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No: 5PSQ-154

Impact of the COVID-19 Pandemic on Antimicrobial Consumption and Antimicrobial Resistance

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BACKGROUND AND IMPORTANCE

Recent studies have reported an increase of antimicrobial use during the COVID-19 pandemic. The impact of overuse on the propagation of antimicrobial resistance could be an indirect adverse consequence of the pandemic.

AIM AND OBJECTIVES

To describe the impact of the COVID-19 pandemic on antimicrobial prescription trends and analyse the relationship with the evolution of antimicrobial susceptibility.

MATERIALS AND METHODS

- ❑ Descriptive study to investigate the prescription of antimicrobials (ATC J01) and the evolution of resistance before and after of COVID-19 pandemic in adult patients admitted to a tertiary-care hospital.
- ❑ Antimicrobial use was expressed into defined daily doses per 100 discharges (DDD/100D). We compared first wave COVID (March-June 2020) versus preCOVID period (March-June 2019).
- ❑ Antimicrobial sensitivity (EUCAST v11.0) was evaluated as percentage of bacterial strains resistant isolated between January-June 2021 versus preCOVID situation (January-December 2019).

RESULTS

- ❖ During first wave 4465 adult patients were admitted to the hospital versus 5318 in the same period of 2019
- ❖ In this context **antimicrobial consumption increased +79.09%** (735.85/ 410.89 DDD/100D).

The most important changes of antimicrobials consumption compared to preCOVID period

Drug	COVID/preCOVID (DDD/100D)	Increase DDD/100D (%)
amoxicillin	60.23 / 2.19	+ 2650.98
azithromycin	107.73 / 5.69	+ 1791.68
cefotaxime	0.99 / 0.18	+ 461.22
ceftriaxone	139.24 / 28.97	+ 380.67
vancomycin	24.25 / 8.33	+ 199.40
aztreonam	2.61 / 0.92	+ 185.49
meropenem	43.29 / 24.39	+ 77.48
cefuroxime	14.6 / 9.23	+ 60.77
linezolid	27.57 / 17.19	+ 60.40
cefixime	2.72 / 1.82	+ 49.32
piperacillin / tazobactam	49.81 / 33.75	+ 47.58
amoxicillin / clavulanate	95.23 / 79.96	+ 19.09

The most important changes in bacterial sensitivity

Bacteria	No. isolated Jan-Dec 2019	No. isolated Jan-Jun 2021	Drug	Sensibility Jan-Dec 2019	Sensitivity Jan-Ju 2021	Pearson's chi-square sig
Escherichia coli	4085	1648	no-change			
Klebsiella spp.	1095	425	gentamicin	93%	86%	p=0.000
			cefuroxime	78%	73%	p=0.036
			cefotaxime	81%	76%	p=0.028
			nitrofurantoin	87%	81%	p=0.010
			aztreonam	74%	70%	p=0.226
			ceftazidime	81%	77%	p=0.076
			cefepime	82%	78%	p=0.069
Pseudomonas aeruginosa	507	195	gentamicin	83%	78%	p=0.114
Staphylococcus aureus	878	400	no-change			
Enterococcus faecalis	572	266	no-change			
Enterococcus faecium	146	87	nitrofurantoin	92%	83%	p=0.120
			ampicillin	12%	6%	p=0.305

CONCLUSION AND RELEVANCE

- ✓ **Important increase in hospital antimicrobial consumption** was observed, especially b-lactams and carbapenems.
- ✓ **Minimal changes in antimicrobial susceptibility** was observed, detected only in *Klebsiella spp*, *Pseudomonas aeruginosa* and *Enterococcus faecium*.
- ✓ Antimicrobial stewardship strategies can help to keep the consumption of antimicrobials within acceptable levels.