Pediatrician and Family Physician Agreement with and Adoption of Universal Hepatitis B Immunization

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Background. The purpose of this study was to assess (1) rates of agreement with and adoption of the universal hepatitis B vaccine recommendation among practicing pediatricians and family physicians in nine selected states; (2) physicians' attitudes related to hepatitis B immunization; and (3) physicians' perceptions of parental attitudes regarding the hepatitis B vaccine series.

Methods. Self-administered questionnaires were mailed to 3014 pediatricians and family physicians in selected metropolitan areas and non-metropolitan areas of nine states. Outcome variables were agreement with and adoption of the hepatitis B vaccine recommendation. Predictor variables included physicians' characteristics, practice type and location, and proportion of managed care and Medicaid patients. Other variables that were studied include physicians' attitudes related to hepatitis B immunization, sources of immunization recommendation information, personal completion of the hepatitis B immunization series, and physicians' impressions of parental attitudes about the vaccine.

Results. Pediatricians were more likely than family physicians to report that they knew "a lot" about the recommendation (95% vs 84%), agreed with it (83% vs 57%), and have adopted it into practice (90% vs 64%). More physicians in both specialties had adopted the recommendation than actually agreed with it. Doubt about long-term protection from the vaccine was a strong predictor of not agreeing with or adopting the recommendation. Parental resistance to or request for hepatitis B vaccine affected the likelihood of physicians adopting it.

Conclusions. Pediatricians and family physicians continue to differ in both agreement with and adoption of universal hepatitis B immunization. Two years after the recommendation was made, less than two thirds of all family physicians have adopted this recommendation. Adoption is likely influenced by practice policy, physician attitudes, and perceived parental opinions. We recommend that as new vaccines are approved and recommended, research be conducted to explore and address issues germane to physician agreement and adoption.

Key words. Hepatitis B vaccines; immunization; physicians' practice patterns; pediatricians; physicians, family.
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Universal immunization of infants against hepatitis B was recommended in 1991 by the Advisory Committee on Immunization Practices (ACIP) of the United States Public Health Service.[1] In 1992, the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) issued similar recommendations.[2,3]

Previous studies identified significant differences between pediatricians and family physicians in selected single states regarding their rates of awareness of, agreement with, and adoption of this recommendation.[4-8] As part of a multistate project assessing child immunization practices, this study was undertaken to provide a broader assessment of the rates of agreement with and adoption of universal hepatitis B immunization among practicing pediatricians and family physicians; physicians' attitudes about hepatitis B immunization; and

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physicians' perceptions of parental opinions about the hepatitis B vaccine series.

Methods

Questionnaires were mailed in late 1993 to physicians selected from the American Medical Association (AMA) Masterfile, a database of all physicians in the United States. A total of 3014 physicians (1165 pediatricians and 1849 family physicians) were surveyed. The study population represented selected metropolitan and non-metropolitan areas, as defined by the Office of Management and Budget, of nine states: California, Texas, Wisconsin, Colorado, Massachusetts, Tennessee, Pennsylvania, Georgia, and Hawaii. These states were chosen to provide variability with respect to region of the country, population dispersion (metropolitan vs non-metropolitan), patterns of organization of care (fee for service vs managed care), state vaccine distribution systems, and immunization rates.

Family physicians were oversampled relative to pediatricians because previous studies of immunization practices indicated that approximately 20% of family physicians limit their care to adults or do not administer pediatric immunizations.[5,6]

Questionnaires were accompanied by hand-signed, personalized cover letters. Three reminder letters and questionnaires were sent to all non-respondents over the 4 months following the initial mailing. The questionnaire was pretested with a sample of practicing pediatricians and family physicians in South Carolina to ensure clarity of interpretation and ease of completion. The pretest data are not included in our analysis.

Study variables were constructed from the survey data and from demographic data available from the AMA Masterfile. Outcome variables of primary interest included physicians' self-reported agreement with and adoption of the recommendation for universal hepatitis B immunization. Variables hypothesized to predict physician agreement and adoption included physician characteristics (eg, specialty, specialty society membership), practice type (eg, solo vs group vs public clinic), practice location (eg, metropolitan vs non-metropolitan), and the proportion of patients enrolled in managed care plans and in Medicaid. Other variables that were studied include physician attitudes related to hepatitis B immunization (eg, perception of long-term vaccination efficacy, level of disease risk among their patient population), sources of immunization recommendation information, self-reported knowledge about the recommendation, personal completion of the hepatitis B immunization series, and physician impressions of parental opinions about the vaccine.

Initial analysis involved frequency distributions and univariate analysis of all items from the survey and the AMA Masterfile. Cross-tabulations and chi-square analysis were used to determine the significance of the association between each predictor variable and the outcome variables. Finally, logistic regression was used to determine the independent effect of the predictor variables on agreement with and adoption of the hepatitis B vaccine recommendation. Logistic models were constructed separately for family physicians and pediatricians using all potential predictor variables. Predictors identified as significant in these models are those at the $P<.01$ level. We believe this rigorous criterion is appropriate, given the large number of variables in each model.

All analyses were adjusted (weighted) for probability of selection and differential response rate among those surveyed. Factors associated with differential response included physician specialty, state of residence, board certification, major professional activity, and federal employment. The initial weights were rescaled to allow for generalization to the population from which the sample was drawn without inflating the sample size. Estimates obtained using rescaled weights are the same as those obtained using original weights. Rescaling was performed primarily to avoid exaggerated statistical significance due to large sample size.

