



Development Of Infections Caused By Pseudomonas Aeruginosa After Endoprosthetics And Monitoring The Rate Of Increase In It Is Antibiotic Resistance

Pliska N.N.¹, Balgazarov S.S.¹, Ramazanov Zh.K.¹, Abilov R.S.¹, Moroshan A.V.¹, Kriklivyy A.A.¹

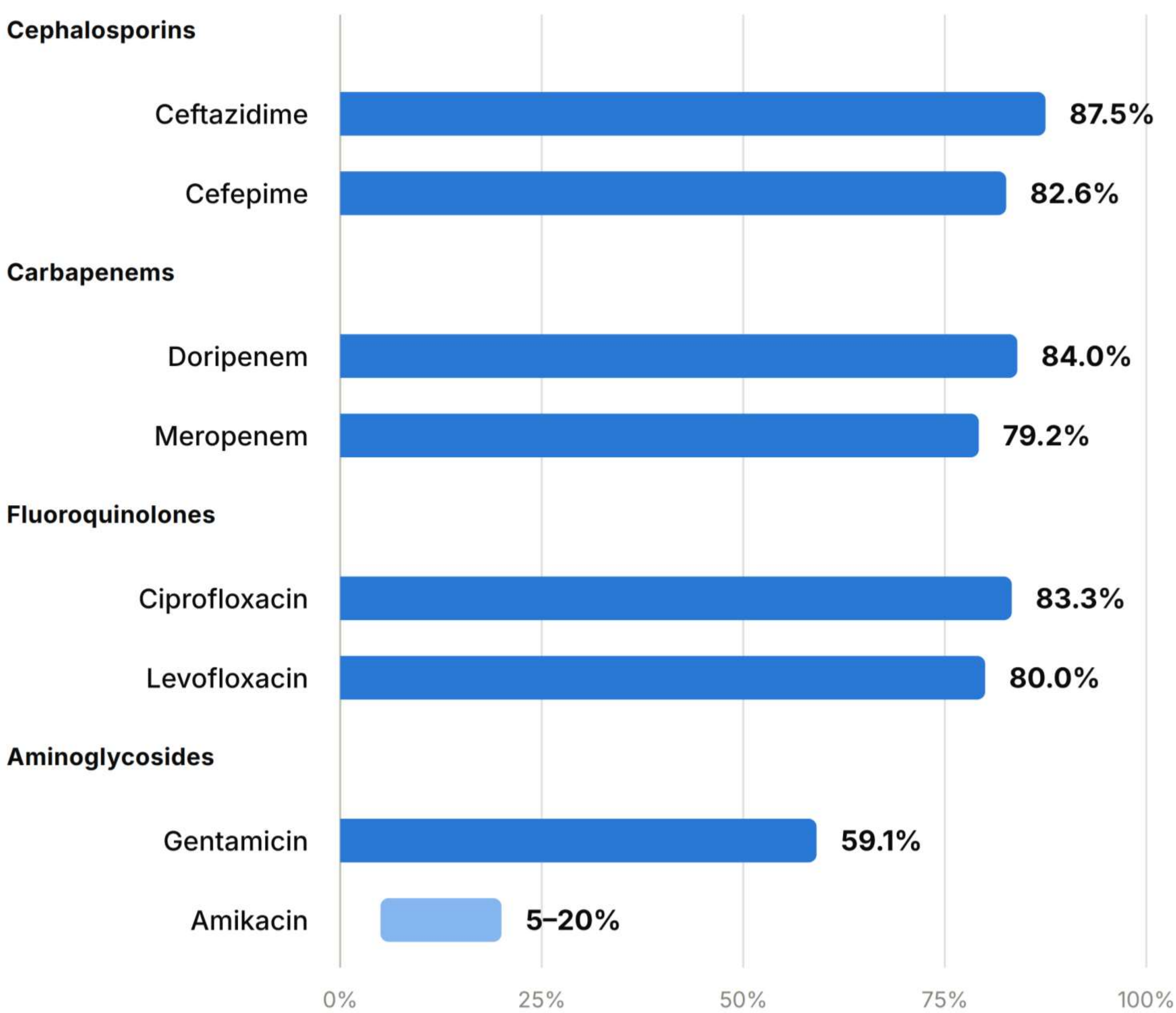
¹National Scientific Center of Traumatology and Orthopaedics named after academician N.D. Batpenov, Astana, Kazakhstan

Introduction & Aim

The latest surgical approaches in traumatology and orthopedics rely heavily on implants. According to global data, 3–4% of primary arthroplasties are complicated by periprosthetic infection, while in revision arthroplasty this rate may reach 40%. The growing number of implant surgeries is accompanied by an increase in related complications. Chronic infection can cause systemic damage, leading to sepsis and death. Infections after large joint arthroplasty are especially important because of their major social and economic impact on working-age patients. Periprosthetic infection is most often caused by staphylococci and less commonly by gram-negative bacteria; treatment is challenging because of frequent antibiotic resistance. One of the most problematic pathogens is *Pseudomonas aeruginosa*, which is highly resistant in the environment, colonizes human skin and mucous membranes, and accounts for up to 20% of nosocomial infections. Over time, it is microcolonies can merge and form a biofilm. The aim of the study was to assess the dynamics and resistance of *Pseudomonas aeruginosa* in periprosthetic joint infection in order to optimize therapy.

Resistance of Pseudomonas aeruginosa by 2024

Share of isolates resistant, grouped by antibiotic class



Methods

The study included fistula tracts, synovial fluid samples, and intraoperative biopsies from patients with periprosthetic joint infections obtained during revision surgeries. The biological material was thoroughly examined using a special bacteriological method using sonication.

4,236

samples analysed
2020–2025

29.9%

culture-negative
70.1% yielded growth

13.2%

Pseudomonas aeruginosa
second most common isolate

87.5%

ceftazidime resistance
up from 8.5%

Results

From 2020 to 2025, 4,236 biomaterial samples were analyzed (29.9% negative). Staphylococci predominated in periprosthetic joint infections (63.5% of isolates), of which coagulase-negative strains accounted for 34.8% 29.5% – *S. aureus*. *Pseudomonas aeruginosa* took second place (13.2%).

An analysis of *Pseudomonas aeruginosa* resistance revealed a sharp decline in antibiotic effectiveness by 2024: Cephalosporins: resistance to ceftazidime ranged from 8.5% to 87.5%, while resistance to cefepime increased from 25% to 82.6%. Carbapenems: a jump in resistance was observed to meropenem (from 14.9% to 79.2%) and doripenem (from 14.2% to 84%). Fluoroquinolones: ciprofloxacin rates reached 83.3%, levofloxacin — 80%. Aminoglycosides: gentamicin showed an increase in resistance to 59.1%, while amikacin maintained relative effectiveness (fluctuations). 5–20%).

Conclusions

Analysis of the obtained data allows us to conclude that *Pseudomonas aeruginosa* resistance to a wide range of antibiotics, including penicillins, cephalosporins, carbapenems, fluoroquinolones, and aminoglycosides, has increased significantly. Therefore, the optimal antibacterial regimen for the treatment of periprosthetic joint infections caused by *Pseudomonas aeruginosa* requires an individualized approach and is based on the results of an antibiogram. However, our studies have shown that amikacin and a combination of piperacillin and tazobactam may be effective against this pathogen.