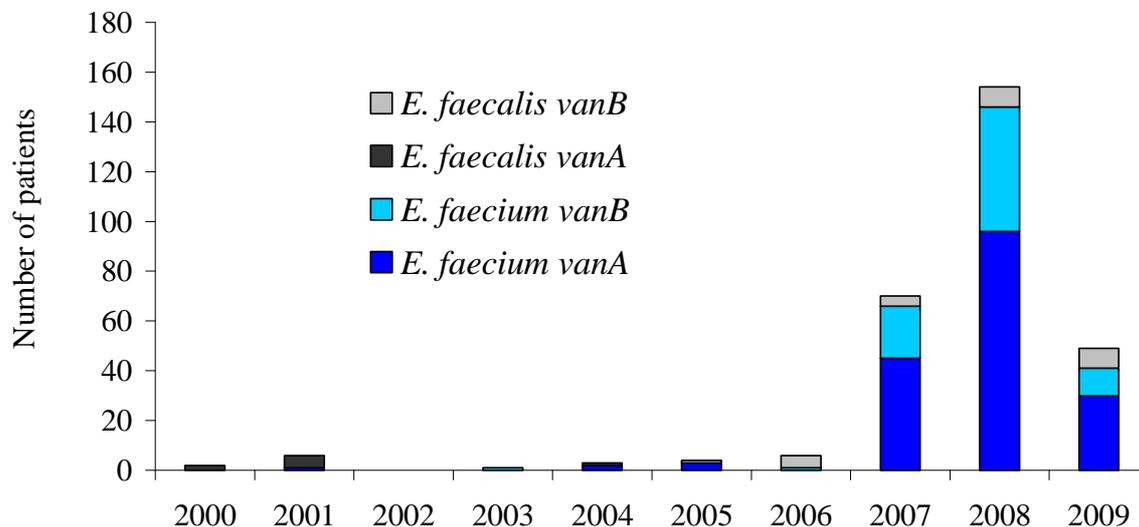


Vancomycin-resistant enterococci (VRE), 2009

Hospital and community diagnostic laboratories are requested to refer all vancomycin-resistant *Enterococcus faecium* and *E. faecalis* isolates to ESR for the national surveillance of these resistant organisms. At ESR, the isolates are confirmed as vancomycin resistant, the *van* gene is identified by PCR, the isolates' susceptibility to a range of antibiotics is determined, and the isolates are typed by pulsed-field gel electrophoresis (PFGE).

VRE from 47 patients were confirmed in 2009. The species and *van* genotype distribution of the VRE from these 47 patients is shown in Figure 1. 29 patients had *vanA E. faecium*, 11 had *vanB E. faecium*, and 7 had *vanB E. faecalis*. There were no isolates of *vanA E. faecalis*.

Figure 1. Species and *van* genotype of VRE isolated in New Zealand, 2000-2009



The number of VRE referred to ESR in 2009 was only about one-third the number referred in 2008 (Figure 1). The relatively large numbers of VRE in 2007 and 2008 were due to outbreaks of vancomycin-resistant *E. faecium* in Auckland hospitals, and also to a small outbreak in Waikato Hospital in 2008.

In 2009, the majority (90.2%) of the VRE were from Auckland hospitals (47.1% Middlemore Hospital, 33.3% Auckland City Hospital and 9.8% North Shore Hospital). A more detailed breakdown of the sources of the VRE referred in 2009 is shown in Table 1.

In 2009, the majority (43, 87.8%) of the VRE were isolated from rectal swabs or faecal specimens as the result of screening for the organism. The remaining VRE were isolated from blood (1, 2.0%) or other miscellaneous diagnostic specimens (5, 10.2%).

Table 1 shows the various VRE strains identified by PFGE typing in 2009. Among the *vanA E. faecium* isolates, strain EfAH was most common and isolated from patients in the three major Auckland hospitals. This strain was the third most

common vanA *E. faecium* strain isolated in 2008. The two most common vanA *E. faecium* strains isolated during the 2007-2008 VRE outbreaks, EfN and EfAF, were not (EfAF) or rarely (EfN) identified in 2009.

No strain was predominant among the 2009 vanB *E. faecium* isolates. There were two isolates of strain EfAB, the most common vanB *E. faecium* strain identified in 2008. There were no isolates of the other two vanB *E. faecium* strains prevalent during the 2007-2008 outbreaks (EfO and EfQ).

Strain EfJ was almost wholly prevalent among the vanB *E. faecalis* isolates. This strain has been predominant among vanB *E. faecalis* isolates since 2005, and all isolates of this strain have come from the Northland or Auckland area. Most cases appear to be sporadic.

