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EARSS indicator organisms are *Enterococcus faecalis* and *Enterococcus faecium*.

In recent years, increasing resistance to first-line antibiotics has been described in these species worldwide, principally in *E. faecium*, although with important geographical differences.² Although infections with vancomycin-resistant enterococci are still relatively uncommon in many European hospitals, the high occurrence of ampicillin-resistant *E. faecium* is of clinical concern.

The goal of this multicentre prospective study was to analyse the evolution of antimicrobial resistance in enterococci collected by EARSS Spanish hospitals from 2001 to 2006.

The selection of the 41 participating hospitals was done according to EARSS criteria.¹² All the first blood isolates per patient and year obtained between 2001 and 2006 were included. Each laboratory identified strains and tested their susceptibility according to standard microbiological procedures. To assess the comparability of susceptibility test results, a quality assurance exercise (UK National External Quality Assessment Scheme) was performed yearly.

Patients with community-acquired infections were those who had a positive enterococci culture at the time of or within 48 h of hospitalization.

Of the 3469 consecutive blood isolates of enterococci, corresponding to the same number of patients, 2784 were *E. faecalis* (80.3%) and 685 were *E. faecium* (19.7%). The male/female ratio was 62.3%/37.7% for *E. faecalis* and 60.7%/39.3% for *E. faecium*. Most enterococci isolates were from patients >64 years old (57.7% for *E. faecalis* and 52.1% for *E. faecium*).

There were 2683 (77.3%) isolates implicated in nosocomial infections; 2137 *E. faecalis* (77.9%) and 546 *E. faecium* (81.6%). The hospital departments with most isolates were: internal medicine, 849 (*E. faecalis*/*E. faecium* ratio of 686/163); ICU, 855 (726/129); surgery, 366 (269/97) and paediatric departments, 193 (149/44).

Non-susceptibility to ampicillin, vancomycin, high-level gentamicin (HLG) and erythromycin was found in *E. faecalis*/*E. faecium* at rates of 1.3%/65.1%, 0.4%/3.9%, 35.8%/15.4% and 86.8%/90.2%, respectively.

Differences in antibiotic resistance rates between enterococci implicated in nosocomial infections and those causing community-acquired infections showed that only ampicillin resistance in *E. faecium* was significantly higher in nosocomial than in community isolates (68.5% versus 50.4%; OR: 2.1, 95% CI: 1.5–3.2, *P* = 0.0001).

Resistance to ampicillin in *E. faecium* increased from 49.2% (2001) to 75.4% (2006) (χ² test for trend = 12.9; *P* = 0.0003). This kind of resistance varied by sex [more prevalent in males (OR: 1.4, 95% CI: 1.0–1.9, *P* = 0.05)] and by hospital department [more prevalent in ICU than in non-ICU departments (OR: 2.6, 95% CI: 1.5–4.5, *P* = 0.0005)].

Of the *E. faecium* isolates, 87 (12.7%) were simultaneously resistant to ampicillin and HLG. Resistance to high concentrations of gentamicin was more prevalent in ampicillin-resistant strains (19.7%) than in ampicillin-susceptible strains (7.1%) (OR: 3.1, 95% CI: 1.8–5.5, *P* < 0.0001).

A total of 38 vancomycin non-susceptible isolates were detected; 24 of them (18 *E. faecium* and 6 *E. faecalis*) were teicoplanin-susceptible (VanB phenotype), whereas 14 (9 *E. faecium* and 5 *E. faecalis*) were teicoplanin non-susceptible (VanA phenotype). The distribution of vancomycin

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**References**


**Keywords:** antibiotic resistance, surveillance.

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**Transparency declarations**

None to declare.
non-susceptible E. faecium varied from 1.6% in 2001 to 4.4% in 2006 ($\chi^2$ test for trend = 0.4; $P = 0.5$). The 27 vancomycin non-susceptible E. faecium isolates came from 17 different hospitals, with no more than 3 isolates recovered from individual hospitals.

Finally, some hospitals of the network reported susceptibility data for additional antibiotics. High-level resistance to streptomycin was reported for 1167 E. faecalis and 253 E. faecium at rates of 49.2% and 57.8%, respectively. Linezolid was tested against 955 E. faecalis and 241 E. faecium, but only 7 E. faecalis (0.7%) were reported as non-susceptible.

In a recent study, the majority of vancomycin-resistant E. faecium isolated from hospital outbreaks in the USA belonged to the clonal complex 17 (CC17). In European countries, the prevalence of hospital-adapted CC17 is rare. Since ampicillin resistance seems to be a very specific genetic marker of CC17, the increase in infections caused by ampicillin-resistant E. faecium could be an indirect sign of the emergence of CC17 in hospitals. Recently, an outbreak of ampicillin/ciprofloxacin/vancomycin-resistant vanB2-containing E. faecium belonging to CC17 in hospitals has been described in a Spanish hospital; of the 34 strains analysed in the latter study, 3 were from blood and were also included in the present surveillance study.

In summary, in this study, we report on 3469 Spanish enterococcal isolates that were isolated from blood and that were collected over a 6 year period. Vancomycin resistance remained low (<5% in E. faecium and <1% in E. faecalis), but ampicillin resistance, either alone or in combination with HLG resistance, experienced a 53.3% increase in E. faecium, suggesting that CC17 may have spread in Spanish hospitals.

Acknowledgements

EARSS is funded by the European Commission, DG Sanco (Agreement SI2.123794). This study was supported by a research grant from the Dirección General de Salud Pública, Ministry of Health, Spain (reference 1429/05–11).


Transparency declarations

None to declare.

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