How Important is Early Childhood Hepatitis B Vaccination?

A Survey of Primary Care Physicians

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BACKGROUND. Although early childhood hepatitis B vaccination rates have risen dramatically in the United States, there are still areas with low rates. Understanding the barriers to vaccination as perceived by primary care physicians is key to raising rates in such areas.

METHODS. A stratified random sample of family physicians, pediatricians, and general practitioners—younger than age 65 and having office-based practices across the United States—was selected from the American Medical Association physician list, including nonmembers. A standardized telephone survey was conducted by trained interviewers in 1995. Physicians seeing 5 or more patients younger than age 6 per week and having a practice comprising ≥50% primary care patients were eligible.

RESULTS. Most physicians (78%) rated the importance of hepatitis B vaccine as high. Based on regression analyses, the primary determinants of the importance of hepatitis B vaccine were: no stated concerns about its routine use (odds ratio [OR] = 2.8; 95% confidence interval [CI], 1.7 - 4.7), low disease incidence/importance in the practice (OR = .33; 95% CI, .18 - .60), preference for administering hepatitis B vaccine during adolescence (OR = .36; 95% CI, .18 - .72), specialty as family physician (OR = .36; 95% CI, .23 -.57), and specialty as general practitioner (OR = .37; 95% CI, .21 - .63).

CONCLUSIONS. Most primary care physicians recommend hepatitis B vaccination, although a number of concerns exist. Given that only 4 years had elapsed from the time of the new recommendations for routine early childhood hepatitis B vaccination in 1991 until this survey, remarkable progress has been made.

KEY WORDS. Hepatitis B vaccines; vaccination; economics; hepatitis B virus; child health; infant. *(J Fam Pract 1998; 47:370-374)*

Following the adoption in 1991 of recommendations for routine early childhood hepatitis B vaccination, immunization rates rose dramatically from 8% in 1992 to 82% in 1996. Thus, the national goal of a 70% hepatitis B immunization rate was achieved.[1] However, rates differed across the country, ranging from 57% (Wyoming) to 93% (South Carolina).

Previous surveys of physicians revealed concerns about hepatitis B vaccine including: low prevalence of hepatitis B virus (HBV) infection; too many additional injections; unknown duration of efficacy; cost, and lack of reimbursement; low risk of HBV exposure as a child; and parental resistance.[2-8] Most of these surveys were conducted in only a single state; thus, generalizability may be limited.[2,3,5-8] For this study, we conducted a national survey about early childhood vaccinations, including hepatitis B.[9,10]

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METHODS

We studied a stratified random sample of 3681 physicians in the 50 states, obtained from the American Medical Association's physician list, including nonmembers. The sample consisted of equal-sized strata of general pediatricians (PEDs), board-certified family physicians (FPs), and general practitioners (GPs), including noncertified family physicians. Physicians seeing 5 or more patients younger than age six per week and having a practice comprising ≥50% primary care patients were eligible.

Computer-assisted telephone interviews were conducted in 1995. We used one common set of questions and two subsets; potential participants were randomly assigned to a subset before contact.[9,10] In this context, we report the findings related to hepatitis B from the 634 physicians in subset 2. Demographic data pertain to all physicians regardless of assigned subset.

To generalize the results to the nation, we weighted the data by the estimated fraction of eligible physicians in each specialty.[11,12] The survey responses on

hepatitis B vaccine importance used a 0 to 10 Likert scale that grouped responses as unimportant (0-3), intermediate (4-6), and important (7-10). For regional analyses, we used the definitions of the National Center for Health Statistics, but after data inspection, some regions were combined to simplify presentation. Location (rural or urban) was determined from 1990 census data, according to the ZIP code. We used chi-square tests of association and logistic regression with forward selection; variables significant at $P < .01$ were retained in the regression model. We used SAS Institute software (SAS Institute Inc, Cary, NC) to do the calculations.

TABLE 1

Physicians' Concerns About Routine Use of Hepatitis B Vaccine for All Young Children, by Physician Specialty

Concern	Respondents Within Each Specialty Expressing the Concern, %* FP (n = 180)	GP (n = 118)	PED (n = 336)	Overall† (n = 634)
None	24‡	40	44	37.1
Unproven duration of vaccine efficacy	30§	14	25	26.0
Too expensive	24§	18	14	17.7
Low disease incidence/ unimportant to my practice	11§	13	6	8.3
Preference to administer to adolescents—not infants	9	3	6	6.9
Safety/side effects	9‡	14	3	5.5
Too many additional injections	8	5	4	5.1

FP denotes family practice; GP, general practitioners; PED, general pediatrician.
Note: More than one response could be given, so the total is >100%. Other answers included: prefer to give to high-risk persons only (2%), efficacy and immunogenicity concerns (1%), prefer to administer both to infants and adolescents (0.9%), ethics of administering vaccine to infants for a high-risk adolescent or adult behavior (0.5%), difficulties in completing a 3-dose series (0.4%), confusion about dosing and catch-up vaccination (0.4%), and other (3%).
*Column percentages of only one row of each 2x3 table is shown.
†The percentages in this column are weighted.
‡$P < .01$.
§$P < .05$.