Table 1. VRE referred to ESR, 2009

Species	van gene	Referred from	PFGE profile/strain ¹	Number of patients ²	
<i>E. faecium</i>	A	Middlemore Hospital	EfAH	7	
			EfAJ	5	
			EfAK	3	
			EfAI	1	
			distinct ³	3	
		Auckland City Hospital	EfAH	4	
			EfAJ	2	
			EfAL	2	
			EfN	1	
			EfY	1	
	North Shore Hospital	EfAH	1		
		B	Middlemore Hospital	EfAB	2
				EfAC	1
				EfAE	1
				distinct	1
Auckland City Hospital	EfAE	2			
	distinct	1			
Waikato Hospital	EfAE	1			
	distinct	1			
	Christchurch Hospital	distinct	1		
<i>E. faecalis</i>	B	Auckland City Hospital	EfJ	3	
			EfZ	1	
		North Shore Hospital	EfJ	4	
		Whangarei Hospital	EfJ	2	

1 In-house pulsed-field gel electrophoresis (PFGE) profile designations. PFGE profiles were analysed with BioNumerics software version 5.1 (Applied Maths, St-Martens-Latern, Belgium) using the Dice coefficient and unweighted-pair group method with arithmetic averages, at settings of 0.5% optimisation and 1.5% position tolerance. The PFGE profiles of isolates designated as the same strain share $\geq 90\%$ similarity. PFGE profile designations in boldface are profiles of strains that were identified prior to 2009.

2 Two vanA *E. faecium* strains (EfAK and a distinct strain) were isolated from one patient. Two vanB *E. faecalis* strains (EfJ and EfZ) were isolated from another patient. These patients are included in the counts for each of the strains isolated from them. VanB *E. faecalis*, strain EfJ, was isolated from each of two patients in two different hospitals. These patients are included in the counts for each hospital they were in.

3 Distinct isolates that share $< 90\%$ PFGE profile similarity with any other VRE isolate.

The antimicrobial susceptibility among the 2009 VRE isolates is shown in Table 2. Almost all VRE were multiresistant to ≥ 3 antibiotic classes in addition to glycopeptides. The vanB genotype typically confers resistance to vancomycin but not teicoplanin. However, one vanB *E. faecium* isolate was resistant to both vancomycin and teicoplanin (MIC ≥ 256 mg/L for both antibiotics).

Table 2. Resistance among VRE, 2009

Antimicrobial agent ¹	Percent resistance			
	<i>E. faecium</i>			<i>E. faecalis</i> vanB ³ n=8 ⁴
	vanA n=30 ²	vanB n=11	All n=41	
ampicillin	93.3	90.9	92.7	0.0
ciprofloxacin	93.3	100	95.1	100
gentamicin high-level	30.0	72.7	41.5	87.5
nitrofurantoin	0.0	27.3	7.3	0.0
quinupristin/dalfopristin	6.7	0.0	4.9	100 ⁵
streptomycin high-level	23.3	54.6	31.7	0.0
teicoplanin	83.3 ⁶	9.1 ⁷	63.4	0.0
tetracycline	86.7	18.2	68.3	100
multiresistant ⁸	93.3	90.9	92.7	87.5

1 Ampicillin, ciprofloxacin, gentamicin, linezolid and teicoplanin susceptibilities were determined by Etest MICs. Nitrofurantoin, quinupristin/dalfopristin, streptomycin and tetracycline susceptibilities were determined by disc testing. MICs and zones of inhibition were interpreted according to the Clinical and Laboratory Standards Institute's criteria.¹ No isolate was resistant to linezolid, although one vanA *E. faecium* isolate had intermediate resistance (MIC 4 mg/L).

2 Includes isolates of two different strains from the same patient.

3 All *E. faecalis* isolates had the vanB genotype.

4 Includes isolates of two different strains from the same patient.

5 *E. faecalis* are intrinsically resistant to quinupristin/dalfopristin.

6 The remaining vanA *E. faecium* isolates had intermediate teicoplanin resistance (MICs 16 mg/L).

7 One vanB *E. faecium* isolate was teicoplanin resistant (MIC ≥ 256 mg/L).

8 Resistant ≥ 3 classes of antibiotics in addition to glycopeptides (quinupristin/dalfopristin resistance not included for *E. faecalis*).

¹ Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; nineteenth informational supplement. Villanova, PA, USA: CLSI, 2009 CLSI document M100-S19