Hepatitis B Vaccination Practices in State and Federal Prisons

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SYNOPSIS

Objective. Incarcerated populations are a group at high risk for hepatitis B. About 30% of people experiencing acute hepatitis B virus infection (HBV) have a history of incarceration. Offering routine HBV vaccinations to incarcerated individuals could have a significant effect on public health. The objective of this study is to identify current vaccine practices and the perceived feasibility of routine vaccinations for hepatitis B within correctional settings.

Method. The authors surveyed the medical directors of state correctional facilities in all 50 states and the federal prison system regarding current HBV vaccine practices. Surveys were faxed or mailed between July 1 and September 1, 2000.

Results. Thirty-five states and the federal system responded (response rate = 70.6%). These systems account for 77% of all inmates in federal or state prisons and jails. Two states give hepatitis B vaccine routinely, nine states offer no hepatitis B vaccine, and 26 states and the Federal Bureau of Prisons offer hepatitis vaccine to some inmates. Most states do not spend enough money to vaccinate even those prisoners at highest risk. Under the Vaccine for Children program, 19,520 youths could receive vaccine immediately. According to the respondents, if vaccine were available at no-cost, 25 states and the Federal Bureau of Prisons would routinely offer vaccination to all inmates.

Conclusions. Most correctional systems do not routinely offer vaccine to their incarcerated populations, but would if funds were available. There exists now a unique public health opportunity to prevent a significant proportion of new hepatitis B infections.

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INTRODUCTION

There are about two million individuals currently incarcerated in the United States, a number that has more than tripled since 1980.[1] In 1999, approximately 0.6% of the entire US adult population was in a state or federal jail or prison.[2] With an annual turnover rate as high as 800% in jails and 50% in prisons, incarcerated individuals are no longer separate from the rest of society.[3] Released inmates usually return to their communities, where they often continue to engage in behaviors that put them and their contacts at risk for blood borne and sexually transmitted infections.

Hepatitis B has been a vaccine-preventable disease for more than 20 years, yet there are approximately 8,000 new infections reported every year in the United States, and nearly ten times as many unreported new infections.[4,5] An estimated 22,000 births occur to women infected with the hepatitis B virus (HBV) each year, and infections during infancy, which account for only 1–3% of cases, account for 20–30% of chronic infections.[8] About 1.25 million Americans are chronically infected with HBV and therefore potentially infectious to others.[6] Five thousand hepatitis B related deaths occur each year as a result of cirrhosis and hepatocellular carcinoma, with the median age of death occurring in the fifth decade of life.[5] Recommendation for universal hepatitis B vaccination of infants in the United States was made in 1991, and recommendation for "catch-up" hepatitis B vaccination for 11- to 12-year-olds was made in 1995.[7] The federal Vaccines for Children (VFC) program, begun in 1993, provides free vaccine for eligible children under 19 years of age. With these recommendations and the availability of free vaccine for many children, transmission of HBV infection is expected to decrease significantly in the future. However, the overall effects of this decrease in transmission may not be seen for several decades.[6,9] Acute HBV infections will continue to occur at significant rates in the coming years, as many adolescents and young adults are still not getting vaccinated and will likely put themselves at risk for HBV infection through sex and drug-use behaviors.

