

# Susceptibility patterns for *Enterococcus spp.* clinical isolates collected over a 14-year period at Sunnybrook Health Sciences Centre



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## BACKGROUND

*Enterococci* are commensal gram-positive cocci that are a common cause of urinary tract infections, endocarditis, intra-abdominal, skin, soft tissue and wound infections. Up until recently *E. faecalis* was the most common *Enterococci* implicated, however, the frequency of *E. faecium* infections have increased over time. *E. faecalis* is known to be more virulent, however less resistant to antibiotics when compared to *E. faecium*. There is a paucity in data describing the resistance rates of *Enterococci* in Canadian settings over time.

## OBJECTIVES

To identify changes in antimicrobial resistance for *Enterococcus spp.* clinical isolates collected at Sunnybrook Health Sciences Center (SHSC) between 2007-2016.

## METHODS

**Date Collection:** Susceptibility data for *Enterococcus spp.* isolates collected from inpatients at SHSC Bayview campus between October 2002 and September 2016 were extracted from the SHSC Microbiology database.

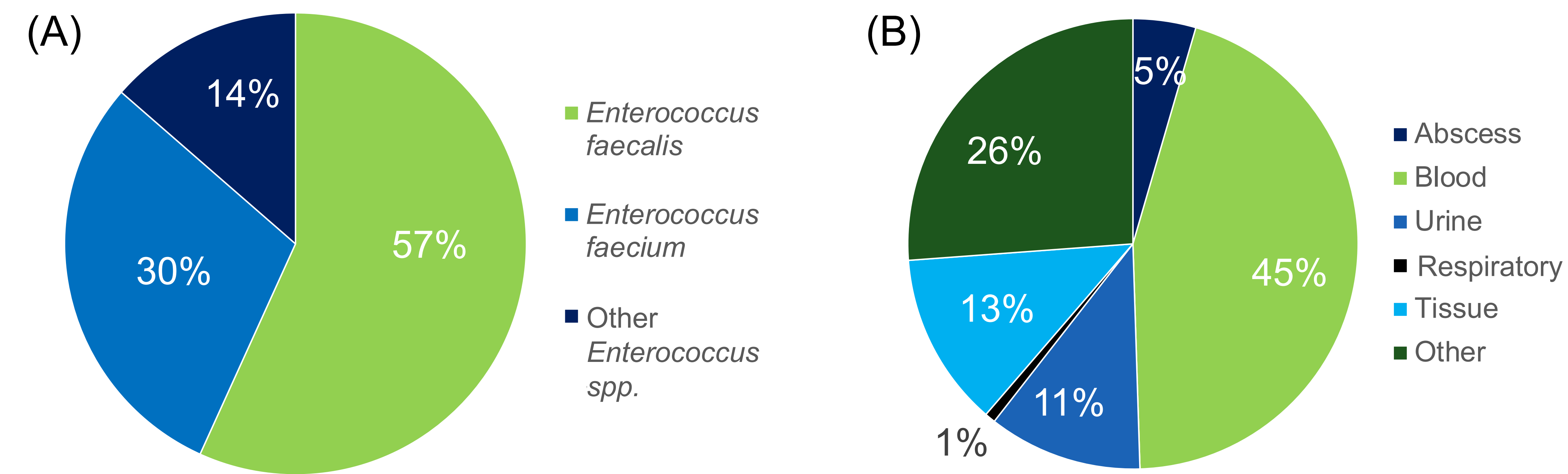
**Analysis:** Clinical isolates were classified as multi-drug resistant (MDR), extensively drug-resistant (XDR) and pan drug resistant (PDR). Trends in ampicillin, ciprofloxacin, gentamicin, nitrofurantoin, tetracycline and vancomycin susceptibility were analyzed using Poisson regression models with a significance level of 0.05. Datasets containing <20 isolates per year were excluded from the analysis.

