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## Antibiotic consumption and resistance patterns of major Gram-negative bacteria in The Teaching Hospital of Infectious Diseases from Cluj Napoca

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**Background:** The rate of antibiotic resistance is increasing in community and healthcare-associated infections. The inappropriate and excessive use of antimicrobials is a major factor responsible for the development and spread of antimicrobial resistance in acute care settings.

The objective of this study was to analyse the trends in antibiotic consumption and local resistance patterns of Gram-negative bacteria.

**Material/methods:** We conducted a prospective study that involved the computerised pharmacy database from 2007 to 2015 and laboratory-based surveillance of antimicrobial resistance during 2010-2015 at the Teaching Hospital of Infectious Diseases, Cluj-Napoca. Targeted microorganisms included *E.coli*, *Klebsiella* spp., *P. aeruginosa* and *Acinetobacter* spp. Identification of strains and antibiotic susceptibility tests were performed with API bioMerieux system or Vitek-2. Antimicrobial

consumption was expressed as defined daily doses/100 bed-days (DDD/100BD), according to anatomic therapeutic chemical classification (WHO, version 2005).

**Results:** Total mean antibiotic use remained stable over time (160.46 DDD/100BD, 95%CI 148 to 172). Overall penicillins were the main antibiotics used (39.5%) followed by third-generation cephalosporins (23.7%), fluoroquinolones (12.3%), macrolides (8%), carbapenems (3%) and glycopeptides (2.3%). Penicillins consumption decreased from 76 to 42 DDD/100B (chi-square for trend 14, p 0.0001) and was associated with decreased incidence density of ESBL-producing *E. coli* (OR 1.68, 95%CI 1.27-2.2) and ESBL-producing *Klebsiella* spp. (OR 1.87, 95%CI 1.43-2.4). A decreased use of fluoroquinolones from 25 to 13 DDD/100BD and lower rate of ciprofloxacin-resistant *P. aeruginosa* was noted. Significant increasing trends for carbapenems consumption from 1 to 8.9 DDD/100BD (chi-square for trend 16.8, p<0.0001) were reported associated with the incidence density of carbapenems-resistant *Klebsiella* spp. (OR 5.28, 95%CI 3.4-8.17). Although the use of cephalosporins increased over time from 16 to 39 DDD/100BD (chi-square for trend 14.8, p 0.0001), the incidence density of third-generation cephalosporins resistance did not change significantly.

**Conclusions:** This study highlighted the significant relationship between antibiotic consumption and antimicrobial resistance of major Gram-negative bacteria. The restriction of antibiotic overuse, especially of high-risk antibiotics, is essential to limit the emergence of resistant strains.