Over 75% of HBV infections in adults occur among persons who have defined risk factors for HBV infection,[6] and more than half of these persons could have been vaccinated on the basis of known risk factors during a previous institutional encounter (e.g., during treatment at an STD clinic). Incarceration in prison or jail is just such an institutional encounter, where there is an opportunity to prevent HBV infection among many at-risk individuals before they re-enter their communities.[9–11] Previously incarcerated individuals are a population at high risk; about 30% of persons with acute HBV infection report a history of incarceration.[12] Individuals detained within prisons or jails are among those at the highest risk for HBV infection due to a high prevalence of drug injection and risky sexual practices among offenders.[3,13,14] Injection drug users in particular represent the group most at risk for hepatitis B, and about 83% of the nation's two million injection drug users are incarcerated at some time during their lives.[15,16] Furthermore, injection drug use and high-risk sexual activity continue to take place once individuals are incarcerated, and intra-prison HBV transmission can occur since protective measures such as sterile needles and condoms are seldom available within prisons.[16–20] The seroprevalence of markers for HBV infection within incarcerated populations is high, ranging from about 16% to 50%.[12,13,21–23] The risk of intra-prison transmission is highlighted by a recent outbreak of hepatitis B within a state correctional facility. Serological testing for acute hepatitis B in that entire facility revealed an incidence of 1.2% per six months, and that investigation is ongoing.[12] In Rhode Island, we found the incidence of hepatitis B infection to be 12.2/100 person-years among re-incarcerated female offenders, confirming further that this population, whether in or out of the correctional setting, is at high risk of acquiring hepatitis B.[24]

OBJECTIVES

Vaccinating inmates of long-term correctional facilities has been a recommendation for over a decade, but current and former inmates continue to constitute a significant proportion of new HBV infections.[6] Despite available information about the pressing need for hepatitis B vaccination in prisons, information about the feasibility of routine vaccination and the actual vaccination practices of various correctional facilities is scarce. Many factors must be considered before implementing routine vaccination in prisons, among them how vaccination would fit into existing medical service delivery, whether correctional officials and prison health care providers would support such programs, and whether funding would be available from state or Federal governments. To ascertain current vaccination practices, interest in routine vaccination, and the feasibility of providing routine vaccinations in prison settings, we surveyed all 50 state Departments of Correction and the Federal Bureau of Corrections regarding hepatitis B vaccination of prisoners.

METHODS

We mailed a two-page survey directly to the Medical Director or institutional equivalent in each state's Department of Corrections and the Federal Bureau of Prisons in July and August of 2000. The survey included questions about the prison population, the amount of money spent on hepatitis B vaccine for inmates and the health care budget for the Department of Corrections. It also inquired about current vaccination practices, and asked about the feasibility of providing routine vaccinations if the vaccine were provided at no cost. Finally, we asked whether facilities had tracked occurrences of an outbreak of hepatitis B ever, or in the past year, and whether estimates of the seroprevalence of HIV, hepatitis B and C in state facilities were available. Follow-up surveys were sent to nonrespondents with follow up phone calls; for the two states reporting routine vaccination, we conducted semi-structured interviews via email. Surveys were returned by fax or by mail. Data was tabulated in Microsoft Excel. Vaccination practices were mapped across the United States. We estimated the number of inmates that would have access to hepatitis B vaccine based on questionnaire responses and calculated the cost of hepatitis B vaccinations per inmate in the facilities that offered vaccinations.

RESULTS

We had 36 responses—35 from the states and one from the Federal Bureau of Prisons, representing a response rate of 70.6% (Table 1). Respondents reported the most recent data available, which was usually from 1999. Our sample had jurisdiction over a total daily population of 1,048,412 individuals, representing 77% of the total 1,366,721 inmates under the jurisdiction of state and federal prison authorities.[1] Among respondents, the mean average daily population was 29,214 inmates (range: 1,008 – 159,700), with the federal system holding 120,000 inmates, Texas holding 154,000, and California holding 159,700 inmates. All respondents had jurisdiction for their entire state, or in the case of the federal system, the entire country. In our sample, a total of 424,291 people were admitted annually, representing 69% of the 615,226 annual admissions to state or federal prisons.[25] Of all inmates in custody of their state Department of Correction, 2.1%, or 22,204, were under the age of 19, and therefore eligible for free vaccine under the Vaccines for Children (VFC) Program. On average, 8.3% of inmates were female and 91.6% were male.