RESULTS

Introductory letters were sent to 3681 physicians, 2100 of whom were determined eligible. An office staff member refused the interview in 331 cases, without direct communication between the physician and the interviewer.[9] Among the remaining 1769 physicians, 1236 gave interviews, resulting in a 70% response rate.[9] On the basis of data from the AMA file, there were no substantial differences between respondents and those who refused, apart from specialty; PEDs (76%) were more likely to respond than GPs (63%) or FPs (66%; $P < .001$).[9]

DEMOGRAPHICS

The mean age of the 1236 participants was 45±9 years; 71% were men. The racial breakdown was 82% white (non-Hispanic), 10% Asian, 3% African American, 2% Hispanic, and 3% other. Overall, 86% of survey participants were board certified, and most (86%) worked in metropolitan areas; 40% were in a 1- or 2-person practice; 33% worked in practices of 3 to 5 physicians; and 27% were in practices of 6 or more physicians. Additional demographic data were published elsewhere.[9]

HEPATITIS B VACCINE

We asked physicians to rate the importance of immunizing all young children against hepatitis B. Most (78%) rated it as important, 7% believed it is unimportant, and 15% gave it an intermediate rating. These ratings were not associated with practice location, since 70% of the rural physicians and 78% of urban physicians gave immunization high ratings. Importance varied by specialty; high ratings were reported by 85% of PEDs, 70% of GPs, and 65% of FPs ($P = .0001$). When asked the percentage of children younger than age 2 in their practice for whom they recommended hepatitis B vaccine, 513 of the 626 respondents (82%) recommended it for all infants; by specialty, 92% of PEDs, 65% of GPs, and 74% of FPs ($P = .001$).

The frequency and types of concerns about hepatitis B vaccination during infancy varied by specialty (Table 1). Concern about expense, for example, was noted by 24% of FPs, 18% of GPs, and 14% of PEDs ($P \leq .01$). Concern about low disease incidence in the practice was reported by 7% of rural and 8% of urban physicians ($P = .70$).

Not surprisingly, those reporting lower ratings of the importance of hepatitis B vaccination during infancy were more likely to list concerns (Table 2). Reporting of no concerns occurred in 6%, 24%, and 43%, respectively, of those rating the vaccine as unimportant, of intermediate importance, and important ($P < .01$).

Region

The percentage of physicians that recommended hepatitis B vaccination varied by region: Mountain (69%), New England and Mid-Atlantic (91%), East and West North Central (80%), South Atlantic and East South Central (82%), Pacific (77%), and West South Central (82%; $P = .019$). The importance that physicians place on vaccination did not vary by region. Only two concerns varied by region: expense and adverse effects. Although concern about expense was related to region ($P = .001$), we note that state policies for universal vaccine purchase and free distribution to private providers also varied by region ($P = .001$). Since physicians in universal vaccine purchase states were less likely to cite expense than others (10% vs 19%, $P = .04$), we believe that the region is confounded by universal purchase state. The percentage that cited concern about adverse events was, by region: Mountain (1%), New England and Mid-Atlantic (3%), East and West North Central (5%), South Atlantic and East South Central (5%), Pacific (8%), and West South Central (15%; $P = .01$). Since specialty also varied by region ($P = .001$), and since concern about adverse events varied by specialty, the possibility of confounding exists; subgroup analyses were not performed because of size.

TABLE 2

Concerns About Routine Early Childhood Hepatitis B Vaccination and the Degree of Their Importance as Viewed by Physicians (N=634)

Concern	Degree of Importance, %*		
	Unimportant	Intermediate	Important
None	6†	24	43
Unproven duration of vaccine efficacy	32‡	37	23
Too expensive	31‡	20	16
Low disease incidence/ unimportant to my practice	18†	19	5
Preference to administer to adolescents—not infants	23†	12	5
Safety/side effects	7	9	5
Too many additional injections	5	10	4

*Percentages are weighted; column percentages from only one row of each 2x3 table are shown.
†$P < .01$.
‡$P < .05$.

Analyses by Primary Payer

Physician ratings of the importance of early childhood hepatitis B vaccination were not associated with the practice's primary payer, as defined elsewhere.[13] However, concern about low incidence of HBV infection differed by primary payer: Medicaid (0%), health maintenance organization (11%), fee-for-service (9%), and no predominant source (9%; $P = .05$). More fee-for service physicians (22%) were concerned about the expense than were health maintenance organizations (8%), Medicaid (8%), or no predominant source physicians (20%; $P = .006$). There was no association between payer and the other concerns.

