Outbreak of vancomycin-resistant *Enterococcus* in a renal transplant unit

Dear Editor,

In hemodialysis units, vancomycin-resistant *Enterococcus* (VRE) colonization is common, probably associated with vancomycin use and the characteristics of these patients. This panorama of colonization is also found in renal transplant units (RTU).[1] However, epidemiological data including risk factors associated with colonization or infection due to VRE in this population are scanty. Here, we describe an outbreak and the measures used to eradicate VRE in a RTU.

The outbreak took place in a RTU of a 700-bed University Hospital in Curitiba (PR, Brazil). The first case of VRE in this hospital was described in 2004 and the percentage of VRE infection has been between 1.16% and 2.4%.

In March 1, 2009 the first case of VRE in the RTU was reported. Thus, three samples of rectal swabs were obtained from all patients admitted to the unit. Three patients turned out positive and one patient was negative in the first day. In the second week, two cases of VRE colonization were found and one patient had a negative culture. In the third week, one of eight patients was positive. In the fourth week one out of six patients was positive. Since then, no other patient with VRE was found in the RTU. Surveillance was discontinued after four months of continuous vigilance. During the outbreak, a total of eight patients were found to be colonized and one patient was infected (urinary tract infection) from a total of 33 patients screened in the unit. Environmental samples, such as beds, clothes, walls, tables, chairs, doors, doorknobs, stretcher, mattresses, pillows, and several other objects were all negative. Cultures from the hands of healthcare workers were also negative.

Vancomycin resistance was confirmed using Kirby-Bauer disk diffusion and the E-test.[2]

PCR to detect VRE resistance genes was performed following Petrich et al.,[3] which amplified the *van*A gene in all strains of *Enterococcus faecium*. Pulsed-field electrophoresis, described elsewhere, demonstrated a predominant genotype.[4] Genotype A and its subtype A1 were found in the RTU, and genotype B was found in patients from other units.

A case-control study was performed. Cases included all VRE colonized/infected patients from the RTU. Controls were patients with three rectal swabs negative for VRE admitted during the same period (four months) to the unit. Clinical data were extracted from the medical records and are described in the Table 1. Duration of hospitalization and previous use of ceftriaxone were risk factors for VRE in the univariate analysis. Ceftriaxone was an isolated risk factor for VRE in the binary regression ($p = 0.029$), demonstrating an OR = 8.8 (95% CI: 1.25-62.20).

An educational program about VRE was implemented following published guidelines.[5] The major focus of the education program was to enforce healthcare workers to adhere to contact isolation guidelines: I) wear of gown; II) use of gloves; III) hand hygiene using alcohol gel before and after any patient manipulation. Daily bath with chlorhexidine was done for all patients as an additional measure to control the outbreak. All material (clothes, pillows etc) used by patients were separated in plastic bags to further sterilization (autoclave or ethylene oxide).

Previous use of third generation cephalosporins was the only independent risk factor for VRE colonization in this outbreak. Although vancomycin has always been described as risk factor for VRE, third generation cephalosporins have also been nailed down in small series.[6,7]

Costs related to VRE infection can exceed three times the average admission.[8] In addition to extra cost, there is the risk of developing of an endemic status of VRE. In our study, intensive measures were effective to control the outbreak. The

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Table 1. Case control study of patients colonized/infected with VRE during an outbreak

Variable	VRE positive (n = 9)	VRE negative (n = 24)	p-value
Age (median with range)	36 (15 - 49)	37 (8 - 70)	NS
Gender (male %)	55.55%	58.33%	NS
Admission duration (mean ± SD)	16.11 ± 15.71	7.65 ± 3.90	0.018
DM	0.00%	4.16%	NS
ICC	11.11%	4.16%	NS
HAS	25.00%	33.33%	NS
Intensive care unit	0.00%	4.16%	NS
Surgery	11.11%	20.83%	NS
Neoplasm	0.00%	0.00%	NS
Under dialysis	11.11%	8.32%	NS
Cyclosporine	22.22%	20.83%	NS
Mophethyl-mycophenolate	100.00%	95.83%	NS
Tacrolimus	77.77%	54.13%	NS
Prednisone	100.00%	95.83%	NS
Azathioprine	0.00%	0.00%	NS
Urinary catheter	11.11%	29.16%	NS
Previous renal transplant	22.22%	4.16%	NS
Previous antibiotic use			
Ceftriaxone	44.44%	8.32%	0.034
Cefepime	11.11%	0.00%	NS
Carbapenem	0.00%	0.00%	NS
Piperacillin-tazobactam	0.00%	0.00%	NS
Vancomycin	22.22%	0.00%	0.068
Metronidazole	0.00%	0.00%	NS
Mortality	0%	4.10%	NS

NS, non-significant.

infection control activities to tackle the outbreak were extended to four months, a decision based on previous studies, which showed recurrence when carried out for only two months.[9,10]

Adherence to all measures of isolation and use of alcohol gel are enough to control a VRE outbreak, including cohort in larger units.[11] Some authors demonstrated that even with all measures applied, VRE can become endemic in the hospital.[12] Guidelines are available but we believe that the most important in an outbreak is the continuous and intensive staff education.[13]

Daily chlorhexidine bathing decreases the incidence of colonization by Gram-positive cocci, but its use as a measure of control of VRE outbreak has not been described. Skin colonization is a major source of VRE and reduction in the VRE acquisition rate reduces the colonization pressure.[14]

This study contributes to the understanding of the epidemiology dynamics of a VRE outbreak in RTUs and highlights infection control measures that can be useful in the control of VRE spread.

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