A Comprehensive Assessment of Carbapenem Use across 90 Veterans Health Administration Hospitals with Defined Stewardship Strategies for Carbapenems UNIVERSITY OF IOWA CARVER COLLEGE Hiroyuki Suzuki MD^{1,2}, Eli N Perencevich MD MS^{1,2}, Michihiko Goto MD MSCI^{1,2}, Rajeshwari Nair PhD MBBS MPH^{1,2}, CARVER COLLEGE Mireia Puig-Asensio MD, PhD², Erika Ernst PharmD³, Daniel J Livorsi MD MS^{1,2} OF MEDICINE

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Introduction

- Antimicrobial stewardship (AS) principles can be promoted in a programmatic manner through a variety of AS strategies or through the individual decisions of prescribers, like Infectious Disease (ID) consultants
- The effect of AS and ID consultation on carbapenem-prescribing and their interaction has only been assessed in single center studies or studies addressing one AS strategy

Study Objective

- To describe carbapenem use across all Veterans Health Administration (VHA) hospitals, including the frequency of carbapenem use, variability in carbapenem use across institutions and stated indications for carbapenem use
- To assess whether AS and ID consultation were both associated with better carbapenem-prescribing in a national cohort

Materials and Methods

<u>Study Design</u>

Retrospective cohort of all acute-care patient-admissions between 1/1/2016 and 12/31/2016 at VHA hospitals

Hospital-level risk-adjusted analysis for inpatient carbapenem use

- Hospitals were categorized into 1 of 3 carbapenem-specific AS strategy
- No strategy (NS)
- Restrictive policies (RP)
- Prospective audit and feedback (PAF)
- Hospitals that provided an incomplete response or used a variety of strategies were excluded
- Antibiotic use and time at risk for antibiotic exposure were summarized as days of therapy (DOT) and days-present
- Volume of carbapenem use was compared between AS strategies with a generalized estimating equation model for proportion outcomes and negative binomial generalized estimating equation models for inpatient DOTs

Cases with \geq 5 consecutive days of inpatient carbapenem-prescribing

Manual chart review of randomly-selected cases for appropriateness of carbapenem-prescribing

- NS: 100 patients, RP: 225 patients, PAF: 100 patients were randomly selected
- Two ID physicians, blinded to the AS strategy, performed manual chart reviews to assess appropriateness on day 4 of carbapenemprescribing
- Appropriateness was summarized as an assessment score
- Median ranked assessment scores were compared with the Kruskal-Wallis test

Assessment scores

- 1. Appropriate Better
- 2. Acceptable
- 3. Suboptimal
- 4. Unnecessary
- 5. Inappropriate

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Results

There were 429, 802 patient admissions during 2016 across 80 hospitals (NS: 56, PP: 258, PAF: 202) At least one inpoint catalogenem does was administered during 9,114 patient admissions with P Sday 80 febre administered during 9,114 patient does and were service (NS: 56, RP: 258, PAF: 202) • Characteristics of 90 hospitals Main annual admissions $\frac{N_2}{100}$, $\frac{N_2}{10$	Hospital-level risk-adjuste	ed analysi	is for inpatien	t carbap	enem use	• Manual chart i	review of	randomly	-selected	cases for	 Assessmer 	t scores o	of carbapen	em-prescribi	ng across thr	ee
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admissions median (IQR) (23.5-40) (23.5-45) 30 ID consult* 194 (45.6) 29 (29) 113 (50.2) 52 (52) * ID consultations were more common at RP/PAF sites than NS sites (51% vs 29%; p<0.01)	 Median (IQR) inpatient carba 	apenem DO	<u>Ts exposed in 1,0</u>	000 patient	<u>t-</u>	Modified APACHEIII	34 (25-42)	33	34 (26-42)	35.5				ID ■no ID		
³⁰ ID consult* 194 (45.6) 29 (29) 113 (50.2) 52 (52) * ID consultations were more common at RP/PAF sites than NS sites (51% vs 29%; p<0.01) present absent p-value	admissions		-			median (IQR)		(23.5-40)		(23.5-45)						
* ID consultations were more common at RP/PAF sites than NS sites (51% vs 29%; p<0.01)	30					ID consult*	194 (45.6)	29 (29)	113 (50.2)	52 (52)			חו	consultation	D consultation	
						* ID consultations were mor	re common at RF	P/PAF sites than	NS sites (51% v	/s 29%; p<0.01)				present	absent	p-value





* Risk-adjusted model included patient demographics, severity of illness, comorbidity, facility complexity and clustering of observations within hospitals

IQR: Interquartile range, COPD: Chronic obstructive pulmonary disease, CHF: Congestive heart failure, HIV: Human immunodeficiency virus, AIDS: Acquired immunodeficiency syndrome, SSTI: Skin and soft tissue infection, APACHE: Acute physiology and chronic health evaluation

Conclusions

- PAF was associated with less carbapenem use
- RP was associated with more appropriate carbapenem-prescribing
- ID consultation was made more frequently in hospitals with carbapenem stewardship
- ID consultation was associated with better carbapenem-prescribing compared to no ID consultation
- The use of AS and ID consultations may be complementary, and hospitals could leverage both to optimize carbapenem use









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SD: standard deviation