Aetiology and Antimicrobial Resistance in Prosthetic Joint Infections: An International Multicentre Study

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STUDY AT A GLANCE

56 centres

16 countries

621 culture-positive PJIs (2021)

INTRODUCTION & AIM

Contemporary data on prosthetic joint infection (PJI) aetiology from international cohorts are scarce. We aimed to describe causative pathogens of PJI, focusing on multidrug-resistant organisms (MDROs) and cefazolin non-susceptibility across world regions.

METHODS

- **Retrospective** analysis of PJI episodes diagnosed in 2021 according to **EBJIS criteria**[1], across 56 centres in 16 countries.
- **MDROs** were defined per **Magiorakos** et al.[2]
- In **perioperatively** acquired PJIs, we estimated the proportion caused by **cefazolin non-susceptible** pathogens.
- **Geographical differences** were assessed by logistic regression adjusted for **potential confounders** (age, sex, Charlson's comorbidity score, known MRSA colonization, previous antibiotic use (≥2 days), urgent surgery e and early infection (≤3 months).

CONCLUSIONS

- **MDROs accounted for nearly one in five PJI episodes, led by Gram-negative bacilli, with marked geographical differences.**
- **More than half of perioperative PJIs were cefazolin non-susceptible.**
- **These findings challenge universal cefazolin-based surgical prophylaxis and support region-specific antibiotic policies.**

REFERENCES

1. McNally M et al. The EBJIS definition of periprosthetic joint infection. Bone Joint J. 2021;103-B(1):18–25.
2. Magiorakos AP et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect. 2012;18(3):268–281.

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RESULTS

621 culture-positive PJIs

61.7% caused by staphylococci

17.7% caused by MDRO

52% perioperative PJIs cefazolin non-susceptible

- We included **621** culture-positive PJIs.
- **Staphylococci** predominated (61.7%, 95% CI 57.7–65.5), followed by Gram-negative bacilli, enterococci and streptococci.
- Overall, **17.7%** (95% CI 14.8–20.9) of episodes were caused by **MDRO**, with significantly higher proportions in South America (44.7%) and Asia (30.8%) than in North America (15.2%) and Europe (10.3%).
- After multivariable adjustment, MDRO infection was approximately **fivefold higher for episodes from South American** centres (adjusted odds ratio [aOR] 5.1, 95% CI 3.0–8.8) and **fourfold higher for those from Asian c**entres (aOR 4.3, 95% CI 1.7–10.8) compared with European centres.
- **MDROs** were predominantly **Gram-negative bacilli** (9.0% of all PJIs).
- Among **471** culture-positive **perioperative** PJIs, **52%** (95% CI 47.4–56.6) were **cefazolin non-susceptible**, led by **methicillin-resistant coagulase-negative staphylococci** (17.8%) and cefazolin non-susceptible Enterobacterales (14.5%).

