Post-Prescription Review with Threat of Infectious Disease Consultation and Sustained Reduction in Meropenem Use Over Four Years

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INTRODUCTION

- Post-prescription review with feedback (PPRF) is an effective antimicrobial stewardship strategy
- Following a meropenem shortage, we implemented PPRF with mandatory infectious disease (ID) consultation for meropenem and imipenem use >72 hours
- Providers were made aware of the policy via electronic alert when ordering the antibiotic

METHODS

- Setting: University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC) in Seattle, WA
- Design: Retrospective and longitudinal study in hospitalized patients before (Jan 2013 – Nov 2015) and after (Nov 2015 – Oct 2019) the policy was implemented
- Al inpatients were included, except cystic fibrosis and NICU
- Analysis: Interrupted time series (ITS)

OUTCOMES

- Primary outcome: meropenem and imipenem days of therapy (DOT) per 1,000 patient-days
- Secondary outcomes:
  - Carbapenem duration of therapy
  - Annual 30-day mortality and length of stay (LOS) among patients with GNR bacteremia at UWMC
  - Concurrent antibiotic use trends for cefepime, ceftriaxone, and piperacillin-tazobactam
  - Empiric meropenem and imipenem use (“first starts”)

RESULTS

Table 1. Patient Demographics

	Pre-intervention n = 4066	Postintervention n = 2552
Sex		
Female	1664 (41)	1031 (40)
Male	2402 (59)	1521 (60)
Age		
< 20	44 (1)	45 (2)
21–30	361 (9)	245 (10)
31–40	434 (11)	306 (12)
41–50	586 (14)	358 (14)
51–60	1029 (25)	594 (23)
61–70	944 (23)	595 (23)
> 70	668 (16)	409 (16)
Race		
Black	311 (8)	224 (9)
Other	753 (19)	429 (17)
White	3002 (74)	1899 (74)
Comorbidities		
Any malignancy	1457 (36)	875 (34)
Cerebrovascular disease	1391 (34)	1176 (46)
Chronic pulmonary disease	1346 (33)	1088 (43)
Congestive heart failure	1478 (36)	894 (35)
Liver disease	291 (7)	213 (8)
Metastatic solid tumor	672 (17)	405 (16)
Myocardial infarction	409 (10)	206 (8)
Peripheral vascular disease	453 (11)	364 (14)
Renal disease	1586 (39)	1063 (42)

- 4,066 and 2,552 patients in the pre- and post-intervention periods, respectively
- The two groups were similar in baseline demographic and clinical characteristics
- Meropenem and imipenem DOT/1,000 patient-days decreased immediately by 43% (p=0.001) at HMC and 72.1% at UWMC (p<0.001)
- Ertapenem DOT did not change significantly following the intervention
- The policy was intended to impact antibiotic use after 72 hours, but we observed a significant decline in up-front usage of the antibiotics at both institutions
- Mediation duration of meropenem decreased from 4 to 3 days (p<0.001)
- No significant difference in 30-day mortality or LOS by intervention period among patients with GNR bacteremia
- ITS was performed on cefepime use and did not suggest a statistically significant difference in baseline trend towards increased utilization

Figure 1: Meropenem and Imipenem DOT (Jan 2013 – Nov 2019)

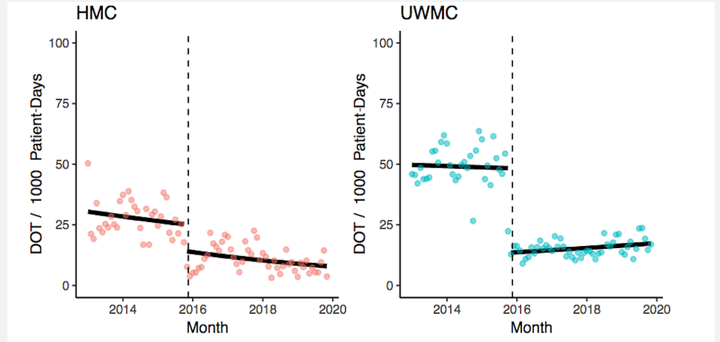


Figure 2: Ertapenem DOT (Jan 2013 – Nov 2019)

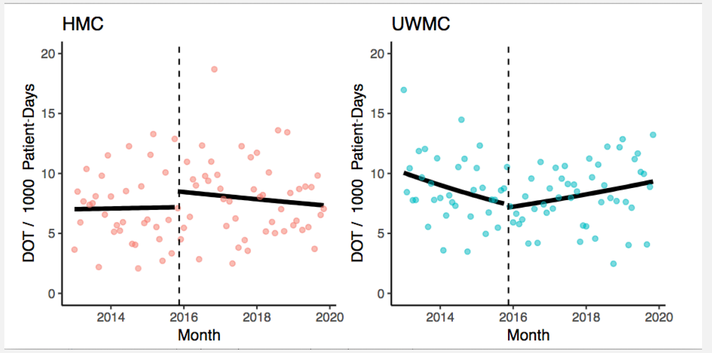
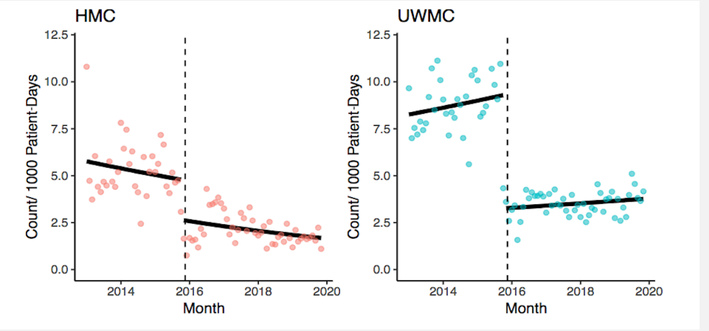


Figure 3: Meropenem and Imipenem First Starts (Jan 2013 – Nov 2019)



DISCUSSION

- There was a significant decline in meropenem and imipenem consumption following implementation of this policy, which was sustained over a 4-year period
- Reduced consumption was primarily due to a decline in empiric usage of carbapenems
- Carbapenem-sparing strategy did not appear to result in patient harm, measured by 30-day mortality and LOS
- Our findings show that PPRF combined with mandatory ID consultation can serve as an impactful intervention to significantly reduce carbapenem consumption without compromising clinical outcomes

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