Nine of the responding states do not offer hepatitis B vaccine to inmates. Of the 27 respondents (26 states and the Federal Bureau of Prisons) that do offer hepatitis B vaccine to inmates, only two states, Texas and Michigan, offer routine hepatitis B vaccination. Neither Texas nor Michigan routinely screens for hepatitis B immunity. The remaining 24 states and the Federal Bureau of Prisons offer hepatitis B vaccination in limited circumstances. Two of these 24 states routinely screen all their inmates for hepatitis B immunity. Fifteen states vaccinate inmates when a physician orders it; 11 states vaccinate inmates considered "at-risk" based on either community behaviors (e.g., injection drug use) or prison activity; 11 states vaccinate inmates who have hepatitis C; 10 states vaccinate inmates who have HIV; two states vaccinate inmates who request it; and one state, Hawaii, routinely vaccinates all inmates sentenced for more than one year (categories are not mutually exclusive). Of the nine states not offering any vaccination, one noted the cost was prohibitive and two deemed it "medically unnecessary."

Twenty-five states and the Federal Bureau of Prisons stated they would offer routine vaccinations to all inmates if they had access to free hepatitis B vaccine. This represents 927,615 inmates who could be vaccinated against hepatitis B today if funds were made available. Of the 25 state Departments of Correction that would routinely vaccinate inmates if vaccine were free, 14 do not use the VFC program, even though these 14 states have 10,635 inmates under 19 years of age under their combined jurisdictions (Table 2).

Nine states reported that they would not offer routine vaccinations even if the vaccine was free. Of these, two reported they lacked the infrastructure to do so, two reported that it would not be a good use of limited personnel resources, and one state reported it would continue to vaccinate only a subset of inmates.

Fourteen respondents reported the amount of money their Departments of Correction spend on hepatitis B vaccinations per year. Two states offer vaccine to all inmates; Michigan spent $1,000,000 and Texas spent $12,322,490. Of the remaining 12 states, the average spent per year on vaccines was $33,194. Using $23.25 as the price for one dose of hepatitis B vaccine under the federal contract, we estimated the number of doses each of these prison systems purchased.[26] Based on this calculation, enough doses were purchased in Texas to fully vaccinate each of the 154,000 inmates in that system. In Michigan, enough doses were purchased to fully vaccinate about one-third of their 44,767 inmates. Vermont was the only other state that spends enough money to fully vaccinate a significant portion of its inmates, purchasing enough vaccine to give three doses

Table 1. Hepatitis B vaccination practices in state and federal prison systems: 2000

Respondent	*Average Daily Population (ADP)*	*Number of admissions/year*	*Do you offer hepatitis B vaccination to any inmates?*	*If hepatitis B vaccine were available free of charge, would you routinely vaccinate all inmates?*
Alaska	2,734	19,344	No	
Arizona	26,300	14,000	Yes	Yes
California	159,700	115,000	Yes	Yes
Colorado	16,000	7,000	Yes	Yes
Delaware	6,245	27,483	Yes	No
Federal Bureau of Prisons	120,000		Yes	Yes
Georgia	40,000	16,000	Yes	Yes
Hawaii[a]	5109	13,944	Yes	No[a]
Idaho	5,010	2,750	No	No
Illinois	46,000		Yes	No
Indiana	25,000	10,000	Yes	Yes
Kansas	8,604	3,156	No	Yes
Kentucky	14390	7824	No	No
Massachusetts	10,894	8,000	Yes	Yes
Maryland	25,000	7000	Yes	Yes
Maine	1,611		No	Yes
Michigan[b]	44767	8153	Yes	Yes
Minnesota	6416	4400	Yes	Yes
Missouri	27,500		No	No
Montana	2,500	1,250	No	Yes
North Carolina	31,605	2000	Yes	Yes
North Dakota	1,008		Yes	Yes
Nebraska	3600	1500	Yes	Yes
Nevada	9,959	4479	Yes	No
New York	71493	29505	Yes	Yes
Ohio	46,000	18,252	Yes	Yes
Oklahoma	21,788	7,362	Yes	Yes
Pennsylvania	36,000	6,653	Yes	Yes
Rhode Island	3,300	15,000	Yes	Yes
South Dakota	2,500		No	No
Tennessee	16,900	8,300	Yes	Yes
Texas[b]	154,000	39,000	Yes	Yes
Utah	5,408	4000	Yes	Yes
Virginia	35,000	12,000	Yes	Yes
Vermont	1,350	4,000	Yes	No
Washington	14721	6936	Yes	Yes

