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

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

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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.

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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 ¹⁻³. 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 ⁴⁻⁷.

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.

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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 ≥ 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 ⁴. 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 ⁸ 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 ⁹. 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.-

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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 ¹⁰. 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 ¹¹.
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.

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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 ^{10,11},
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.

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

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