## RESULTS

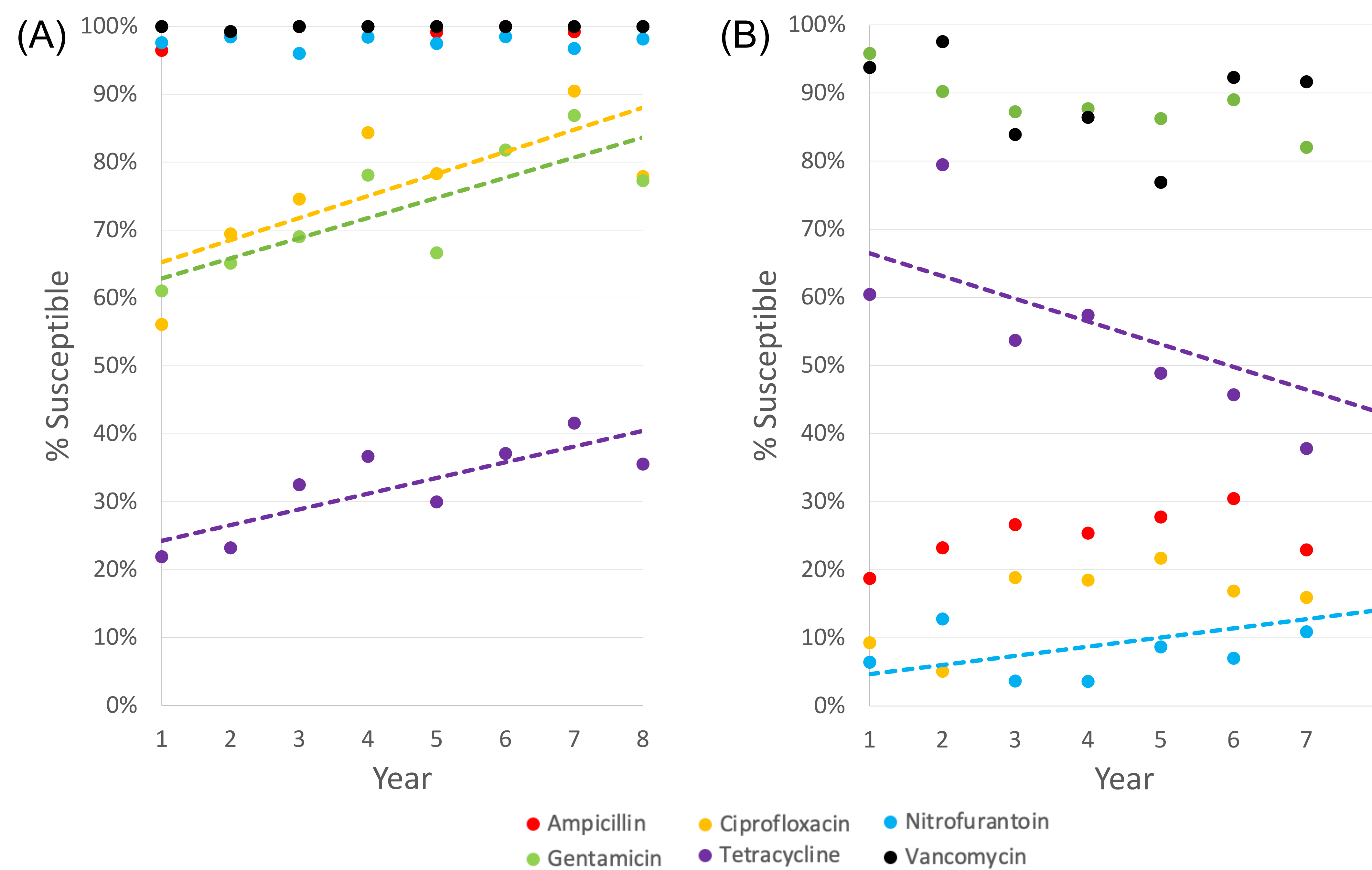
The number of total *Enterococcus* isolates identified (n=2617), and their respective specie distribution is captured in Figure 1. Among the 2617 isolates, 57% were *E. faecalis* (n=1486), 30% were *E. faecium* (n=775) and 14% were other *Enterococcus spp.* (n=356) (Fig. 1A). Generally, isolates were cultured from a blood specimen (Fig. 1B).

Susceptibility trends were recorded started from 2008/2009 (Fig. 2). For *E. faecalis*, susceptibilities for ciprofloxacin (+3.9% susceptible/year, p=0.0117), gentamicin (+3.9% susceptible/year, p=0.0144) and tetracyclines (+7% susceptible/year, p=0.42) increased overtime (Fig. 2A). As for *E. faecium*, nitrofurantoin susceptibility increased by 24% each year (p=0.0013) (Fig. 2B). The susceptibility to tetracyclines (-4.5% susceptible/year) demonstrated a noteworthy decline, however, this was not statistically significant (p=0.562).

## RESULTS



**Figure 1:** (A) The distribution of the 2617 *Enterococcus* clinical isolates identified by species. *E. faecalis* represented the majority of isolates. (B) The culture source of the isolates. Most isolates came from blood cultures.



**Figure 2:** (A) Susceptibility of *E. Faecalis* isolates to ampicillin, ciprofloxacin, gentamicin, nitrofurantoin, tetracycline and vancomycin each year from October 2008 to September 2016. Increased susceptibility to ciprofloxacin, gentamicin and tetracycline was noted. (B) Susceptibility of all *E. faecium* isolates to ampicillin, ciprofloxacin, gentamicin, nitrofurantoin, tetracycline and vancomycin each year from October 2008 to September 2016. A statistically significant increase in susceptibility was found for nitrofurantoin in addition to an insignificant decrease in tetracycline susceptibility.

## DISCUSSION

This study further characterizes the differences between *E. faecalis* and *E. faecium* in the context of antimicrobial resistance. Our data indicate that susceptibilities of *E. faecalis* is improving at SHSC. Perhaps this reflects improved antimicrobial stewardship policies at the institution, demonstrating improved antibiotic use overtime.

Since *E. faecium* has inherent resistance against multiple antibiotics, it is perhaps unsurprising that there were few trends of clinical significance. An unexpected observation is the apparent decline of sensitivity to tetracycline for *E. faecium* (Fig. 2B). Tetracyclines are not first-line treatment for *Enterococcus* species as they exhibit high resistance. Although this difference was not found to be statistically significant, further studies and monitoring should investigate the reason for decreased tetracycline susceptibility of *E. faecium* isolates.

### Limitations:

- This was a single center study and thus the resistance patterns observed are not representative of trends at other institutions
- These are clinical cultures and therefore potentially represent asymptomatic carriage and not necessarily infection
- Changes in institutional policy and procedure regarding *Enterococcus* susceptibility testing over the 14 year study period (i.e. which isolates are tested for which antibiotics) represents a potential source of bias

## CONCLUSION

Although sensitivities to antibiotics appear to be improving at our site, *E. faecium* infections are on the rise. *E. faecalis* and *E. faecium* demonstrate heterogenous susceptibility patterns thus antimicrobial stewardship interventions for *Enterococcus* should be targeted on a species level.

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### DISCLOSURES

Authors have the following to disclose concerning possible personal or financial relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:  
V Bugaj – Nothing to disclose  
C Peragine – Nothing to disclose  
SAN Walker – Nothing to disclose