CZU: 615.33.015.8:579.84/.86:[616.98:578.834.1]

Antibiotic resistance in ESKAPE pathogens in severe COVID-19: A threat to ICU patients

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Keywords: *ESKAPE; COVID-19; carbapenem resistance; multidrug resistance; ICU.*

Introduction

The emergence of multidrug-resistant (MDR) ESKAPE pathogens in severe COVID-19 patients poses a significant challenge in intensive care units (ICUs). The study aims to assess the antibiotic resistance profile of ESKAPE pathogens isolated from the respiratory tract of critically ill COVID-19 patients and its impact on treatment efficacy and patient outcomes.

Material and methods

Tracheal swab samples were collected from ICU patients diagnosed with severe COVID-19. Following collection, swabs were immediately transported to the microbiology laboratory, where they were inoculated onto appropriate culture media and incubated under standard conditions. Colonies suspected of being ESKAPE pathogens were identified using Vitek 2 Compact, antimicrobial susceptibility was determined based on the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines.

Results

Out of 227 isolates from the ESKAPE group, the distribution was: *P. aeruginosa* – 28 (16.47%), *A. baumannii* – 125 (73.53%), *E. faecium* –

10 (5.88%), *E. coli* – 6 (3.53%), *K. pneumonia* – 38 (22.35%), *S. aureus* – 20 (11.76%). Extensive Carbapenem Resistance: *A. baumannii* exhibited 95.2% resistance to imipenem and 92.8% to meropenem. *K. pneumoniae* showed 66.7% resistance to ceftriaxone and 18.9% to meropenem. *P. aeruginosa* displayed 47.6% resistance to imipenem and 50% to meropenem. Aminoglycoside Resistance: 95.3% of A. *baumannii* isolates and 67.8% of P. Aeruginosa isolates were resistant to tobramycin. 98.4% of *A. baumannii* isolates exhibited resistance to amikacin, while 51.8% of *P. aeruginosa* were resistant to gentamicin. Fluoroquinolone Resistance: *A. baumannii* showed 95.9% resistance to ciprofloxacin and 95.7% to levofloxacin. *K. pneumoniae* exhibited 71.4% resistance to ciprofloxacin. Macrolide and β-Lactam Resistance: *K. pneumoniae* and *P. aeruginosa* demonstrated high resistance to cephalosporins (65-100%). *S. aureus* had 44.4% resistance to ciprofloxacin and 33.3% to azithromycin. *Enterococcus faecium* showed 100% resistance to vancomycin, confirming the presence of VRE (Vancomycin-Resistant Enterococcus) strains.

Conclusions

The widespread resistance to carbapenems, fluoroquinolones, and aminoglycosides significantly limits treatment options, increasing the risk of therapeutic failure, prolonged hospitalization, and high mortality rates. These findings underscore the critical need for infection control measures, targeted antimicrobial therapy, and novel treatment strategies to combat MDR infections in COVID-19 ICUs.

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