Different Patterns of Antibiotic Use in Different Administrative Categories: An Overview of 10 years (2009/2018) of a Statewide Surveillance Program in Sao Paulo, Brazil

Filipe T. Piastrelli, MD[1], Denise B Assis, MD[2], Geraldine Madalosso, MD[2], Ícaro Boszczowski, MD[1,3]
1. Infection Control Department, Hospital Alemão Oswaldo Cruz 2. Divisao de Infeccoes Hospitalares, Centro de Vigilancia Epidemiologica "Prof. Alexandre Vranjac" Centro de Controle de Doencas, Secretaria de Estado da Saude, São Paulo 3. Infection Control Department Hospital das Clínicas.

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Background

- Knowledge about antibiotic use is important to plan effective interventions in antibiotic stewardship programs.
- Different antibiotic use patterns can be observed in groups of hospitals with specific characteristics.
- Brazil has a complex healthcare system and hospitals have different administrative categories. That determines different resources and operating conditions.

Objective

- To describe ICU antibiotic use in different administrative categories based on data reported to the Nosocomial Surveillance System (NSS) of the State Health Department in the State of Sao Paulo, Brazil.

Methods

- Ecological study of antibiotic use (DDD/1000 pd*) in ICU from 2009 to 2018 in administrative categories:
  - Private, Philantropic and Public hospitals
  - Public hospitals were subdivided as
    - Social Health Organization (SHO): private administration, public resources
    - Direct public administration (DPA): public administration and resources
- Overall pooled mean was calculated by therapeutic class in the total of the hospitals and in each group
- The incidence and proportion of MDRO (multidrug resistant organisms) from blood cultures was calculated.

* DDD: defined daily dose, pd: patient-day

Results

Figure I: Antimicrobial use by therapeutic class between 2009 and 2018 in DDD/1000 pd

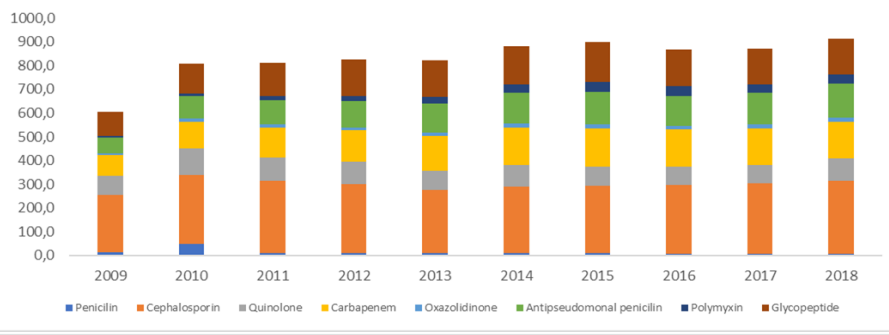

Table I: Antibiotic use by therapeutic class by administrative type in DDD/1000 patients-day

Therapeutic class	Administrative type			
	Philanthropic	Private	Public	p
Penicilin	8.52 (1.25)	15.57 (0.56)	9.20 (1.20)	**<0.05**
Cephalosporin	308.48 (263.95)	280.69 (220.68)	272.38 (203.97)	**<0.001**
Quinolone	101.96 (59.38)	89.50 (48.83)	72.34 (32.66)	**<0.001**
Carbapenem	120.22 (99.05)	135.65 (114.23)	170.09 (158.01)	**<0.001**
Oxazolidinone	4.07 (0.0)	24.54 (0.0)	8.10 (0.0)	**<0.001**
Antipseudomonal penicilin	95.83 (84.31)	128.34 (118.87)	125.03 (112.03)	**<0.001**
Polymyxin	22.01 (3.13)	22.29 (8.28)	46.69 (24.57)	**<0.001**
Glycopeptide	120.25 (98.64)	143.15 (119.91)	182.23 (167.40)	**<0.001**
Total	785.12 (744.30)	849.07 (730.57)	889.11 (796.01)	**<0.001**

Table II: Antibiotic use in public hospital by subgroup between 2009 and 2018 in DDD/1000 patients-day

Therapeutic class	Administration type in public hospitals		
	SHO	DA	p
Penicilin	10.67 (2.20)	8.72 (0.87)	**<0.001**
Cephalosporin	231.64 (212.59)	285.10 (201.79)	>0.05
Quinolone	67.70 (34.41)	73.79 (32.32)	>0.05
Carbapenem	208.01 (185.72)	158.25 (148.05)	**<0.001**
Oxazolidinone	9.83 (0.0)	7.57 (0.0)	>0.05
Antipseudomonal penicilin	131.15 (127.43)	123.03 (108.12)	**<0.05**
Polymyxin	74.47 (56.04)	38.02 (17.88)	**<0.001**
Glycopeptide	202.46 (189.85)	175.91 (155.38)	**<0.001**
Total	928.84 (883.61)	871.67 (765.26)	**<0.001**

SHO: Social Healht Organzation – private administration. DPA: Direct administration - public administration

- 386 (332-420) hospitals/year, 17.490.966 patient-days
  - 27% philantropic, 26% public, 47% private
- Total antibiotic use in ICUs increased from 588.16 (2009) to 943.12 (2018) DDD/1000pd
  - Public(889.11) > Private(849.07) > Philanthropic(785.12) p<0.05
  - Public SHO (928.84) > Public DPA (871.67) p<0.001
- The proportion of resistant phenotypes was higher in public hospitals than private and philanthropic institutions

Table III - Proportion of resistant bacteria by phenotypic profile of resistance and administration type in the period 2009 to 2018.

Administration type	CRAb	CRPa	CRKp	ESBL	MRSA	VRE
Philanthropic	65,6%	28,2%	26,3%	24,6%	62,9%	23,0%
Private	71,4%*	34,1%	29,6%	23,8%	56,9%	22,4%
Public	76,8%*	44,0%*	37,0%*	29,3%*	72,7%*	40,7%*

CRAb: Carbapenem-resistant *A. baumannii*, CRPa: Carbapenem-resistant *P.aeruginosa*, CRKp: Carbapenem-resistant *K.pneumoniae*, ESBL: Extend spectrum beta-lactamase – producing Enterobacteriaceae, MRSA: Methicilin-resistant *S.aureus*, VRE: Vancomycin resistant *Enterococcus sp.*

Discussion

- Few studies have evaluated the difference in antibiotic use by administrative type.
- Understanding antibiotic use patterns in different scenarios will allow the planning of more specific public health actions.
- More studies are needed to investigate the causal relationship of this difference.

References

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