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Bloodstream infection by *mcr*-1-harboring *Escherichia coli* in a cancer patient in southern Brazil

Dear Editor,

The rapid spread of plasmid-mediated *mcr-1* gene has become a worldwide concern since it confers resistance to polymyxins considered as a last resource for treatment of infections caused by multidrug-resistant Gram-negative bacilli.[1] Despite its low frequency in Brazil, the *mcr-1* gene has been reported in *Escherichia coli*[2] and *Klebsiella pneumoniae*[3] clinical isolates. In this study, we report a case of bloodstream infection by *mcr-1*-harboring *E. coli* in southern Brazil.

The presence of *mcr-1* gene was investigated in 340 polymyxin-resistant Gram-negative bacilli clinical isolates (*Enterobacteriaceae*, *Acinetobacter baumannii* and *Pseudomonas aeruginosa*) collected between August 2015 and January 2018 in a university hospital located in Santa Maria, Rio Grande do Sul, Brazil. Among clinical isolates, one *E. coli* harbored the *mcr-1* gene isolated from blood cultures in September 2017. The patient was a 59-year-old woman with malignant neoplasm of middle third of esophagus and intrahepatic cholangiocarcinoma admitted to the hospital for a transthoracic esophagectomy. Four days after the procedure, the patient was transferred to the Adult Intensive Care Unit (ICU) due to hemodynamic instability and ventilatory discomfort. Empirical treatment with ceftriaxone (1 g 12/12 h) and metronidazole (1.5 mg/day) was initiated. Laboratory tests revealed leukocytosis (27,115 ± 7684.20/mm^3) with left shift (8997.75 ± 1619.14/mm^3 immature leukocytes) and increased C-reactive protein (>25 mg/dL; reference value: <0.3 mg/dL). *E. coli* isolate was recovered in two blood cultures from different peripheral sites and *Klebsiella pneumoniae* carbapenemase-producing *K. pneumoniae* (KPC-Kp) isolate in a rectal swab culture for epidemiological surveillance. Based on antimicrobial susceptibility testing (Table 1) by the VITEK® 2 system (bioMérieux, Marcy-l'Étoile, France), the antibiotic regimen was switched to amikacin (250 mg 12/12 h) and meropenem (1 g 8/8 h). Nine days after transthoracic esophagectomy, the patient had complications such as septic shock, peritonitis, surgical wound dehiscence and died.

Resistance to colistin was verified by broth microdilution according to EUCAST (http://www.eucast.org) and confirmed by polymyxin-NP test.[4] Presence of the *mcr-1* gene was verified by conventional PCR using specific primers[5] and detected

Table 1 – Antimicrobial susceptibility profile of KPC-Kp, *E. coli* harboring *mcr*-1, transconjugant and *E. coli* J53.

Antimicrobial agent	MIC range (μg/mL)	KPC-Kp	*E. coli* harboring *mcr*-1	Transconjugant	*E. coli* J53
Amikacin	2–64	4	≤2	≤2	≤2
Cefepime	1–64	≥64	≥64	32	≤1
Ceftazidime	1–64	16	≥64	16	≤1
Ceftriaxone	1–64	≥64	≥64	32	≤1
Ciprofloxacin	0.25–128	64	32	≤0.25	≤0.25
Colistin	0.25–128	≥128	64	4	≤0.25
Ertapenem	0.5–8	≥8	≤0.5	≤0.5	≤0.5
Gentamicin	1–16	≥16	≤1	≤1	≤1
Imipenem	0.25–16	8	≤0.25	≤0.25	≤0.25
Meropenem	0.25–16	≥16	≤0.25	≤0.25	≤0.25
Piperacillin/tazobactam	4–128	≥128	≤4	≤4	≤4
Tigecycline	0.5–8	2	≤0.5	≤0.5	≤0.5

only in the *E. coli* isolate, being confirmed by Sanger sequencing. Species identification of the *mcr-1*-positive isolate was confirmed using MALDI-TOF MS system (Bruker Daltonics, Germany). To assess the transfer ability of the *mcr-1* gene, conjugation experiment with azide-resistant *E. coli* J53 was performed. We were able to obtain one tranconjugant carrying *mcr-1* gene and it was selected on Luria-Bertani agar supplemented with 150 μg/mL sodium azide and 2 μg/mL colistin. The transconjugant presented elevated MIC for colistin in comparison with *E. coli* J53.

This study reports the first detection of *mcr-1* gene in Santa Maria, RS, Brazil and emphasizes the need to strengthen hospital infection prevention and control measures to prevent its spreads.

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Conflicts of interest

The authors declare no conflicts of interest.

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