[a]Hawaii routinely vaccinates any inmates incarcerated for more than one year.

[b]Michigan and Texas already provide routine vaccinations to all inmates.

to about two-thirds of its inmate population. The remaining 11 states reporting financial data spend enough to give full doses of vaccine to 0.2–8.6% of their inmate population, or to an average of 2.5% of their inmates. The Texas, Vermont and Michigan Departments of Correction respectively spend 4.26%, 1.2%, and 0.71% of their total health care budget on HBV vaccine, to fully vaccinate 100%, 66% and 33% of their inmates, on average.

Semi-structured interviews with Texas and Michigan revealed that the benefit to the community as well as the benefit to inmates were factors in beginning routine vaccination. Initially providing vaccine to all inmates has been a separate logistical issue, given the

Table 2. Prison systems that would offer routine hepatitis B vaccination if vaccine was free: 2000

Responding states	*Number of inmates younger than 19 (% of ADP)*[a]		*Number of female inmates*[a] *(% of ADP)*	
Arizona	1578	(6.0%)	1841	(7.00%)
California	1956	(1.2%)[b]	11,179	(7.00%)
Colorado	320	(2.0%)	1600	(10.00%)
Federal Bureau of Prisons				
Georgia			3000	(7.50%)
Indiana	1500	(6.0%)	200	(20.00%)
Kansas	89	(1.0%)	602	(7.00%)
Massachusetts			763	(7.00%)
Maryland	2500	(10.0%)	1000	(4.00%)
Maine			64	(4.00%)
Michigan	45	(0.1%)		
Minnesota	257	(4.0%)	385	(6.00%)
Montana	75	(3.0%)	385	(20.00%)
North Carolina	2212	(7.0%)	1925	(6.00%)
North Dakota			50	(5.00%)
Nebraska	27	(0.8%)	252	(7.00%)
New York	929	(1.3%)	3503	(4.90%)
Ohio	2116	(4.6%)	5474	(11.90%)
Oklahoma	763	(3.5%)	2222	(10.20%)
Pennsylvania	1404	(3.9%)	1512	(4.20%)
Rhode Island	33	(1.0%)	198	(6.00%)
Tennessee	101	(0.6%)	896	(5.30%)
Texas	3296	(2.4%)	12012	(7.80%)
Utah	54	(1.0%)	379	(7.00%)
Virginia			7000	(20.00%)
Washington	265	(1.8%)	1089	(7.40%)
Totals	19,520		57,531	

[a]Empty cells represent no response. Thus, these totals underestimate the true totals.

[b]California maintains about 6,000 inmates age 15–25 within a separate incarceration system, under a different department and director than the California Department of Corrections (personal communication, E. Horowitz MD). For all analysis and discussion, we refer to the number of youths within the California Department of Corrections only.

large size of the average daily population in proportion to the number of new admissions per year, though providing routine vaccine to newly incarcerated persons has not presented unusual logistical problems. In both states, inmates receive the first dose at intake processing. The programs are well accepted by both prison staff and prisoners. One problem noted was that inmates are not always well informed about the benefits of vaccination, and thus sometimes refuse it.