Logistic Regression

To determine predictors of the importance of early childhood hepatitis B vaccination, we used regression analysis. Since this variable was skewed, two categories were formed from the 0 to 10 Likert scale: important (7-10) and less important (0-6), and logistic regression was performed.[14] Among demographic and practice variables and concerns about the vaccine, the significant predictors of higher importance were no concern about the vaccine (odds ratio [OR] = 2.8; 95% confidence interval [CI], 1.7 - 4.7); not stating that the vaccine is unimportant for their practice (OR = .33; 95% CI, .18 - .60); not stating that it should be given to adolescents instead of infants (OR = .36; 95% CI, .18 - .72); and not being an FP (OR = .36; 95% CI, .23 - .57) or a GP (OR = .37, 95% CI, .21 - .63, all $P < .01$).

DISCUSSION

Only 4 years elapsed from the time of new recommendations for routine infant hepatitis B vaccination in 1991 until this survey was done, and remarkable progress has been made.

Specialty differences in beliefs about hepatitis B vaccination also have been reported by others.[2,4] We previously believed that these differences were because of varying rural-urban distribution in the incidence of HBV infection, economics, and geographic distribution by specialty.[15] However, our current data suggest that specialty is a major factor, although the region is also an influence (vaccination was recommended less in the Mountain region).

In considering specialty differences, what is the impact on patient outcomes (ie, would a difference in the timing of hepatitis B vaccination matter)? The timing in childhood is somewhat flexible, as seen by the range of 6 to 18 months as the recommended age for the third dose, provided there is no exposure to HBV infection.

Why do specialty differences exist? We suggest several possibilities. First, of vaccine-preventable diseases among all ages in the United States, influenza and *pneumococcus* infection cause the greatest mor-

tality, mostly in the elderly.[16] Thus, it is not surprising that FPs, who see patients of all ages, rate hepatitis B vaccination of lower importance than do PEDs, who see patients of a limited age distribution.

Immunization information sources vary by specialty. Most PEDs (74%) rate the *Red Book*,[17] a comprehensive publication, as the most important source of information, whereas FPs cite a variety of sources: journals (44%), *Red Book* (34%), health department (11%), colleagues (5%), others (6%).[9] We suggest the development of a comprehensive text on immunization for FPs.

The timing of dissemination of hepatitis B vaccine information varied by specialty. In 1991, after the Advisory Committee on Immunization Practices (ACIP) recommended hepatitis B vaccination for infants (younger than 12 months of age), but before the American Academy of Pediatrics the (AAP) and the American Academy of Family Physicians (AAFP) recommended it, 82% and 48% of North Carolina PEDs and FPs, respectively, were aware of the new recommendations, but only 37% and 23% agreed it was warranted in their practice. Eight months later, after the AAP and AAFP recommended hepatitis B vaccination for infants, 66% of PEDs and 32% of FPs agreed that it was warranted.[8] We conducted a MEDLINE search that revealed that 3 review or policy articles appeared in 1992 in the journal *Pediatrics* but none in *The Journal of Family Practice* or the *American Family Physician.* (There was also a 1992 notice in the *AAFP Reporter.*) In 1993, a research article about FP's acceptance of infant hepatitis B vaccination and an editorial questioning its routine use appeared in *The Journal of Family Practice.*[6,18] In 1993, 2 review articles and an editorial appeared in the *American Family Physician.* The 1991 ACIP recommendations were mailed to PEDs in 1992 and to FPs in 1993.[8,19] Thus, there was approximately a 1-year difference in the timing of information dissemination between specialties.

In 1991, the majority of voting ACIP members were PEDs and there were no voting FPs. In 1991, there were 2 nonvoting liaisons to the ACIP from the AAP (including the *Red Book* editor) and one nonvoting liaison from the AAFP. We suggest that the Centers for Disease Control and Prevention consider more FPs for voting positions at the ACIP.

Finally, as both our study and Freed et al[8] found, FPs are more concerned about economic barriers than PEDs.

Criticism of one specialty based on comparisons of survey data between specialties may not account for important background information, such as the epidemiology of diseases encountered. Therefore, caution and respect are needed in understanding the perspectives of each specialty. The awareness-to-adherence model by Pathman and colleagues[20] provides a useful framework for understanding physician beliefs and designing interventions.

LIMITATIONS

This study has certain limitations. First, although those who refused participation did not differ from participants on year of graduation or rural versus urban locale, they did differ by specialty—a higher proportion of PEDs participated than FPs or GPs (76%, 66%, 63%; $P < .001$). It is impossible to know if the nonrespondents differ on early childhood hepatitis B vaccination. A second limitation is the use of self-report by physicians, which does not always correspond to actual practices or to vaccination rates.

CONCLUSIONS

Most primary care physicians recommend hepatitis B vaccination for young children and rate the importance of hepatitis B vaccine highly. Some physicians have concerns about low disease incidence and some prefer to administer hepatitis B vaccine in adolescence. Beliefs vary by specialty. Given that only 4 years had elapsed from the time of the new recommendations for routine early childhood hepatitis B vaccination until this survey, remarkable progress has been made.

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