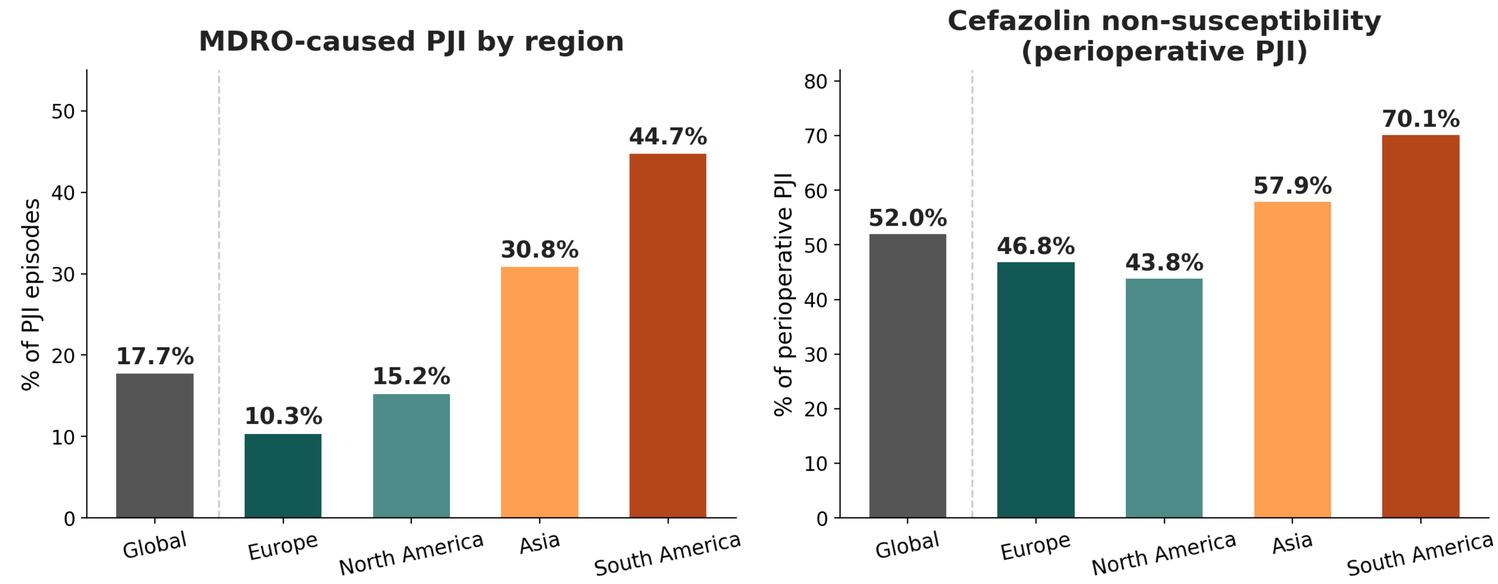
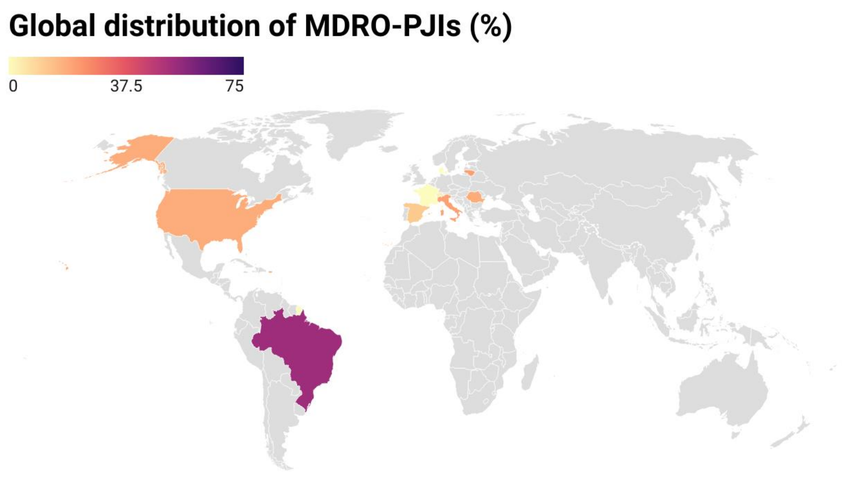


