

**TITLE:** MEROPENEM-NONSUSCEPTIBLE *Serratia marcescens* OUTBREAK DURING THE COVID-19 PANDEMIC

**AUTHORS:** ROCHA, L.F.<sup>1</sup>; LUTZ, L<sup>1</sup>; PEREIRA, D.C.<sup>1</sup>; WINK, P.L.<sup>1,2</sup>; MARTINS, A.F.<sup>1,2</sup>; BARTH, A.L.<sup>1,2</sup>

**INSTITUTIONS:** 1. HOSPITAL DE CLÍNICAS DE PORTO ALEGRE, PORTO ALEGRE, RS (RUA RAMIRO BARCELOS, 2350, AV. PROTÁSIO ALVES, 211 - SANTA CECÍLIA, PORTO ALEGRE - RS, 90035-903); 2. UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL, PORTO ALEGRE, RS (FARROUPILHA, PORTO ALEGRE - RS, 90010-150)

**ABSTRACT:**

*S. marcescens* isolates are increasingly resistant to antibiotics and consequently, the treatment of infections caused by this pathogen is difficult. During the COVID-19 pandemic, around 5% of COVID-19 positive patients required ICU admission as they are at risk of developing secondary infections. This study aimed to describe the outbreak of meropenem-nonsusceptible *S. marcescens* (MNSSm) in a tertiary care hospital in Southern Brazil and to evaluate the antimicrobial susceptibility profile of *S. marcescens* clinical isolates. The setting for this study was an 836-bed university hospital. Non repeated MNSSm strains from clinical samples were collected during the period of January 1, 2020 to January 30, 2022. Bacterial identification was performed by Vitek©MS System (bioMérieux, France) and antibiotic susceptibility tests were performed according to BrCAST v.2021. The presence of carbapenemase genes (*bla*<sub>NDM-1</sub>, *bla*<sub>KPC</sub>, *bla*<sub>VIM-type</sub>, *bla*<sub>GES-type</sub>, *bla*<sub>OXA-48-like</sub>, and *bla*<sub>IMP-type</sub>) was evaluated by multiplex high resolution melting real-time PCR (HRM-qPCR). The incidence of MNSSm was estimated as the number of cases per 1000 patient-days. A total of 170 MNSSm were isolated during the period of this study, of which 77.65% (132/170) were from COVID-19 positive patients, most of them from ICUs (82.58%, 109/132). Tracheal aspirate represented the majority of clinical samples (77.1%, 131/170). The most prevalent carbapenemase gene found by HRM-qPCR was *bla*<sub>KPC</sub> (91.02%, 142/156) followed by *bla*<sub>NDM-1</sub> (4.49% (7/156)). Resistance to tigecycline and ceftazidime-avibactam accounted for 73.81% (124/168) and 10.7% (6/56) of the isolates, respectively. Tigecycline minimal inhibitory concentration (MIC) ranged from 0.5 to 8.0 µg/mL and MIC<sub>50</sub>/MIC<sub>90</sub> were 1.0/2.0 µg/mL. Meropenem and Ceftazidime-avibactam MICs were accessed for 56 isolates and ranged from 3.0 to 250.0 µg/mL and 0.5 to 256, respectively. Meropenem and Ceftazidime-avibactam MIC<sub>50</sub>/MIC<sub>90</sub> were 8.0/256µg/mL and 0.5/8 µg/mL, respectively. The incidence density ranged from 0 to 1.39 cases per 1,000 patient-days, the highest being detected between March and May 2021. MNSSm belongs to a group of pathogens that cause healthcare-associated infections in critically ill patients. MNSSm was not common in our institution, however, during the COVID-19 pandemic, its prevalence has increased, especially in COVID-19 positive patients.

**Keywords:** *Serratia marcescens*, meropenem, outbreak, COVID-19

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