

Introduction

Enterobacteriaceae represent the most prevalent group of bacteria in community and hospital infections of most Brazilian hospitals and carbapenem-resistant *Enterobacteriaceae* (CRE) are emergent microorganisms that threaten public health.

Rationale: The CRE are associated with high mortality and high costs of healthcare.

Objective: To establish the clinical characteristics and the time trends in mortality of colonized / infected patients by CRE and analyze the trend to treatment with polymyxin, from January 2012 to May 2015 in the sectors of critically ill patients (Red Room and General Intensive Care Unit - ICU) of the Salgado Filho Public Hospital of Rio de Janeiro.

Methods

It was a retrospective study, which analyzed the microbiological and epidemiological information of critically ill adult patients colonized / infected by CREs from a four-year period (2012 through 2015).

In the period, all culture of any specimen with *enterobacteriaceae* recovered from critical patients were selected, but only one culture for patient. Resistance to any carbapenem tested in the unit (meropenem, imipenem and ertapenem) were searched regardless of the minimum inhibitory concentration (MIC) for this antibiotics.

Only a sample is contemplated for patient per month. Microbiological information from laboratory reports, the databases of the commission for infection control and clinical information obtained from medical records (age, sex, underlying diagnosis, diagnosis of infection, type of microorganism and final outcome) were recorded in an electronic spreadsheet.

The frequency of these data were compared using chi-square test or Fisher's exact test. The data of the antibiotics consumption were calculated by adjusting the number of patients day the amount of drugs used in therapy against enterobacteria to establish the defined daily dose (DDD) for each period.

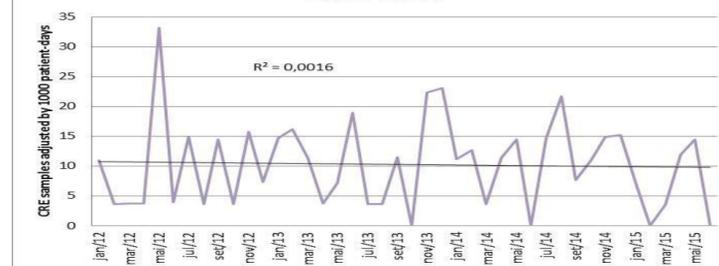
Trends in mortality with patients with infections with CRE were done by adjusting the frequency of the prevalence for each period, using the Wilcoxon rank sum test and additionally associations between mortality and consumption of antibiotics were calculated using the odds ratio with confidence interval 95% (Stata® program version 9.2, StataCorp®, TX).

This study was approved by the ethics committee of the institution and the Brazil Platform ethics committee under protocol number 47885515.8.0000.5279

Trends in mortality in patients with colonization / infection by Carbapenem-Susceptible and Resistant Enterobacteriaceae. Public Hospital Salgado Filho Rio de Janeiro 2012-2015

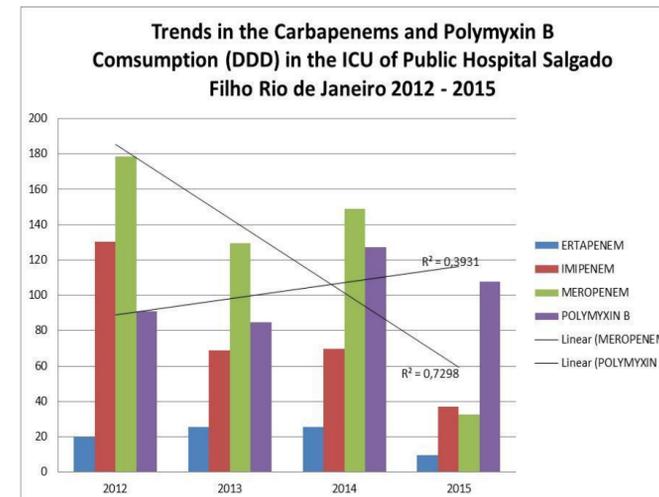
Year	CSE (%)	CRE (%)	P-value
2012	46 (66,67)	46 (79,3)	0,1
2013	16 (50)	16 (35,5)	0,2
2014	31 (60,7)	31 (70,4)	0,3
2015	9 (69,2)	18 (85,7)	0,2

Trends in Prevalence of CRE in the ICU of the Public Hospital Salgado Filho Rio de Janeiro 2012-2015



Results

In total, 333 positive cultures of *enterobacteriaceae* were analyzed from 258 patients treated in the critical settings. Of these cultures 50.4% were resistant to at least one of the carbapenemics tested (CRE).



In 61.8% of cases, these enterobacteria were obtained from patients in the general ICU. The frequency of male patients colonized or infected by these bacteria was 88% and the average age was 55.34 ± 1.1 (mean \pm SD; years). The species most frequently isolated were *Klebsiella* spp, *Enterobacter* spp and *Escherichia coli* with prevalence of 36%, 21% and 12.6% respectively. These bacteria were more frequently recovered from tracheal secretion (44.4%), urine (21%) and blood (16.5%). The overall mortality in these patients was 61.8% in those who had positive cultures of Carbapenem-Susceptible *Enterobacteriaceae* (CSE), and 73.8% in those with CREs.

We observed a higher mortality in critical patients infected / colonized by CREs (73.8% versus 61.8% of CSEs, $p = 0.02$).

This mortality remains high in the period of the study despite of the reduction in carbapenems prescription seemed in the critical settings.

It's worrying that the increases rates of polymyxin prescription, which can enhance the risk for outbreaks by naturally polymyxin-resistant CREs (*Serratia* spp, *Proteus* spp, *Providencia* spp and *Morganella* spp.)

Conclusions

The prevalence of infection / colonization by CREs in critical patients remain stable in the time, with high mortality and costs despite of reduction in the rates of carbapenem consumption.

Acknowledgements

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References

- FALAGAS, ME. et al. 2014. Deaths attributable to carbapenem-resistant Enterobacteriaceae infections. Emerg Infect Dis 20:1170-1175.
- DERDE, LP. et al. 2014. Interventions to reduce colonisation and transmission of antimicrobial-resistant bacteria in intensive care units: an interrupted time series study and cluster randomised trial. Lancet Infect Dis 14(1):31-39
- LATIBEAUDIERE, R. et al. 2015. Surveillance cultures growing carbapenem-Resistant Acinetobacter baumannii predict the development of clinical infections: a retrospective cohort study. Clin Infect Dis 60(3):415-422
- PITOUT, J.D. et al. 2015. Carbapenemase-Producing *Klebsiella pneumoniae*, a Key Pathogen Set for Global Nosocomial Dominance. Antimicrob Agents Chemother 59:5873-5884.
- TUMBARELLO, M. et al. 2012. Predictors of mortality in bloodstream infections caused by *Klebsiella pneumoniae* carbapenemase-producing *K. pneumoniae*: importance of combination therapy. Clin Infect Dis 55:943-950