Impact of an antimicrobial stewardship program on carbapenem prescription in a tertiary hospital in France

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Introduction

- Antimicrobial stewardship programs aim at reducing the overuse of broad-spectrum antibiotics
- To restrict the use of carbapenem in our university hospital, the approval of the antibiotic stewardship team (AST) is needed
- The objective of this study was to evaluate the carbapenem use in our pediatric and adult wards**

Methods

- Patients receiving carbapenems were identified using a computer-generated alert system
- They underwent a prospective review by the AST for eligibility for de-escalation
- Clinical and microbiological data were collected
- We then analyzed all carbapenem prescriptions and subsequent AST intervention in pediatric and adult wards during one year (2014)

Results

- 383 carbapenems prescriptions for 158 children and 140 adults were reviewed
- Most of the patients had underlying diseases (95%) and 51% had known carriage of extended spectrum beta-lactamase enterobacteriaceae (ESBLE)
- Most of the prescriptions came from intensive care wards (33%) and were initiated for lung and urinary tract (29%) infections (**Figure 1**)
- Carbapenems were initiated empirically in 269 (70%)
- Among the 264 documented infections (**Table 1**): 50.7% of the isolated organisms were ESBLE; 8.3% were not susceptible to carbapenems, and 8.7% had alternatives to carbapenem according to susceptibility testing
- AST prospectively reviewed 323 prescriptions (**Figure 2**), inappropriate prescriptions were mainly observed in pediatric wards (46% vs. 34%, $p < 0.05$)

Figure 1. Localization of infections treated with carbapenem

Table 1. Documented infections associated with carbapenem prescription

Characteristics of documented infections	Pediatric wards N=134	Adult wards N=130	Total N=264
Treatment initiation following documentation*	48 (38.7)	48 (37.7)	96 (38)
ESBL (%)	71 (53)	63 (48.4)	134 (50.7)
Agents (%)			
<i>Klebsiella</i> spp.	52 (38.8)	36 (27.6)	88 (33)
<i>Enterobacter</i> spp.	26 (19.5)	27 (18.4)	53 (20)
<i>E.coli</i>	22 (16.5)	27 (20.8)	49 (18.5)
<i>Nocardia</i> spp.	1 (0.7)	8 (6.2)	9 (3.4)
<i>Pseudomonas</i> spp.	13 (9.7)	16 (12.3)	29 (11)
Gram positive cocci	10 (7.5)	9 (6.9)	19 (7.1)
Other	10 (7.5)	7 (5.4)	17 (6.4)
Antibiotic therapy			
Adequate #	124 (92.5)	118 (90.7)	242 (91.7)
Existing alternative to penems #	86 (64.2)	69 (53)	155 (58.7)

* 13 missing data; # microbiologically effective according to antibiotic susceptibility testing (EUCAST)

Figure 2 Flow chart of carbapenem prescription

AST : Antibiotic stewardship team

Conclusion

- Carbapenem therapy was generally initiated in severely ill patients or with risk factors of drug resistance
- However, more than one third of carbapenem prescriptions were considered inappropriate and discontinued by the AST, mostly in pediatric wards
- The study suggests that AST implementation is essential to better control pediatric antibiotic use and subsequent antimicrobial resistance