INADEQUATE HEPATITIS B VACCINATION OF ADOLESCENTS AND ADULTS AT AN URBAN COMMUNITY HEALTH CENTER

Joshua Sharfstein, MD, and Paul H. Wise, MD, MPH
Boston, Massachusetts

Hepatitis B remains a major public health problem in the United States, but public vaccination policy has targeted infants rather than the high-risk adults who constitute the vast majority of patients at imminent risk of infection. The effects of this policy were studied at a community health center in Boston. Adolescents and adults who attended a community health center between January 1, 1992 and May 31, 1993 and had human immunodeficiency virus (HIV) or another sexually transmitted disease (STD)—indications for vaccination according to the Centers for Disease Control and Prevention—were identified through chart review. The vaccination rate and missed opportunities were determined. In addition, directors of Boston health centers were surveyed on hepatitis B vaccine at their clinics.

Of 178 individuals with HIV or another STD and without serologic evidence of prior exposure to hepatitis B, two (1.1%) received the vaccine. There were 342 missed opportunities. Only two of 14 medical directors said their clinics routinely offered vaccine to individuals with STDs. The medical directors rated financial barriers as more important obstacles to hepatitis B vaccination than nonfinancial barriers. These results indicate that many high-risk adolescents and adults do not receive a preventive intervention that is federally recommended, potentially life saving, and cost effective. Inadequate public funding for vaccine may be a key barrier for this population. (*J Natl Med Assoc.* 1997;89:86-92.)

Key words: hepatitis B ◆ vaccination

Despite the approval in 1982 of a safe and effective vaccine to prevent its spread, hepatitis B virus infects an estimated 300,000 Americans each year, approximately 25,000 of whom will become chronic carriers at substantial risk of early death from fulminant hepatitis, chronic liver disease, and hepatocellular carcinoma.[1] Causing an estimated 5000 deaths a year,[2] hepatitis B is the third most deadly vaccine-preventable disease in the nation after influenza and pneumococcal pneumonia.[3]

Transmission of the hepatitis B virus occurs mainly in adolescents and adults through heterosexual activity, homosexual activity, and intravenous drug use, although a significant minority of patients have no identified source of infection.[4] Infections are several times more common in minority and socioeconomically disadvantaged communities,[5] as well as among individuals with a history of sexually transmitted diseases (STDs).[6] In response to this epidemiology, the Advisory Committee on Immunization Practices (ACIP) of the US Public Health Service

From the Harvard Institute for Reproductive and Child Health, Harvard Medical School, Boston, Massachusetts. This research was supported in part by a grant from Harvard Medical School. Requests for reprints should be addressed to Dr Joshua Sharfstein, c/o Boston Medical Ctr, Dept of Pediatrics, 818 Harrison Ave, Boston, MA 02118.

recommended in 1985 that all individuals with a recent history of multiple sexual partners, an STD, or intravenous drug use be vaccinated.[7] Yet 80% of adolescents and adults vaccinated between 1982 and 1990 against hepatitis B were health-care workers, a group that comprises just 4% of new infections.[5]

This failure to immunize high-risk adolescents and adults has been attributed to their lack of access to the health-care system, their lack of knowledge about hepatitis B, and physicians' inability to identify candidates for the vaccine when they do come to the clinic.[1,2] In addition, despite demonstrated cost savings with vaccination,[8] inadequate public funding has meant that many of those at highest risk for hepatitis B must pay the full cost of the vaccine (up to $200) themselves.[9]

In 1991, citing the failure to vaccinate high-risk adolescents and adults, the ACIP officially recommended universal infant vaccination against hepatitis B. Supporters of this approach argue that vaccinating infants is feasible and would prevent a substantial percentage of chronic infections.[10] But infant initiatives have been criticized by physicians who argue that resources should go first to those at greatest imminent risk of infection, especially given that the duration of immunity after vaccination is as yet unknown.[11] A recent study demonstrated that only 23% of family physicians and 53% of pediatricians in North Carolina in October 1992 routinely vaccinated newborns.[12] Recently, the new federal Vaccines for Children program has offered the promise of federally funded vaccine for high-risk children under the age of 18 who are uninsured or on Medicaid; whether this effort will survive remains to be seen. But the vast majority of individuals who contract acute hepatitis B in the United States are adults. For this group, the hope of a major initiative for vaccination remains unfulfilled.

