When vancomycin-resistant *E. faecium* is grown for 12 hours with one-half minimum inhibitory concentration of vancomycin, large cells 2 to 4 µm in length consisting of individual enterococci connected by wide and fibrous cross walls result. Considering their size and the fact that most constitutive individual cells are shielded from the environment by these wide cross walls, it was conceivable that they could be more resistant to disinfectants than *E. faecium* of normal structure.

Two strains of *E. faecium* resistant to 400 µg/mL vancomycin were incubated for 12 hours with 200 µg/mL vancomycin to produce the large cells. A Gram stain confirmed the presence of large cells. Suspensions of approximately 10^{10} colony-forming units (CFU)/mL of large cells, as well as organisms grown with vancomycin (control), were challenged by the suspension technique with disinfectants or with saline as a control.

The organisms were exposed to 70% isopropyl alcohol for 5 and 10 seconds, diluted in trypticase soy broth, and planted on blood agar. They also were exposed to povidone iodine 1:10 in water for 30 and 60 seconds, neutralized with 1% sodium hyposulfite, and planted on blood agar. Colony counts were done after 48 hours of incubation. Exposure of large cells for both strains for 5 seconds to 70% isopropyl alcohol or 30 seconds to povidone iodine 1:10 produced growth of 70 and 90 CFU/mL, respectively. Exposure for 10 seconds to the alcohol for 60 seconds to povidone iodine resulted in no growth. The controls, not exposed to disinfectants, produced growth ranging from 10^{6} to 4×10^{6} CFU/mL.

In conclusion, the large cells of *E. faecium* that resulted from exposure to vancomycin, and the cells of normal structure grown without vancomycin, were highly and equally susceptible to alcohol or to povidone-iodine.

**REFERENCES**


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**Victor Lorian, MD**  
**Fleance Fernandes, MS**  
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**Natural History of Colonization With Vancomycin-Resistant Enterococcus faecium**

**To the Editor:**

We would like to add our observations on gastrointestinal colonization with vancomycin-resistant enterococci (VRE) in cancer patients to those of Montecalvo et al. At the University of Maryland Cancer Center (now the Greenebaum Cancer Center), VRE have been isolated from rectal surveillance cultures of 51 patients during a 3-year period (March 1993-February 1996). We describe the pattern of colonization on weekly inpatient follow-up cultures and the influence of antibiotic use, specifically vancomycin, on the pattern of colonization.

Fifty-five percent of these patients had acute leukemia; 25%, other hematological malignancies; 14%, solid tumors; and 6%, other diagnoses (sickle cell anemia, cryoglobulinemia, aplastic anemia). Their mean age was 55 years (range, 23-84). The mean length of stay prior to the first VRE isolation was 45 days (range, 1-156). Seventy-one percent died during the follow-up period. The mean number of days survived in those who died was 214 (range, 1-736).

Of the 51 patients, there was sufficient follow-up information on 36 (70%) to define three patterns of VRE colonization. We found an association between vancomycin use and the pattern of VRE colonization in these patients (Table). Patients with a persistent pattern of colonization were more likely to have received vancomycin while hospitalized compared to patients with intermittent or clearing patterns of VRE colonization. Also, patients with an intermittent pattern of colonization were more likely to have received vancomycin while hospitalized compared to patients with a clearing pattern of VRE colonization. Although a similar trend was seen with overall antibiotic use, the effect of vancomycin was more striking.

**TABLE**

**The Use of Antibiotics While Hospitalized in Cancer Patients With Vancomycin-Resistant Enterococcus faecium (VRE) Colonization**

<table>
<thead>
<tr>
<th>Pattern of VRE Colonization</th>
<th>Persistent N=14</th>
<th>Intermittent N=10</th>
<th>Clear N=15</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days hospitalized, mean</td>
<td>127</td>
<td>47</td>
<td>42</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>All antibiotics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% hospital days on antibiotics, mean</td>
<td>87</td>
<td>75</td>
<td>65</td>
<td>0.37</td>
</tr>
<tr>
<td>Specific antibiotics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% hospital days on vancomycin, mean</td>
<td>41</td>
<td>27</td>
<td>17</td>
<td>0.02</td>
</tr>
</tbody>
</table>

* One-way analysis of variance.
These results suggest that antibiotic use, specifically vancomycin, promotes persistent gastrointestinal colonization with VRE. Pulsed-field gel electrophoresis results in patients with an intermittent pattern of VRE colonization demonstrated that, in one half of the patients, the same isolate persisted despite the three negative cultures over 3 weeks. While this could be due to inadequate sampling, it more likely was due to persistent colonization at levels too low to be detected by culture until the use of antibiotics promoted the growth of VRE again. These results also suggest that 25% of cancer patients with VRE colonization will have recurrence of VRE colonization despite sufficient negative cultures to discontinue isolation according to Hospital Infection Control Practices Advisory Committee recommendations; finally, we show that the pattern of VRE colonization over time is associated with the use of vancomycin. This supports the recommendation of the Hospital Infection Control Practices Advisory Committee for vancomycin restriction.

