

and the lack of negative-pressure rooms, high-efficiency particulate air filters, and UV irradiation lamps. It is also necessary to take into account data incidence among the population at large: these amount to 8.7 cases per 100,000 in the United States⁴ and 40 cases per 100,000 in Spain.⁵

Bacille Calmette-Guérin vaccination data did not provide significant results and were not included in the final model. This result could imply an absence of any protection against conversion or the loss of that protection over time.

In conclusion, the incidence of TST conversion at the Puerta del Mar Hospital is high by comparison with other centers. Age, employment in a high-risk work area, and job category all were associated with *Mycobacterium tuberculosis* infection. Our screening and risk reduction programs for hospital staff should take into consideration the risk profiles described in this study.

Dedicated to the memory of Dr. Zarzuela-Ramírez's father, Manuel Zarzuela-Boy.

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Risk of Hepatitis A Among Hospital Personnel in an Intermediate-Endemicity Area

To the Editor:

Hepatitis A virus (HAV) infection has a worldwide distribution, and, like other enterically transmitted infectious diseases, its prevalence is strongly tied to levels of socioeconomic development and standards of hygiene.¹ Results of surveys carried out in countries such as France or Belgium have suggested that healthcare workers are at higher risk of hepatitis A.^{2,3} However, data from other surveys have not demonstrated an increased prevalence of HAV antibody in this group compared with control populations.^{4,5} European Mediterranean countries have been considered classically as areas of moderate endemicity for HAV, where infection occurs mainly in children and young adults.¹ However, epidemiological surveys carried out in recent years in Southern European countries have shown a decrease in the prevalence of antibodies against HAV and a change in the epidemiological pattern of HAV infection.⁶ In fact, the prevalence of anti-HAV antibody has dramatically decreased in Spain in the last 15 years, resulting in a growing proportion of susceptible children and young adults.^{7,8} The aim of this study was to determine whether hospital healthcare workers can be considered as a group at increased risk of hepatitis A in a country with intermediate endemicity of HAV.

The study population included healthy personnel between 18 and 45 years of age at one University General Hospital in Madrid, Spain. All healthcare workers and volunteers with nonhealthcare occupations who were seen by the Preventive Medicine Department for routine health check-ups during 1996 were invited to participate. Information on age, gender, type of occupation, and years of professional activity was recorded. A 10-mL blood sample was collected for anti-HAV antibody determination by an enzyme-linked immunosorbent assay (Abbott Laboratories, Chicago, IL) in the Laboratory of Microbiology of the hospital.

Mean age in years ($\pm$ standard deviation [SD]), mean duration of professional activity in years ($\pm$ SD), and

gender distribution at enrollment were calculated for both groups and were compared by analysis of variance (one-way) and chi-square tests, respectively. The overall prevalence of anti-HAV antibody in the two study groups, as well as the prevalence stratified by age (18-24, 25-31, and >31 years) and duration of activity (1-5 and >5 years), were calculated. The association between the prevalence of anti-HAV antibody and group (healthcare and nonhealthcare), controlled for age and duration of activity, was evaluated by Mantel-Haenszel stratified analysis (two-tailed) with calculation of the odds ratios and their 95% confidence intervals (CI_{95} , Cornfield's method). All statistical analyses were carried out using Epi Info (version 6.5; Centers for Disease Control and Prevention, Atlanta, GA).

A total of 182 subjects were recruited during 1996, 6% of all hospital personnel between 18 and 45 years of age. Of these, 68 (37%) had nonhealthcare occupations (mainly food handlers, cleaning personnel, and maintenance workers) and had a mean age of 31.7 (± 6) years and a mean duration of activity of 9.0 (± 2) years; 36% were male. The remaining 114 (63%) were healthcare workers (physicians or nursing personnel) and had a mean age of 26.6 (± 4) years, and a mean duration of activity of 6.0 (± 1.5) years; 31% were male. Differences between groups in relation to age and duration of activity, but not gender distribution, were statistically significant ($P < .05$).

The prevalences of anti-HAV antibody of nonhealthcare personnel and healthcare workers were 54.4% (CI_{95} , 43%-66%) and 21.9% (CI_{95} , 14%-29%), respectively ($P < .01$). The Table shows the prevalence of anti-HAV antibody found in both groups (healthcare and nonhealthcare) when they were stratified by age and duration of professional activity.