To assess the clinical impact of these vaccination policies at the local level, we studied the effects of the current fragmented approach to funding hepatitis B recommendations on vaccination of high-risk adolescents and adults in community health centers in Boston. At one clinic, vaccination rates and missed opportunities for vaccination were determined among individuals with several common identifiable risk factors for hepatitis B. In addition, the medical directors of all of Boston's community health centers were surveyed on the comprehensiveness of their vaccination efforts and on their perceptions of barriers to vaccination of high-risk adolescents and adults.

METHODS

To examine hepatitis B vaccination practices in an area of significant need, a freestanding health center that serves a poor, inner–city community in Boston was selected. The study period began on January 1, 1992, which was the date that Massachusetts began to provide the hepatitis B vaccine free to all newborns.

Between January 1, 1992 and May 31, 1993, 3113 patients were seen at the adult medicine department at the clinic, 1621 in obstetrics/gynecology, and 2962 in pediatrics. Of these, 2579 were men (33.5%). Approximately 75% of the clinic's patients are African American, 13% are Hispanic, 4% are white, and 3% are Haitian.

Record Review

All laboratory and billing records for the health center between January 1, 1992 and May 31, 1993 were reviewed. A total of 324 adolescents and adults (>10 years old) seen in the adult medicine, adolescent medicine, and obstetrics/gynecology departments and had either a billed visit or a positive lab test for human immunodeficiency virus (HIV) or an STD were identified. The list of qualifying STD diagnoses was provided by the Hepatitis Branch of the Centers for Disease Control and Prevention, and included genital warts, herpes, trichomoniasis, urethritis, pelvic inflammatory disease, gonorrhea, chlamydia, and syphilis. Because HIV laboratory testing at the clinic is anonymous, and urethritis and pelvic inflammatory disease are clinical diagnoses made by the health provider, all cases for these three diagnoses were identified through billing only.

Of the 324 individuals identified through the laboratory and billing systems, the medical records of 283 (87%) were located. These records were reviewed to identify those who met two criteria: patients who were seen for HIV or an STD in the adult medicine, adolescent medicine, or obstetrics/gynecology departments between January 1, 1992 and May 31, 1993 and patients who had a "potential vaccine visit" in the study period, meaning a visit in which the provider clearly knew the patient had HIV or an STD and potentially could have given the vaccine. For the patients meeting these criteria, demographic, serological, and clinical data were recorded.

Potential opportunities for vaccination were assessed according to the following system, based on

ACIP vaccine recommendations.[2] The first opportunity for vaccination was the initial visit in the study period when the provider knew of the HIV or STD diagnosis. The second opportunity was any visit at least 1 month after the "first visit," and the third opportunity was any visit at least 2 months after the second. It also was noted whether the patient had a vaccination opportunity during a prenatal care visit and whether it was documented that vaccine was offered but not accepted by the patient.

Insurance status was documented as private, public, and no insurance. Public insurance programs included Medicaid (including Medicaid patients enrolled in a health maintenance organization), Medicare, and Act Now, a public program for persons with HIV. At the beginning of the study period, only Act Now paid for the hepatitis B vaccine for its clients. Beginning in February 1993, Medicaid also reimbursed for the vaccine for enrolled adolescents and adults with HIV or other STDs "on an individual–consideration basis" (L. Bannister, unpublished data, January 1992). None of the private insurance companies insuring more than five patients in our study covered the vaccine for this population. During the study period, a small city program established by a grant from the Boston Foundation was available to provide a total of 250 doses of vaccine to uninsured individuals.

Survey of Medical Directors of Community Health Centers

Hepatitis B infections are more common among minority individuals of lower socioeconomic status.[4] In Boston, this population is served by community health centers across the city, whose goal is to bring "a strong orientation toward the provision of preventive, outreach and social services in addition to their medical care component."[13] Using a list provided by the Massachusetts League of Community Health Centers, the medical directors of 25 Boston health centers were surveyed on their opinions of national hepatitis B policy, their clinics' use of the vaccine, and their perceptions of barriers to vaccine distribution. Fifteen (60%) of the 25 health centers responded to the survey. Because clinics affiliated with hospitals might have more resources for hepatitis B vaccination, the affiliations of responding and nonresponding clinics were compared. Responding and nonresponding clinics also were compared on whether they offer acquired immunodeficiency syndrome (AIDS) testing and adolescent health-care services, since these services might attract individuals who qualify for vaccination.

