

**Serveur Académique Lausannois SERVAL [serval.unil.ch](http://serval.unil.ch)**

## **Author Manuscript**

**Faculty of Biology and Medicine Publication**

**This paper has been peer-reviewed but does not include the final publisher proof-corrections or journal pagination.**

Published in final edited form as:

**Title:** Colonization With Vancomycin-Resistant Enterococci After Discharge From an Epidemic Ward: Results of Outpatient Contact Screening by Visiting Nurses.

**Authors:** Voide C, Petignat C, Blanc DS, Zanetti G, Genoud P, Wasserfallen JB, Senn L

**Journal:** Infection control and hospital epidemiology

**Year:** 2016 Jun

**Volume:** 37

**Issue:** 6

**Pages:** 731-2

**DOI:** 10.1017/ice.2016.43

In the absence of a copyright statement, users should assume that standard copyright protection applies, unless the article contains an explicit statement to the contrary. In case of doubt, contact the journal publisher to verify the copyright status of an article.

1 **Colonization with Vancomycin-Resistant Enterococci (VRE) after Discharge from**  
2 **an Epidemic Ward: Results of Outpatient Contact Screening by Visiting Nurses**

3 C Voide, C Petignat, DS Blanc, G Zanetti, P Genoud, J-B Wasserfallen, L Senn

4

5 Short title : Colonization with Vancomycin-Resistant Enterococci (VRE) : Outpatient  
6 Screening

7

8 1. Cathy Voide MD, Infectious Diseases Service, University Hospital Lausanne,  
9 Switzerland

10 2. Christiane Petignat MD, Service of Hospital Preventive Medicine, University  
11 Hospital Lausanne, Switzerland

12 3. Dominique S Blanc PhD, Service of Hospital Preventive Medicine, University  
13 Hospital Lausanne, Switzerland

14 4. Giorgio Zanetti Professor, Service of Hospital Preventive Medicine, University  
15 Hospital Lausanne, Switzerland

16 5. Patrick Genoud, Nursing Directorate, University Hospital Lausanne, Switzerland

17 6. Jean-Blaise Wasserfallen Professor, Medical Directorate, University Hospital  
18 Lausanne, Switzerland

19 7. Laurence Senn MD, Service of Hospital Preventive Medicine, University Hospital  
20 Lausanne, Switzerland

21

22 Corresponding Author :

23 Cathy Voide

24 CHUV, Service des Maladies Infectieuses

25 Rue du Bugnon 46

26 CH-1011 Lausanne, Switzerland

27 Tel +41 79 556 47 83

28 Fax +41 21 314 10 08

29 e-mail : [cathy.voide@chuv.ch](mailto:cathy.voide@chuv.ch)

30

31 All authors report no conflicts of interest relevant to this article.

32 Financial support : none reported

33

34

35

36

37

38

39 Following a hospital outbreak of vancomycin-resistant *E. faecium vanB* involving 44  
40 patients, we initiated screening of contacts (roommates or patients hospitalized in an  
41 epidemic ward) who had not been screened before discharge. Between July and  
42 December 2011, a mobile team of 5 nurses performed home screening. Of 256 eligible  
43 contacts, 223 (87%) were screened. Median time between discharge from the epidemic  
44 ward and screening was 163 days (range 0-361). No contact patient was found to be  
45 positive. We showed the feasibility of home screening by visiting nurses and concluded  
46 that preemptive isolation is not justified for contacts readmitted 3 months after  
47 discharge.

48

49

50

51

52

53

54

55

56

57

58 Vancomycin-resistant enterococcus (VRE) is a significant healthcare associated  
59 pathogen. VRE has become endemic in many countries and repeatedly causes  
60 nosocomial outbreaks. Some epidemic clones are highly transmissible and able to  
61 persist up to 16 weeks on inert surfaces <sup>1-3</sup>. Measures to limit the spread of this  
62 bacterium, notably cohorting of VRE carriers and extensive screening and cohorting of  
63 contact patients, appears essential to control a VRE outbreak <sup>4-7</sup>.

64 Contact patients discharged before exclusion of VRE carriage can be the source of  
65 reintroduction of VRE into the hospital upon readmission. Despite this risk, there is no  
66 recommendation about the optimal management of contact patients. At Lausanne  
67 University hospital, readmitted contact patients are quarantined in contact isolation until  
68 3 consecutive rectal swabs are negative.

