00385

Multicenter, Prospective Study of Carbapenemase-Producing Enterobacterales (CPE) in the COVID-19 Era in Argentina (RECAPT-AR)

03. Bacterial susceptibility & resistance

3b. Resistance surveillance & epidemiology: Gram-negatives

Likely attendance

Onsite

Fernando Pasteran [1], Mariano Echegorry [1], Laura Olivieri [1], Diego Faccone [1], Ezequiel Albornoz [1], Celeste Lucero [1], Melina Rapoport [1], Paola Ceriana [1], Alejandra Menocal [1], Juan Manuel De Mendieta [1], Alejandra Corso [1]

[1]Antimicrobianos INEI ANLIS Malbran - Buenos Aires (Argentina)

Background

The increasing prevalence of CPEs is a threat to health systems. COVID-19 has exerted significant pressure on health systems and the short- and long-term consequences it may have on the antimicrobial activity of last-line agents must be measured. RECAPT-AR is a comprehensive, prospective, multicenter, nationwide surveillance of CPEs to determine their incidence, geographical distribution, antimicrobial susceptibility and resistance mechanisms in Argentina.

Methods

During November 2021, 183 hospitals (24 provinces) submitted Enterobacterales to the National Reference Laboratory (one per patient) that met the inclusion criteria: 1) Ertapenem MIC >0.5mg/L or halo <= 22mm or 2) PCR or chromatography positive for a carbapenemase. Isolates were characterized by multiplex PCR for bla_{KPC}, bla_{NDM}, $bla_{OXA\text{-}48\text{-}like}$, bla_{VIM} and bla_{IMP}. Susceptibility assays included: 1) ceftazidime/avibactam (CAZ-AVI) and aztreonam/avibactam (ATM-AVI) MICs by agar dilution, 2) colistin by pre-diffusion, drop-test, agar spot or disk elution methods, and 3) other drugs by VITEK/Phoenix and/or disk diffusion. ATM-AVI was interpreted with ATM breakpoints (EUCAST, S<=1-R>2mg/L). The Z proportions statistical test was performed.

Results

822 isolates were included, being *K. pneumoniae* the most frequent species collected (Figure 1). At least one carbapenemase gene was detected in 97.3% of the isolates. Main genes were bla_{NDM} (41,6%) and bla_{KPC} (39,4%). 8.7% of the strains presented a combination of genes. KPC was more frequently recovered from the abdominal (56%) and respiratory tracts (61%), while MBLs from urine (47%) ($p<0.05$). ATM-AVI was the most active agent against MBLs (susceptible 96.5%-100%), while CAZ-AVI was the most active against OXA-48-like (susceptible 95.1%) ($p<0.05$). Both, CAZ-AVI and ATM-AVI presented equivalent activities

against KPC producers (susceptible 98.9% vs 98.5%, respectively) (p>.05). MBL was associated with lower susceptibility to amikacin (p<0.05) (Figure 2).

Conclusions

A new epidemiological scenario emerges during COVID-19 era in Argentina with equivalent and majority circulation of *bla*$_{NDM}$ and *bla*$_{KPC}$. *K. pneumoniae* continues to be the main species responsible for the dissemination of CPEs. The emergence of carbapenemase co-producers included multiple combinations, with KPC+NDM being the most prevalent. KPC and/or OXA-48-like producers, were potently inhibited by CAZ-AVI. A uniform activity of ATM-AVI was observed among CPEs. These results will strengthen the diagnosis, prevention, and treatment of CPEs in Argentina.

Figure 1

Figure 1 - Carbapenemase genes distribution for the total sample and according to bacterial species

	No. of isolates (%)	No. of Hospitals	Carbapenemase Classes							CRE non-CPE[4]
			A	B	D	Combinations[3]				
						A+D	B+D	A+B	A+B+D	
Total	822 (100%)	183	39.4	41.7	7.5	2.6	2.3	3.6	0.2	2.7
K. pneumoniae	628 (76%)	142	43.3	41.8	5.4	2.5	1.3	4.3	0	1.4
Proteeae Tribe[1]	57 (7%)	28	1.8	68.4	12.3	3.5	12.3	0	0	1.7
E. cloacae	50 (6%)	40	44	20	22	2	2	2	0	8
E. coli	39 (5%)	28	23.1	41.0	20.5	0	2.6	2.6	2.6	7.6
Serratia spp	19 (2%)	16	47.4	0	10.5	5.3	10.5	0	5.3	21
Other *spp*[2]	29 (4%)	23	37.9	51.9	0	3.4	0	3.4	0	3.4

Figure 2

Figure 2 - % susceptibility to selected antimicrobial agents

Antibiotic	Total sample (n: 822)	Carbapenemase Classes						
		A (n: 324)	B (n: 342)	D (n: 62)	Combinations[3]			
					A+D (n:21)	A+B, A+B+D (n: 31)	B+D (n: 19)	CRE non-CPE[4] (n: 22)
Ceftazidime+Avibactam	51.2	98.8	0	95.1	100	0	0	95.5
Aztreonam+avibactam	96.1	98.5	96.5	83.9	100	100	100	95.5
Fosfomycin	71.5	71.8	71.4	71.0	66.7	72.4	61.1	81.8
Tigecycline	76.6	79.4	72.8	88.3	84.2	76.9	62.5	77.3
Amikacin	43.5	66.4	16.7	53.2	66.7	34.4	52.6	77.3
Colistin	64.2	68.8	59.6	78.7	30.0	77.8	25.0	68.2
Aztreonam	7.8	0	18.6	0	0	0	0	0

[1]*Proteus mirabilis* n=29, *Providencia stuartii* n=25, *Morganella morganii* n=2. [2]*K. aerogenes* n=15, *K. oxytoca* n=7, *C. freundii* n=6, *C. koseri* n=1. [3] NDM was the only MBL detected in the combinations [4]CRE: non-carbapenemase producing, carbapenem -resistant Enterobacterales (ESBL/AmpC plus porin loss). The prevalent resistant mechanism(s) (Fig 1) or the most active agent/s (Fig 2) is highlighted in color (p<0.05).

Keyword 1
Antimicrobial resistance (AMR)
Keyword 2
Antimicrobial susceptibility testing (AST)
Keyword 3
Carbapenemase

Conflicts of interest

Do you have any conflicts of interest to declare?
No