Data Analysis

Descriptive statistics for demographic information, clinical variables, and missed opportunities for vaccination were calculated using Stata 2.1.[14] For the survey of clinic medical directors, Microsoft Excel 4.0[15] was used for data tabulation and statistical analysis. A chi-squared test was used to compare responding and nonresponding clinics, and the nonparametric sign test was used to compare medical directors' views of financial with nonfinancial barriers to vaccination.[16] To do this, each of the financial barriers was compared with each nonfinancial barrier, one pair at a time.

RESULTS

Record Review

Of the 283 records reviewed, 219 adolescents and adults who attended the clinic from January 1, 1992 to May 31, 1993 were identified with diagnoses of HIV or a recently acquired STD. The 64 persons who did not meet inclusion criteria included 41 who had been initially misidentified; 13 who were notified of their diagnosis by phone and did not return again (no opportunity to vaccinate); 5 whose STD was not recently acquired; and 5 who were not patients in the adult medicine, obstetrics/gynecology, or pediatrics departments.

Of the 219 patients with clinical indications for vaccination, 41 (19%) patients had positive serologic tests indicating exposure to the hepatitis B virus, making them ineligible for the vaccine. Of the remaining 178 patients, 22 had not been exposed to hepatitis B as confirmed by a negative anti-HBc test or by negative anti-HBs and negative HBsAg tests. The remaining patients (156) had not been tested at all. This latter population was considered presumptively vaccine eligible because the ACIP does not recommend testing these individuals for prior exposure before vaccinating them.[2] Demographic, diagnostic, and insurance characteristics of the study population are presented in Table 1.

Of the 178 vaccine candidates, 2 (1.1%) patients received at least one dose of the vaccine by the end of the study period (Table 1). One was a man with AIDS who received one dose; he was one of 10 vaccine-eligible patients in the study covered by Act Now, the only insurance program that covered the

vaccine throughout the study period. Also vaccinated was a woman with syphilis who received the vaccine only because she was a health-care worker. Of the 178 candidates, 14 (7.8%) were identified as having an STD during a prenatal care visit. In no records was it noted that the vaccine had been offered but refused by the patient.

Missed Opportunities

The number of missed opportunities for vaccinating this population during the study period was tabulated. Sixty-seven (37.6%) patients could have received one dose of hepatitis B after their HIV or STD diagnosis, 55 (30.9%) patients could have received exactly two doses, and the remaining 56 (31.5%) patients could have received all three doses. There were thus 345 opportunities for vaccination. In total, three doses of vaccine were given to this population, leaving the remaining 342 as missed opportunities.

Survey of Medical Directors

Fifteen (60%) of 25 directors responded to the survey. Responding and nonresponding clinics were not significantly different in their institutional affiliation, as 8 of 15 (53%) responding clinics and 6 of 10 (60%) nonresponding clinics were freestanding (P=.74). Nor were responding clinics significantly different from nonresponding clinics in offering AIDS testing (66% versus 80%; P=.47) or adolescent services (80% versus 90%; P=.50). Information on nonresponding clinics was obtained from the Massachusetts League of Community Health Centers.[13]

Of responding medical directors, a clear majority supported the federal recommendation for infant vaccination, but agreed that high-risk adolescents and adults are equally deserving of the hepatitis B vaccine. All 15 medical directors said their clinics vaccinate infants against hepatitis B, including 12 (80%) who said they agreed with this recent federal recommendation and 3 (20%) who disagreed. When asked if vaccinating infants was a higher priority than vaccinating high-risk adolescents and adults, 12 (86%) of 14 directors responding answered no.

We next asked about hepatitis B vaccine distribution to adolescents and adults at the community health centers. Two (13%) of 15 medical directors reported having protocols to identify persons at risk of contracting hepatitis B, and 6 (40%) directors said their clinic provided patient information on hepatitis B vaccination targeted at high-risk adolescents and adults. When asked to estimate how many adolescents and adults are vaccinated for any reason at their clinic each month, 1 clinic director said none, 11 said 0 to 10 patients, 2 reported 11 to 20 patients, and 1 reported 21 to 40 patients.

