

# Prevalence studies of vancomycin-resistant enterococci for monitoring a passive surveillance program in a pediatric hospital

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**Abstract.** The objective of the present study was to check the impact of a program of passive surveillance of stool colonization by vancomycin-resistant enterococci (VRE) by using biannual studies of colonization prevalence in the whole hospital (September 3, 2002,  $N=344$  patients and June 29, 2004,  $N=368$  patients). Rectal swabs were obtained and immediately cultured on bile-esculine azide agar plates with 6  $\mu\text{g/ml}$  of vancomycin. A trend in increase in colonization was observed in our hospital between 2002 and 2004. An increasing number of VRE infections have been recorded during 2004 but most of them were acquired outside of the hospital. Moreover, the diversity of clones showed a low trend of spreading of VRE inside the hospital, suggesting the good effect of control procedures. However, as prevalence studies also allowed us to control the spreading of VRE by means of isolation or cohorting patients, and VRE infections are growing in number in Argentina (Red WHONET Argentina, 2003), we propose to do them yearly. © 2005 Published by Elsevier B.V.

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## 1. Introduction

Vancomycin-resistant enterococci (VRE) were firstly found in Europe in 1987 [1,2]. Almost 10 years later, they were isolated for first time in Argentina [3] and their frequency, both as infecting organisms and as colonizers, grew up steadily.

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Active surveillance demonstrated reduction in the incidence of VRE bacteremia [4]. However, it is difficult to perform in a large tertiary care hospital with high frequency of patients coming from other hospitals.

As the low number of colonized patients and no infections due to VRE were recorded before 2002, a program of passive surveillance for VRE was implemented in the Hospital de Pediatría “Prof. Dr. Juan P. Garrahan”:

- Prevalence studies in sites where colonized patients are hospitalized
- Surveillance cultures performed on swabs from previously colonized patients coming back to the hospital (identified by our database) and to patients coming from hospitals with high prevalence of VRE
- Recovering VRE from modified Skirrow medium used for isolation of *Campylobacter* spp. in stool cultures of children with diarrhea
- Vancomycin susceptibility testing of all enterococci isolated in the microbiology laboratory.

The objective of the present study was to check the impact of this program by using biannual studies of colonization prevalence in the whole hospital, as opposed to previous studies which is limited to intensive care areas (Table 1).

## 2. Materials and methods

All patients hospitalized in the selected days (September 3, 2002 and June 29, 2004), except those assisted at day-care rooms, were included. Patients that refused the study were excluded.

Rectal swabs were obtained and immediately cultured on bile–esculine azide agar plates with 6 µg/ml of vancomycin. After 24–48 h at  $35 \pm 1$  °C, black colonies were identified at species level by conventional tests [5].

Table 1  
Prevalence studies performed at the Hospital de Pediatría “Prof. Dr. Juan P. Garrahan” 1997–2004

Year	Studied patients	Excluded patients	Number of colonized patients	% of colonization
1997 <sup>a</sup>	100	0	0	0
Jun 1998 <sup>a</sup>	158	0	0	0
Sep 1998 <sup>a</sup>	97	0	0	0
1999 <sup>a</sup>	69	0	0	0
2000 <sup>a</sup>	79	0	1	1.3
Sep 2001 <sup>a</sup>	81	0	4	4.9
Oct 2001 <sup>a</sup>	94	0	6	6.4
Nov 2001 <sup>a</sup>	29	1	1	3.5
2002	345	1	17	4.9 <sup>b</sup>
2004	369	1	23	6.2 <sup>b</sup>

<sup>a</sup> Only selected rooms were included.

<sup>b</sup> Chi square  $p > 0.05$ .

Vancomycin resistance was tested by the disk diffusion method and confirmed by Etest and by an polymerase chain reaction specific for *vanA*, *vanB*, or *vanC* genes, when necessary [6]. Clonal relatedness was established by pulse-field gel electrophoresis (PFGE) with *SmaI* as a restriction enzyme.

