stay, median (IQR)	9 (6 – 22)	16.5 (7– 35)	0.079
Microorganism			0.582
Serratia marcescens	22 (73.3)	31 (67.4)	
Morganella morganii	8 (26.7)	15 (32.6)	
Source of bacteremia			
Urinary	10 (33.3)	8 (17.4)	0.110
CVC	12 (40)	16 (34.8)	0.645
SSTI	0 (0)	6 (13)	0.076
Others	5 (16.7)	6 (13)	0.661
Unknown	3 (10)	10 (21.7)	0.184
Source control	12 (40)	19 (41)	0.910
Concomitant infection	5 (16.7)	17 (37.0)	0.057
Antibiotics duration	14 (9 – 15)	14 (12 – 16)	0.078
Empiric therapy Broad spectrum	15 (50.0)	33 (71.7)	0.055

Treatment outcomes between pre- and post-change of antibiotic susceptibility reporting

Outcomes	Pre-change (n=30)	Post-change (n=46)	p-value
In-hospital mortality	2 (6.7)	7 (15.2)	0.469
Clinical response	27 (90)	40 (87)	1.000
Microbiologic success	30(100)	43 (93.5)	0.274
Eradication	22 (73.3)	33 (71.7)	
Presumed	8 (26.7)	10 (21.7)	

■ No significant differences were observed in secondary outcomes between patients in both groups

Rate of broad spectrum antibiotic use as definite therapy



■ There was a decrease in broad spectrum antibiotic use post-change (70% to 54.3%) although this was not statistical significant (p=0.172).

■ Specifically, cefepime use had decreased significantly from 46.7% to 6.5% (p<0.001).

The impact of broad spectrum use on treatment outcomes

Characteristics	In-hospital Mortality (N=9)	No In-hospital Mortality (N=67)	p-value
Age, median (IQR)	70 (58 – 77)	70 (59 – 78)	0.631
Initiation of antibiotics in ICU	5 (55.6)	13 (19.4)	**0.017**
Charlson's comorbidity index, median (IQR)	2 (1 – 4)	5 (3 – 6)	0.679
Pitt bacteremia score, median (IQR)	2 (2 – 5)	1 (0 – 2)	**0.005**
Length of hospital stay, median (IQR)	45 (11 – 60.5)	10 (7 – 26)	0.036
Source control	4 (44.4)	27 (40.3)	1.000
Concomitant infection	7 (77.8)	15 (22.4)	**0.002**
Use of broad spectrum antibiotic	9 (100)	37 (55.2)	**0.010**
Duration of antibiotic	11 (7 – 13.5)	14 (12 – 16)	**0.020**

■ Use of broad spectrum antibiotics were significantly associated with in-hospital mortality (p=0.010)

■ No mortality was observed in patients on narrow spectrum antibiotics

■ There were no statistical significant differences with the use of definitive broad spectrum antibiotic and clinical response or microbiologic success respectively (table not shown)

CONCLUSION

■ Broad spectrum antibiotic use, specifically cefepime, was reduced after susceptibility reporting changes without affecting outcomes in patients with *Serratia marcescens* and *Morganella morganii* bacteremia.

■ This demonstrates the potential role of the microbiology laboratory in antimicrobial stewardship