Only two (13%) medical directors responded that their clinics routinely offered the hepatitis B vaccine to patients with urethritis, pelvic inflammatory disease, or another STD (Table 2). By contrast, 10 (67%) said they offered vaccine to HIV patients, 13 (87%)

Table 1. Characteristics of Patients Attending a Community Health Center With HIV or a Recently Acquired STD, With Hepatitis B Vaccine Eligibility and Vaccination Status

Category	No. Patients	Vaccine Eligible	No. (%) Vaccinated*
Total no. patients	219	178	2 (1.1)
No. females	122	109	1 (0.9)
No. males	97	69	1 (1.4)
Race/ethnicity			
African American	174	147	2 (1.4)
Latino	16	8	0 (0)
White	8	6	0 (0)
Other	21	17	0 (0)
Age (years)			
10 to 19	42	41	0 (0)
20 to 29	92	81	1 (1.2)
30 to 39	56	36	1 (2.8)
>40	29	20	0 (0)
Insurance			
Public	132	101	2 (2.0)
Private	23	21	0 (0)
Uninsured	64	56	0 (0)
Diagnosis			
HIV/AIDS	63	28	1 (3.6)
Urethritis	34	33	0 (0)
PID	8	8	0 (0)
Syphilis	27	23	1 (4.4)
Chlamydia	59	58	0 (0)
Gonorrhea	14	14	0 (0)
Warts	3	3	0 (0)
Herpes	3	3	0 (0)
Trich	8	8	0 (0)

Abbreviations: HIV=human immunodeficiency virus, STD=sexually transmitted disease, AIDS=acquired immunodeficiency syndrome, and PID=pelvic inflammatory disease.
*Vaccination rates are of vaccine-eligible persons.

Table 2. Comparison of Boston Community Health Centers and Availability of Hepatitis B Vaccine for High-Risk Patients

	No. (%) Centers	
Risk Factor	Offer Vaccine	Would Offer Vaccine If Free
Partner of hepatitis B case	14 (93.3)	14 (93.3)
Occupational	13 (86.7)	14 (93.3)
HIV positive	10 (66.7)	14 (93.3)
History of STD	2 (13.3)	10 (66.6)
PID	2 (13.3)	9 (60.0)
Urethritis	2 (13.3)	8 (53.3)

Abbreviations: HIV=human immunodeficiency virus, STD=sexually transmitted disease, and PID=pelvic inflammatory disease.

said they offered vaccine to health-care workers, and 14 (93%) said they offered vaccine to partners of persons with hepatitis B.

The medical directors picked cost as the major barrier to hepatitis B vaccination of high-risk adolescents and adults (Table 3). Lack of health insurance and unwillingness to pay for the vaccine out of pocket were rated significantly more important than other factors ($P<.05$). If free vaccine were available, 8 (53%) of the medical directors said their clinics would offer it to patients with urethritis, 9 (60%) said they would vaccinate patients with pelvic inflammatory disease, and 10 (67%) said they would vaccinate based on a history of another STD (Table 2).

We also asked whether the clinics had ever sought to obtain funding for the hepatitis B vaccine from Medicaid or another insurance company. Of the 13 directors who responded, 3 (23%) said they had tried and succeeded, 5 (38.5%) said they had tried and failed, and 5 (38.5%) said they had not tried. Of the three who succeeded, one commented, "very difficult process" and another wrote "often rejected–occasionally paid depending on carrier."

DISCUSSION

These findings reflect a fragmentation in the provision of hepatitis B vaccine. Over the 17 months of our study, as the Commonwealth of Massachusetts distributed more than 430,000 doses of the vaccine free to infants (L. Paushter, personal communication, May 1994), virtually no high-risk adolescent and adult patients at the clinic we studied obtained even the first dose. Fourteen of the women in our study were diagnosed with STDs during a prenatal care visit, and none was vaccinated.

While a comprehensive approach to fighting hepatitis B requires the inclusion of high-risk adolescents and adults, the United States thus far has been unsuccessful in vaccinating these groups. Yet there is little published research on obstacles to reaching and vaccinating eligible adolescent and adult patients against hepatitis B. One outreach project in Worcester, Massachusetts, found that 39% of susceptible drug users returned to the health department for a second dose, and the authors concluded that a "cost-saving outcome was likely" for the project.[17] A more recent project in STD clinics in the United States found that "immunization is acceptable to a large proportion of patients at risk" and noted return rates varying between 39% and 67%.[18] Efforts aimed at vaccinating adolescents in schools in California, Louisiana, and Oregon from 1992 to 1994 were also successful.[19] Fortunately, the Vaccines for Children program has offered the promise of hepatitis B vaccine to select groups of high-risk adolescents. Unfortunately, it is not clear that such funding will survive the current budget process.