### 3. Results

Prevalence was less than 7% (Table 1). Before 2002, only patients hospitalized in selected rooms, especially intensive care units, were included in prevalence studies. No VRE were detected until the study of year 2000. However, some VRE-colonized patients coming from high prevalence centers have previously been found. As some of those VRE were observed out of intensive care units, we decided to perform surveillance studies including the whole hospital. A total of 345 and 369 patients were studied on September 3, 2002, and June 29, 2004, respectively. Colonization with VRE were detected in 17 (4.9%) patients in 2002 and 23 (6.2%) in 2004 ( $p > 0.05$ ). In 2002, all VRE were *Enterococcus faecium*, but in 2004, two isolates belonged to other species (*Enterococcus faecalis* and *Enterococcus raffinosus*). All VRE were genotype *vanA*. PFGE analysis recognized three major (A–C, 67%) and seven minor clonal types (D–J) among 21 vancomycin-resistant *E. faecium* isolates obtained in the prevalence study of 2004 (Fig. 1).

Infections due to VRE were scarce in our hospital until 2004: 1 in 2001 (bacteremia), 4 in 2002 (1 bowel abscess, 1 bacteremia and two skin and soft tissue infections in burnt patients) and three in 2003 (1 soft tissue infection in a burnt patient, 1 catheter-related infection and 1 urinary tract infection). In 2004, we detected 11 infections due to VRE, at least 3 of them acquired in other hospitals (3 soft tissue infections, 4 urinary tract infections, 2 bacteremia, 1 gall bladder empyema and 1 pleural empyema).

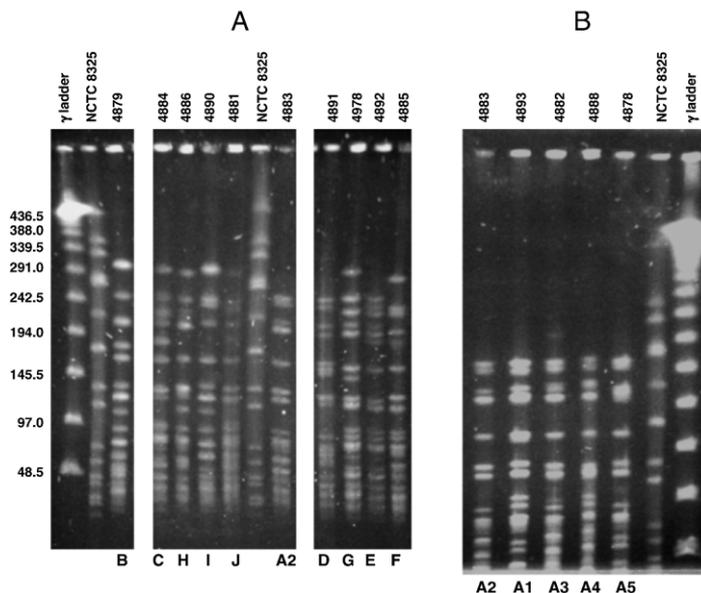


Fig. 1. (A) Clonal types of vancomycin-resistant *E. faecium* isolates obtained in the prevalence study of 2004; (B) clone A subtypes.

#### 4. Discussion

The small number of VRE infections recorded and the small differences along the time shown by studies previous to 2002 prompted us to perform biannual studies but covering the whole hospital.

A trend in increase in colonization was observed in our hospital between 2002 and 2004.

In spite of the increasing number of VRE infections observed during 2004, the fact that most of them came from outside of the hospital (data not shown), the low prevalence of colonization and the diversity of clones showing a low trend of spreading of VRE inside the hospital suggested the good effect of hospital control procedures. However, as prevalence studies also allowed us to control the spreading of VRE by means of isolation or cohorting patients, and VRE infections are growing in number in Argentina (Red WHONET Argentina, 2003), we propose to do them yearly.

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