

#08128 Multiple carbapenemase-producing *Enterobacterales* in Argentina: insights from National laboratory-based study

03. Bacterial susceptibility & resistance

03b. Resistance surveillance & epidemiology: Healthcare-associated bacteria

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Background

The dissemination of multiple carbapenemase-producing *Enterobacterales* (MCPE) carried by high-risk clones, significantly increase patient morbidity and mortality. Since 2020, a sustained rise in MCPE has been documented, reaching 7% of all carbapenemase-producing *Enterobacterales* in 2024 in Argentina. As part of the national laboratory surveillance program, 332 MCPE isolates were submitted to the National Reference Laboratory (NRL) between January-2022 and June-2025 for molecular characterization. The objective of this study was to characterize the MCPE isolates referred to the NRL from 2022 to 2025.

Methods

The 332 isolates were referred to NRL for molecular characterization from 95 hospitals and 19/24 jurisdictions. The primary sample sources were urine (128, 38.5%), blood (78, 23.5%), and skin (22, 6.6%). Taxonomy was confirmed by MaldiTof. Antimicrobial susceptibility tests were performed by disc diffusion (CLSI) and/or automated systems. bla_{KPC}, bla_{NDM}, bla_{VIM}, bla_{IMP} and bla_{OXA-48-like} carbapenemases were confirmed by multiplex PCR. Whole-genome sequencing (WGS) was performed on a sub-set of 26 isolates randomly selected, using Illumina MiSeq. Species, genes, MLST clones, and plasmid replicon types were characterized using the tools in ARIBA.

Results

Species distribution, hospitals and carbapenemase combinations is shown in Figure 1. The most frequent species were *K. pneumoniae* followed by *E. cloacae* complex, *C. freundii*, and *S. marcescens*. The drug with the highest activity was aztreonam/avibactam that outperformed fosfomycin, colistin and tigecycline (Figure 2). KPC+NDM was the most abundant carbapenemase combination. Among this combination, the allelic variants were: KPC-2/NDM-5 (11/26, 42.3%), KPC-2/NDM-1 (10/26, 38.5%), KPC-2/OXA-163 (1/26, 3.8%), KPC-3/NDM-5 (1/26, 3.8%), KPC-2/IMP-8 (1/26, 3.8%), KPC-2/VIM-2 (1/26, 3.8%), KPC-21/NDM-5 (1/26, 3.8%). The predominant *K. pneumoniae* clones were ST258 (4/11, 36.4%) and ST25 (2/11, 18%). Global analysis of replicon types identified 16

replicase families, being Col (22/120, 17.5%), IncFIB (21/120, 17.5%), IncFII (18/120, 15.0%) and IncC (12/120, 10%) the most abundant.

Conclusions

MCPE showed extensive nationwide dissemination. Aztreonam/avibactam were the most active drugs. The predominance of KPC+NDM associated with high-risk *K. pneumoniae* clones and their carriage on the widespread epidemic plasmids, underscores the need to strengthen molecular and epidemiological surveillance to better understand the transmission dynamics and guide control strategies.

Figure 1: Species distribution, hospitals and carbapenemase combination for the total MCPE received at the NRL

	No. of isolates	No. Of hospitals	CARBAPENEMASE COMBINATION [n(%)]						
			KPC-NDM	NDM-OXA	KPC-OXA	NDM-KPC-OXA	KPC-IMP	KPC-VIM	IMP-VIM
Total	332 (100 %)	94	232 (69.9%)	61 (18.4%)	26 (7.8%)	8 (2.4%)	2 (0.6%)	2 (0.6%)	1 (0.3%)
<i>K. pneumoniae</i>	248 (75%)	84	188	36	19	3	1	0	1
<i>E. cloacae</i> complex	14 (4 %)	11	8	3	1	1	0	1	0
<i>C. freundii</i>	12 (4 %)	11	8	0	0	3	0	1	0
<i>S. marcescense</i>	12 (4%)	7	8	2	2	0	0	0	0
<i>K. oxytoca</i>	11 (3%)	8	8	2	0	1	0	0	0
<i>P. stuartii</i>	10 (3%)	7	0	9	1	0	0	0	0
<i>E. coli</i>	10 (3%)	7	6	2	2	0	0	0	0
<i>P. mirabilis</i>	7 (2 %)	7	1	6	0	0	0	0	0
<i>Others</i>	8(2%)	6	5	1	1	0	1	0	0

Figure 2: Susceptibility profile of MCPE

Antimicrobial	No. of isolates tested	% Susceptibility
Aztreonam/Avibactam	305	96.4
Fosfomicin	327	64.8
Colistin	306	59.8
Tigecycline	321	51.1
Gentamicin	328	9.1
Amikacin	327	8.0
Ceftazidime/Avibactam	285	7.4

Green boxes indicate the highest activity. ASTs were done by disc diffusion and automated MIC systems such as Vitek-2 (biomerieux), BD PhoenixTM and SensitreTM. Ceftazidime/Avibactam and colistin were interpreted using EUCAST, fosfomicin using NRL or EUCAST guidelines while tigecycline using FDA guidelines.

Keyword 1

Antimicrobial resistance (AMR)

Keyword 2

Epidemiology of infection

Keyword 3 (Please provide your suggestion)

Carbapenemase, Enterobacterales, Aztreonam/Avibactam