Our study suggests that the absence of funding may be the most important barrier to vaccination of many adolescents and adults with HIV and STDs. The great majority of clinic directors surveyed felt that high-risk adolescent and adults were as high a priority as infants for hepatitis B vaccination. Yet in the clinic studied, just 1.1% of vaccine-eligible adolescent and adults had any hepatitis B vaccinations recorded in their files. Among all Boston clinics, only 2 of 15 reported vaccinating individuals with STDs as recommended by the ACIP. While we did not review records in these clinics, clinic directors might actually be overestimating what vaccination actually occurs.

The most significant reason cited by the clinic directors for low vaccination rates was that their patients could not pay for the vaccine. Were vaccine made freely available to their health clinics, 15 medical directors estimated that in total, they would be able to vaccinate at least 400 more high-risk adolescent and adult patients each month.

Our study suggests that eventually, most high-risk patients who see physicians in a community health center do return to the clinic. More than 60% of

patients in the study could have received at least two doses of the vaccine during their normal clinic visits over a 19-month period–without even having to remember to return for subsequent shots. During regular visits alone, 31.5% of patients could have received all three recommended doses. These numbers are lower estimates, as our data do not account for patients returning for care after our study period. To put the findings in context, a recent cost-benefit analysis showing net savings in the health-care system on immunizing this population assumed that 33% of patients would receive all three doses.[8] Using that study's estimates for vaccine effectiveness (0.9 for 3 doses and 0.60 for 1 or 2 doses) and disease incidence (0.50 over 10 years) for high-risk adolescents and adults, if none of the patients in the clinic had previously been exposed to hepatitis B virus, vaccination at every visit during the study period would have prevented approximately 60 hepatitis B virus infections over subsequent years.

While these data suggest that cost is a major barrier to vaccination, there are alternative explanations that are also possible. First, the fact that none of the patients in the clinic we studied were even offered the vaccine raises the possibility that some might have paid for it on their own. Second, as some medical directors would not target high-risk adolescents and adults even with free vaccine, it is possible that inadequate education of health-care providers contributed to poor vaccination rates. Third, the fact that many clinics may not have tried to obtain funding for hepatitis B vaccine, even when some insurance programs cover it, suggests that any program to distribute vaccine must be easily available to health providers. Indeed, underutilization of the hepatitis B vaccine because of inadequate provider education has been recognized as a problem in the British national health system, where the vaccine is free for those at risk.[20]

Generalization of one clinic's experience must be approached with caution as different clinical settings and state policies likely imply variation in vaccination practices. However, our study provides empirical insight into the troubling dichotomization of hepatitis B vaccination in a large health-care facility, in a city renowned for its medical care system, in a state with some of the most generous public guarantees of health care coverage.

Indeed, it is difficult to accept that more than 98% of any group in any clinic in the United States would fail to receive a preventive intervention that is federally recommended, potentially life saving, and cost effective. These findings suggest that adequate public financing may be crucial for a comprehensive and successful campaign to conquer hepatitis B.

Table 3. Perceptions of Boston Health Clinic Directors of Barriers to Hepatitis B Vaccination of High-Risk Adolescents and Adults*

Barrier	Mean Score
Our patients do not want to pay $150 out of pocket for the vaccine	4.6†
Our patients do not have health insurance for the vaccine	4.6†
Our patients do not understand the importance of the hepatitis B vaccine	2.8
Our patients have too many other health-care problems, so that hepatitis B cannot be addressed during a normal visit	2.6
Health providers are not fully aware of vaccine indications	2.6
Our patients would not return for second and third shots	2.3
Health providers are too busy for hepatitis B education and vaccination	2.3
It is difficult to identify those at risk for hepatitis B	2.1
Language barriers prevent explanation of hepatitis B vaccine	1.9
It is logistically difficult to schedule follow-up visits	1.8
We prescribe the vaccine but patients refuse to be vaccinated	1.8
Vaccinating against hepatitis B would cause our patients' insurance premiums to increase	1.6

*1=not important and 5=important.
†These barriers were rated significantly more important than the other, nonfinancial barriers as judged by sign test at $P<.05$.

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