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.[2] 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 10^6 colony-forming units (CFU)/mL of large cells, as well as organisms grown without 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 and 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.

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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.[1] 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 follow-up in patients. Forty-four percent had a persistent pattern of colonization: two or more cultures over at least 2 weeks were consecutively positive for VRE until death or end of study period. Thirty-three percent had a clearing pattern of colonization: two or more cultures over at least 2 weeks were consecutively negative for VRE until death or end of study period. Twenty-three percent had an intermittent pattern of colonization: VRE was detected again before death or end of study period after at least three cultures negative for VRE over at least 3 weeks. This is very similar to the patterns that Montecalvo et al describe.

Molecular typing by pulsed-field gel electrophoresis (PFGE) of the VRE isolates also showed similar findings. PFGE on consecutive isolates in patients with persistent colonization demonstrated that two thirds of the patients maintained the same strain over time, whereas the remaining third acquired a different strain. In the patients with intermittent colonization, half the patients maintained the same strain, over periods of 3 to 15 months with negative cultures, while the other half acquired a different strain.

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* (VRE) COLONIZATION

	Pattern of VRE Colonization			
	Persistent N=14	Intermittent N=10	Clear N=15	*P**
Days hospitalized, mean	127	47	42	<.01
All antibiotics				
% hospital days on antibiotics, mean	87	75	65	0.37
Specific antibiotics				
% hospital days on vancomycin, mean	41	27	17	0.02

* One-way analysis of variance.

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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[2]; 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[2] 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.[1] 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 prevaccination 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 HBsAg 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 three doses of Engerix B vaccine (SmithKline Beecham, Philadelphia, PA) is $30. Prescreening cost-effectiveness was determined using the following formula for the prevalence of HBsAb above which screening is cost-effective:

$$100 \{ 1 - \frac{(CV - CT)}{CV} \} = \% \text{ prevalence}$$

where CV=cost of vaccine and CT=cost of test. This readily derived formula identifies the seroprevalence rates above which the cost of screening and vaccination would be lower than the cost of vaccination alone, whereas previously described calculations have used the cost of screening to determine cost-effectiveness.[2]

RESULTS

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

TABLE 1
HBsAb Seroprevalence Rates in Healthcare Workers

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

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.

DISCUSSION

Hepatitis B is endemic in Pakistan, with seroprevalence rates of 6% to 8% for HBsAg and 25% to 30% for HBsAb.[3] 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 be not be cost-effective for our institution to prescreen our employees before HBV vaccination. Therefore, we recommended direct vaccination of all our employees, particularly as there are no adverse effects of vaccination in

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