69

70 After a *vanB Enterococcus faecium* outbreak, we evaluated the VRE carriage of  
71 discharged contact patients through VRE home screenings by visiting nurses. A VRE  
72 contact was defined as a patient who had shared the room of a patient carrying VRE or  
73 who had stayed in a ward with  $\geq 2$  VRE cases within previous month. Contact patients  
74 were identified through administrative databases. VRE colonization was ruled out when  
75 3 rectal swabs taken at least a week apart were negative <sup>4</sup>. Contact patients who had  
76 left the hospital before performing the 3 swabs were introduced into an alert system and  
77 followed-up: those who lived in Lausanne and suburbs were first informed by letter and  
78 then contacted by phone in order to obtain their consent for VRE screening at home. A

79 mobile team of five nurses visited the consenting patients and completed the screening  
80 protocol.

81 Rectal swabs were inoculated into an enrichment broth containing vancomycin and  
82 incubated at 37°C for 24h. The broth was inoculated onto a selective chromogenic plate  
83 (ChromID VRE, Biomérieux) and incubated at 37°C for 48h.

84 The cost of the ambulatory screening campaign were computed by summing up the  
85 nursing wage (€48.74 per hour), the travel cost (€0.67 per Km) and the laboratory cost  
86 of swab tests (€100.- if positive, €40.- if negative). The isolation cost was estimated by  
87 summing up the costs of contact precautions material, additional nurse and physician  
88 time, cleaning of room <sup>8</sup> and extra for single room (€100.- per day).

89 In our hospital, the prevalence of vancomycin-resistance in enterococci isolated from  
90 clinical samples is below 1%. During the course of the outbreak, we identified 44 VRE-  
91 positive patients, of whom 5 were identified by clinical samples and 39 were contact  
92 patients detected by screening during their hospital stay <sup>9</sup>. Within the 453 remaining  
93 contact patients, 115 (25%) had three negative screenings before discharge, 28 (6%)  
94 had died, and 54 (12%) lived outside the investigation area. Thus, 256 contact patients  
95 were eligible for ambulatory screening, of whom 33 (13%) were excluded: 27 could not  
96 be reached and 6 refused to participate. Of the 223 included patients, 203 (91%)  
97 completed the screening protocol (3 swabs), 16 (7%) had 2 swabs and 4 (2%) one  
98 swab. Characteristics of the patients are presented in Table 1. All included patients  
99 were ambulatory and living independently. The median length of stay in an epidemic  
100 ward was 7 days (range 1-119) and the median time elapsed between discharge and

101 the first VRE screening was 163 days (range 0-361). The majority of patients had the 3  
102 successive screenings done at home (170 of 203 patients, 84%).

103 None of the included patients were colonized by VRE. The mobile team needed 554  
104 hours (€27'000.-) and 2'396 km (€1'600.-), and performed 645 screening swabs  
105 (€25'800.-). Thus, the total cost of the home screening process was €54'400.-. Twenty-  
106 five of the 223 contact patients included (11%) were readmitted within 3 months,  
107 totalizing 214 isolation days at a cost of €21'400.-

108

109 To our knowledge, this is the first report of a home screening campaign of VRE  
110 contacts. Patient acceptance was good. We did not identify any VRE carriage.  
111 Hypotheses to explain this result could be and the relatively short length of stay on an  
112 epidemic ward (median 7 days) and the delay between discharge and VRE screening  
113 (median of 163 days), whereas the median time of VRE carriage during a large  
114 outbreak was 42 days <sup>10</sup>. A screening performed faster after discharge and longer  
115 hospitalizations could have led to higher rate of VRE-positive contacts. Pearman *et al.*  
116 described the screening of 1'977 ward contacts after discharge from hospital <sup>11</sup>.  
117 Screening swabs were obtained in outpatient clinic, upon readmission or upon  
118 admission to another hospital. Screening lasted for 7 months and detected 54 cases of  
119 VRE carriage (acquisition rate: 2.73%), with a declining yield over time.