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Hepatitis B Immunization of Hospital Employees in an Endemic Area: Should We Screen?

To the Editor:

Healthcare workers are estimated to be at a fourfold higher risk of infection with hepatitis B virus (HBV) than the general population. The HBV vaccine is highly effective, but cost is an important factor that affects implementation of immunization programs. In highly endemic areas, prescreening may reduce costs by avoiding unnecessary vaccination. We studied the HBV profile of our healthcare workers with the aim of determining the cost-effectiveness of pre-vaccination screening.

METHODS

We studied 572 healthcare workers at Aga Khan University Hospital, a large university medical center. Initially, both hepatitis B surface antigen (HBsAg) and antibody (HBsAb) were tested by enzyme-linked immunosorbent assay (Abbott Laboratories, Chicago, IL). However, as the prevalence rates of HBsAb were low, subsequent screening was done only for HBsAb to curtail costs. The clinical areas surveyed are shown in the Table.

The current cost of HBsAb in our laboratory is $8 (US) and that of hepatitis B surface antigen (HBsAg) and antibody (HBsAb) were tested by enzyme-linked immunosorbent assay (Abbott Laboratories, Chicago, IL). However, as the prevalence rates of HBsAb were low, subsequent screening was done only for HBsAb to curtail costs. The clinical areas surveyed are shown in the Table.

Using our formula, we calculated that it would be cost-effective to prescreen in our institution only if the expected HBsAb prevalence rate was at least 26.7%. Therefore, screening would not have been cost-effective in our hospital.

RESULTS

Three of 80 (3.75%) employees tested positive for HBsAg, while 87 of 572 (15.2%) were HBsAb-positive.

DISCUSSION

Hepatitis B is endemic in Pakistan, with seroprevalence rates of 6% to 8% for HBsAg and 25% to 30% for HBsAb. We found lower seroprevalence rates in our healthcare workers compared to the general population. The reasons for this are unclear but may relate to educational background or economic class.

We found that it would not be cost-effective for our institution to pre-screen our employees before HBV vaccination. Therefore, we recommended direct vaccination of all our employees, particularly as there are no adverse effects of vaccination in

<table>
<thead>
<tr>
<th>Department</th>
<th>No. Tested</th>
<th>% Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor room</td>
<td>10</td>
<td>33</td>
</tr>
<tr>
<td>Emergency room</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Anesthesia</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Clinical laboratory</td>
<td>66</td>
<td>23</td>
</tr>
<tr>
<td>Operating room</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>Medicine</td>
<td>46</td>
<td>20</td>
</tr>
<tr>
<td>Surgery</td>
<td>30</td>
<td>17</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Interns</td>
<td>83</td>
<td>11</td>
</tr>
<tr>
<td>Intensive-care units</td>
<td>66</td>
<td>11</td>
</tr>
<tr>
<td>Outpatient clinics</td>
<td>73</td>
<td>10</td>
</tr>
<tr>
<td>Wards</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Radiology</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>Dental</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Pathology</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>572</td>
<td>15</td>
</tr>
</tbody>
</table>

HBsAb seroprevalence rates in healthcare workers

(>20%) were the Labor and Emergency Rooms, Anesthesiology, and Clinical Laboratory (Table); however, rates by department did not differ significantly (chi-squared, 13.37 with 14 df; P=.50).

Using our formula, we calculated that it would be cost-effective to pre-screen in our institution only if the expected HBsAb prevalence rate was at least 26.7%. Therefore, screening would not have been cost-effective in our hospital.

Discussion

Hepatitis B is endemic in Pakistan, with seroprevalence rates of 6% to 8% for HBsAg and 25% to 30% for HBsAb. We found lower seroprevalence rates in our healthcare workers compared to the general population. The reasons for this are unclear but may relate to educational background or economic class.

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