These results show a lower level of anti-HAV prevalence among healthcare workers than among a control group of nonhealthcare personnel, even when age and duration of activity were controlled. The prevalence of anti-HAV antibody in relation to age in this group of physicians and nursing personnel was also lower than that found in samples of the Spanish population of similar age.^{7,8} These results suggest that, in areas where hepatitis A is still moderately endemic, healthcare activity is not a risk factor for HAV infection and that presence of

anti-HAV antibody is more likely to be associated with other factors, such as socioeconomic level or standards of hygiene. A relatively low level of HAV seropositivity was found among the group of physicians and nursing personnel younger than 31 years of age (10% and 23% for the groups of age of 18-24 and 25-31 years, respectively). Moreover, the prevalence of anti-HAV antibody has been falling over the last 2 decades, so it is likely that future healthcare personnel increasingly will be susceptible to HAV infection.^{7,8} In addition, physicians and nursing personnel are more likely than the general population to have contact with contagious patients, and outbreaks of hepatitis A among healthcare personnel have been described.^{9,10}

Studies to determine the incidence of hepatitis A in this population, as well as clinical studies to show the effectiveness of HAV vaccine in post-exposure prophylaxis and cost-effectiveness studies for different strategies, will be needed to formulate specific recommendations for the appropriate use of hepatitis A vaccines in healthcare personnel.

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TABLE

ASSOCIATION BETWEEN HEPATITIS A PREVALENCE AND PROFESSIONAL ACTIVITY, CONTROLLING FOR AGE AND DURATION OF ACTIVITY

	Prevalence of Anti-HAV			
	Healthcare Worker		Nonhealthcare Worker	
	N	Prevalence	N	Prevalence
Age (y)*				
18-24	72	10%	17	29%
25-31	22	23%	20	35%
>31	20	65%	31	81%
Duration of activity (y)†				
1-5	84	11%	34	26%
>5	30	45%	34	82%

Abbreviations: CI₉₅, 95% confidence interval; HAV, hepatitis A virus; OR, odds ratio.

* Healthcare versus nonhealthcare: OR, 2.5; CI₉₅, 1.1-5.9; P=.02.

† Healthcare versus nonhealthcare: OR, 4.1; CI₉₅, 1.8-9.2; P=.0004.

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Hepatitis B Morbidity in Municipal and Hospital Waste Collection Workers in the City of Rio de Janeiro

To the Editor:

Occupational exposure of municipal and hospital waste collection workers has been the subject of some studies in recent years, mainly because of the growing public concern about environmental and worker health issues.

Stratton et al¹ identify hepatitis B virus (HBV) as an occupational risk for healthcare and related occupation workers. We studied occupational exposure of municipal and hospital waste collection workers to HBV with the aim to compare both populations and to evaluate their HBV morbidity and mortality and the necessity of occupational prevention.

A cross-sectional morbidity study of hepatitis B was conducted between May and July of 1996 among hospital collection workers and in a sample of municipal waste collection workers of Municipal Urban Cleaning Company of Rio de Janeiro (COMLURB).

The "exposed group" consisted of all workers serving specific hospital waste collection routes. As identi-

fied by COMLURB, 32 workers served those routes.

The "non-exposed group" consisted of a sample of the municipal waste collection worker population. As the hospital waste collection is carried out during the day, in the study, only the municipal waste collection workers who work daylight hours were considered, totaling 503 individuals. A sample of 156 workers was sought based on an estimated hepatitis B prevalence of 16% for this population.²

From each worker a blood sample of 10 mL was collected by vacuum. The samples were taken to the Virology Laboratory of the Pathology Clinic at Clementino Fraga Filho Hospital of the Federal University of Rio de Janeiro, where the serum was preserved in a cool chamber. The enzyme-linked immunosorbent assay tests AUSAB (anti-hepatitis B surface antigen [HBs]) and CORZYME (anti-hepatitis B core antigen [HBc]) were used (Abbott Laboratories, North Chicago, IL).

Workers were considered to have previous exposure if either anti-HBc or anti-HBs (without previous vaccination) were presented.

Two nonexposed workers did not agree to have their blood drawn. The blood collected from one of the exposed workers was insufficient to accomplish the tests. As shown in the Table, the prevalences of HBV markers among the remaining municipal and hospital waste collection workers were 14.2% and 12.9%, respectively, and did not statistically differ.

There are no prevalence data of hepatitis B for the Rio de Janeiro population to compare with the results of