DISCUSSION

Only two of 36 responding states offer routine hepatitis B vaccinations to all of their inmates. However, 25 states and the Federal Bureau of Prisons, responsible for 927,615 inmates or 68% of the entire incarcerated population in United States, reported that they would routinely vaccinate their inmates if funding for vaccine was available. Only a small percentage of state facilities reported that they do not have the infrastructure to provide this kind of coverage. Almost 20,000 persons under the age of 19 reside within these 25 state systems, and could be vaccinated today under the Vaccine for Children program. About 2% of the entire incarcerated population is under the age of 19, and therefore eligible for free hepatitis B vaccine through the VFC program. These youth may face the greatest lifetime risk of any incarcerated persons for hepatitis B infection, given the number of future years they have to practice unsafe sex or drug use. Additionally, immediately vaccinating the 8% of inmates who are female could greatly reduce future cases of vertical transmission within this extremely high-risk group.

Some states incarcerate youths separately from

adults, often under a separate departmental authority. Our results do not account for any youths incarcerated outside of their state's Department of Corrections. For example, California has an additional 7,500 persons, aged 12–25, under the supervision of a separate department and director. Vaccine for Children-eligible inmates in this division do receive hepatitis B vaccinations. However, this may not be the case elsewhere, and states may be missing an opportunity to vaccinate these VFC-eligible youths.

Most state Departments of Correction do not vaccinate inmates who are at risk for hepatitis B infection. In those states that do report vaccinating at-risk inmates, crude financial analysis shows that only a fraction of those inmates "at-risk" for hepatitis B infection could actually receive vaccine. While many states report offering vaccines to subsets of inmates, no state reports spending enough money to vaccinate more than 8.5% of their inmates, with the exception of Texas, Michigan, and Vermont. If states decided to vaccinate only the 20% of inmates who report a history of injection drug use, no state besides Michigan, Texas, or Vermont spends enough to vaccinate even these high-risk inmates. While CDC guidelines have called for vaccinating persons in correctional facilities since 1991, clearly this recommendation has not been carried out.[4]

Limitations to this study include the brief nature of the survey, the reliance on self-report by medical directors, and the complexity of state correctional bureaucracies that makes it possible to miss other sources of information. The strengths of this study include the reasonably good response rate, the proportion of inmates represented, and the correlation between the amount of money reported spent on vaccine by Texas and Michigan and the number of inmates they routinely vaccinate.

The apparent difference in proportion of inmates vaccinated by the vaccination programs in Michigan and Texas may be explained by several factors. The program in Michigan has been in existence since 1994, while Texas began in 1999. There are, undoubtedly, more inmates who are already vaccinated in Michigan. Our calculations assume that all inmates receive all three doses of vaccine, but inmates in Michigan may be released, on average, sooner than inmates in Texas, and therefore may not be present to receive scheduled second or third doses. Providing fewer than three doses of the hepatitis B vaccine still provides a protective benefit against HBV infection.[27] Thus, even if a state's routine vaccination program can give only one or two doses due to inmate release or other logistical issues, there is benefit to both public health and the inmate's health.

Although we did not do a formal cost benefit analysis, vaccination of this population is likely to be more cost-effective than providing treatment to current or former inmates with chronic infection (which occurs in 5–10% of individuals infected with HBV as adults). The criminal justice system brings high-risk adults into contact with an established health care infrastructure, and so the main cost of vaccinating these individuals is the cost of the vaccine. The cost of not vaccinating this population can be significant. Interferon treatment for chronic HBV infection costs about $5,700 and is only modestly effective; Lamivudine treatment for chronic infection costs about $1600 per year, may require treatment for up to three years, and is also not completely effective.[28–30] For infected individuals who either fail treatment or go untreated, the suffering and cost of end-stage liver disease can be enormous.[31]

CONCLUSION

Hepatitis B infection among high-risk adults is a large problem that can be prevented with routine vaccination. Incarceration provides a unique opportunity to offer vaccine to a substantial proportion of high-risk adults. Most correctional systems do not offer vaccine to the majority of their inmates, but would do so if vaccine costs were defrayed.

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