120 Screening contact patients at home by a mobile team managed by the hospital,  
121 guarantees an exhaustive monitoring and centralization of results. The cost generated  
122 by the procedure and the time required for the organization of the mobile team are

123 limiting factors. However, the cost is partially offset as screened contact patients will not  
124 be the source of new transmissions in case of readmission, and contact isolation days  
125 are avoided.

126

127 In conclusion, we showed the feasibility of home screening by visiting nurses. It could  
128 be useful in case of an outbreak of a virulent pathogen that requires strict infection  
129 control measures in contact patients. Based on our experience and the literature <sup>10,11</sup>,  
130 we now recommend in our hospital isolation and screening of VRE contact patients if  
131 readmitted within 3 months after discharge, and screening without isolation beyond that  
132 time.



133 **References**

- 134 1. Bonten MJ, Hayden MK, Nathan C, et al. Epidemiology of colonisation of patients  
135 and environment with vancomycin-resistant enterococci. *Lancet* 1996;348:1615-9.
- 136 2. Dancer SJ. Importance of the environment in meticillin-resistant *Staphylococcus*  
137 *aureus* acquisition: the case for hospital cleaning. *Lancet Infect Dis* 2008;8:101-13.
- 138 3. Tacconelli E, Cataldo MA. Vancomycin-resistant enterococci (VRE): transmission  
139 and control. *Int J Antimicrob Agents* 2008;31:99-106.
- 140 4. HCSP. Haut conseil de la santé publique - Prévention de la transmission croisée  
141 des Bactéries Hautement Résistantes aux antibiotiques émergentes (BHRe).  
142 <http://www.hcsp.fr/explorecgi/avisrapportsdomaine?clefr=372> 2013.
- 143 5. Christiansen KJ, Tibbett PA, Beresford W, et al. Eradication of a large outbreak  
144 of a single strain of vanB vancomycin-resistant *Enterococcus faecium* at a major  
145 Australian teaching hospital. *Infect Control Hosp Epidemiol* 2004;25:384-90.
- 146 6. Montecalvo MA, Jarvis WR, Uman J, et al. Infection-control measures reduce  
147 transmission of vancomycin-resistant enterococci in an endemic setting. *Ann Intern Med*  
148 1999;131:269-72.
- 149 7. De Angelis G, Cataldo MA, De Waure C, et al. Infection control and prevention  
150 measures to reduce the spread of vancomycin-resistant enterococci in hospitalized  
151 patients: a systematic review and meta-analysis. *J Antimicrob Chemother*  
152 2014;69:1185-92.
- 153 8. Hubben G, Bootsma M, Luteijn M, et al. Modelling the costs and effects of  
154 selective and universal hospital admission screening for methicillin-resistant  
155 *Staphylococcus aureus*. *PLoS One* 2011;6:e14783.

156 9. Senn L, Petignant C, Chabanel D, Zanetti G. [Control of an outbreak of  
157 vancomycin-resistant enterococci in several hospitals of western Switzerland]. *Revue*  
158 *medicale suisse* 2013;9:890-3.

159 10. Henard S, Lozniewski A, Aissa N, Jouzeau N, Rabaud C. Evaluation of the  
160 duration of vanA vancomycin-resistant *Enterococcus faecium* carriage and clearance  
161 during a large-scale outbreak in a region of eastern France. *Am J Infect Control*  
162 2011;39:169-71.

163 11. Pearman JW, Perry PL, Kosaras FP, et al. Screening and electronic labelling of  
164 ward contacts of vancomycin-resistant *Enterococcus faecium* vanB carriers during a  
165 single-strain hospital outbreak and after discharge from hospital. *Communicable*  
166 *diseases intelligence quarterly report* 2003;27 Suppl:S97-102.

167 Table 1. Characteristics of VRE contact patients screened at home (n=223)  
168  
169

<b>Characteristic</b>	
Age (years, range)	64
Male gender (%)	104 (46.6)
Hospitalization in surgical ward (%)	166 (74.4)
Hospitalization in medical ward (%)	57 (25.6)
Median length of stay (days; range)	7 (1-119)
Median length of stay on an epidemic ward (days; range)	6 (1-60)
Median time elapsed between discharge and VRE screening (days; range)	163 (0-361)
Readmission within 3 months (%)	25 (11.2)

170