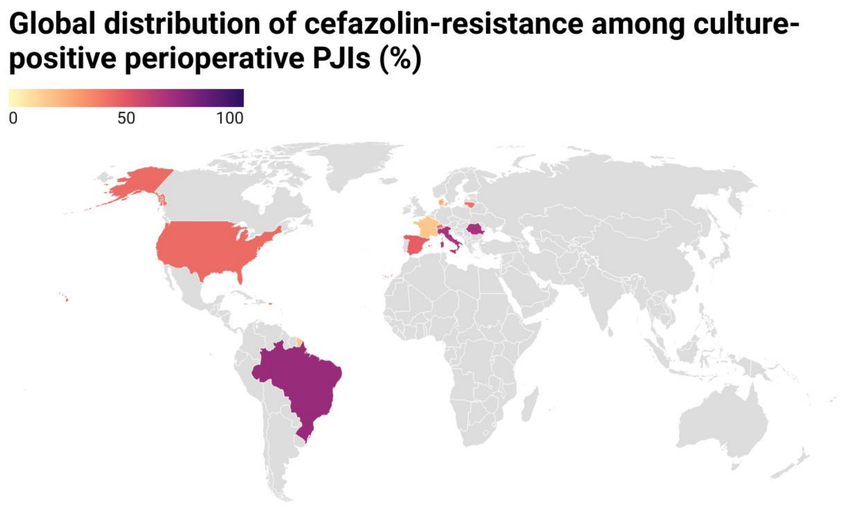
Figure 1. Regional variation in MDRO-caused PJI and cefazolin non-susceptibility.

Table 1. Pathogen distribution by region

Microorganism group	Europe (n=448)	North America (n=33)*	Asia (n=26)*	South America (n=114)*	p-value
1. AEROBIC GRAM-POSITIVE COCCI	336 (75)	28 (84.8)	17 (65.4)	80 (70.2)	0.248
1.1. Staphylococci	275 (61.4)	25 (75.8)	15 (57.7)	68 (59.6)	0.373
• *Coagulase-negative staphylococci*	**144 (32.1)**	7 (21.2)	2 (7.7)	15 (13.2)	**<0.001**
• *Staphylococcus aureus*	135 (30.1)	**18 (54.5)**	13 (50)	57 (50)	**<0.001**
1.2. Streptococci	**46 (10.3)**	3 (9.1)	1 (3.8)	1 (0.9)	**0.012**
1.3. Enterococci	34 (7.6)	2 (6.1)	2 (7.7)	15 (13.2)	0.270
2. AEROBIC GRAM-NEGATIVE BACILLI	107 (23.9)	9 (27.3)	6 (23.1)	**61 (53.5)**	**<0.001**
2.1. Enterobacterales	82 (18.3)	8 (24.2)	6 (23.1)	**49 (43)**	**<0.001**
2.2. Non-fermenting Gram-negative bacilli	23 (5.1)	1 (3)	0 (0)	**26 (24.5)**	**<0.001**
3. AEROBIC GRAM-POSITIVE BACILLI	12 (2.7)	1 (3)	1 (3.8)	0 (0)	0.336
4. ANAEROBIC BACTERIA	**39 (8.7)**	2 (6.1)	0 (0)	1 (0.9)	**0.013**
5. MULTIDRUG-RESISTANT MICROORGANISMS	46 (10.3)	5 (15.2)	8 (30.8)	**51 (44.7)**	**<0.001**
• MRSA	18 (4)	3 (9.1)	**5 (19.2)**	16 (14)	**<0.001**
• MDR-GNB	23 (5.1)	1 (3)	2 (7.7)	**30 (26.3)**	**<0.001**
• ESBL producing Enterobacterales	9 (2)	1 (3)	1 (3.8)	**8 (7)**	**0.040**[1]
• Carbapenemase-producing Enterobacterales	1 (0.2)	0 (0)	0 (0)	**4 (3.5)**	**0.023**[1]
• Other MDRO	5 (1.1)	1 (3)	1 (3.8)	**6 (5.3)**	**0.021**[1]
POLYMICROBIAL INFECTIONS	73 (16.3)	9 (27.3)	1 (3.8)	**45 (39.5)**	**<0.001**
CEFAZOLIN NON-SUSCEPTIBILITY	145/310 (46.8)	14/32 (43.8)	11/19 (57.9)	**75/107 (70.1)**	**<0.001**

GEOGRAPHIC DISTRIBUTION





Country-level distribution of MDRO-PJI and cefazolin non-susceptibility among participating centres.