Results

After removing from the sample physicians who had retired, died, or moved out of state, responses were received from 1863 of 2814 eligible subjects, for an overall response rate of 66% (72% of pediatricians, 63% of family physicians). The 442 respondents who did not give immunizations and did not provide well-child care were excluded, leaving a sample of 1421 for subsequent analysis (742 pediatricians and 679 family physicians). Application of rescaled weights yielded effective sample sizes of 704 pediatricians and 723 family physicians. Demographic characteristics of respondents are shown in Table 1.

Pediatricians were more likely than family physicians to report that they knew "a lot" about, agreed with, and have adopted the recommendation for universal hepatitis B immunization of all infants (Table 2). More family physicians than pediatricians reported believing that it is appropriate to limit hepatitis B vaccination to high-risk patients only (24% vs 10%; $P<.001$). More physicians in both specialties had adopted the recommendation than actually agreed with it. A substantial proportion felt their patients are at low risk for hepatitis B disease (69% of family physicians, 55% of pediatricians; $P<.001$). One

Table 1. Demographic Characteristics of Survey Respondents

Physician Characteristic	Family Physicians, % (n=679)	Pediatricians, % (n=742)
≥40 years old	58	64
Male	81	60
Metropolitan practice location	88	96
Specialty society membership	77	68
Practice type		
Solo practice	26	24
Group practice	63	60
Health department	1	5
Other	10	11
Patient population enrolled in health maintenance organizations		
≤20% patients	50	48
≥50% patients	32	33
Patient population enrolled in Medicaid		
≤20% patients enrolled in Medicaid	73	67
≥50% patients enrolled in Medicaid	15	18

NOTE: *Samples adjusted for probability of selection and response.*

third of respondents expressed concern that the vaccine may not provide long-term protection.

For pediatricians, no significant differences in agreement rates were seen when subjects were stratified by practice type, specialty society membership, practice location, or percentage of patients enrolled in managed care plans or in Medicaid. Pediatricians in solo practice were less likely than others to have adopted the recommendation (85% vs 96%; $P=.003$), and AAP members were more likely than nonmembers to have adopted the recommendation (93% vs 84%, $P<.001$). No significant differences were seen in adoption rates by metropolitan or non-metropolitan status or by percentage of patients enrolled in managed care plans and in Medicaid.

For family physicians, no differences were seen regarding agreement or adoption when subjects were stratified by percentages of patients enrolled in Medicaid and in managed care plans, practice type, or practice location.

Table 2. Knowledge of, Agreement with, and Adoption of Universal Hepatitis B Vaccination Recommendation Among Physicians Responding to the Survey

Survey Item	Family Physicians, % (n=679)	Pediatricians, % (n=742)	*P* Value
Knows a lot about the recommendation	84	95	<.001
Agrees with recommendation	57	83	<.001
Adopted the recommendation	64	90	<.001

NOTE: *Samples adjusted for probability of selection and response.*

Table 3. Physician Perception of Parental and Staff Attitudes About the Hepatitis B Vaccination Recommendation

Survey Item	Family Physicians, % (n=679)	Pediatricians, % (n=742)	*P* Value
Parents know about the recommendation	20	37	<.001
Parents resist the recommendation	14	9	.004
Parents request hepatitis B vaccine	13	23	<.001
Parents resist the number of injections now recommended at a single visit	34	22	<.001
Office staff resists the number of injections now recommended at a single visit	23	12	<.001

NOTE: *Samples adjusted for probability of selection and response.*

AAFP membership was not associated with greater rates of agreement or adoption.

Table 3 identifies physician perceptions of parental opinions about universal hepatitis B immunization. Family physicians were less likely to think that parents know about or request hepatitis B vaccine and more likely to report that parents resist this vaccination for their children. More than one third of family physicians reported that parents resist the number of injections recommended for a single well-child visit, compared with 22% of pediatricians. Similarly, more family physicians believed their staff resisted the current number of injections.

Bivariate analyses were conducted separately for pediatricians and family physicians to assess the correlations between self-reported knowledge, concerns over long-term protection, and patient risk assessments with agreement and adoption of the recommendation. Increased knowledge about the recommendation was significantly associated with greater rates of agreement and adoption; concerns over long-term protection had the opposite effect.

With respect to personal immunization status, 90% of family physicians and 87% of pediatricians had completed the hepatitis B vaccine series. Family physicians who had completed the hepatitis B series were more likely to have adopted the recommendation for universal hepatitis B immunization (64% vs 45%; $P=.002$) but were no more likely to have agreed with it. Among pediatricians, personal hepatitis B immunization was associated with increased rates of agreement (80% vs 64%; $P=.003$) and adoption (88% vs 76%; $P=.006$).

Logistic regression was used to further explore the independent effects of physician beliefs and characteristics on agreement and adoption. Variables that were signifi-

Table 4. Predictors of Family Physicians' Agreement with and Adoption of Universal Hepatitis B Immunization

Variable	OR	95% CI
Predictors of physician agreement with recommendation		
Believes patients are at low risk for hepatitis B	0.2	0.1–0.4
Thinks vaccine may not give long-term protection	0.2	0.1–0.4
Thinks immunization recommendations are contradictory	0.4	0.2–0.7
Feels parents resist multiple injections at one visit	0.4	0.3–0.7
Specialty society keeps physician informed about immunization recommendations	1.9	1.2–3.1
Colleagues keep physician informed about immunization recommendations	2.1	1.3–3.3
Reports that parents request hepatitis B vaccine	3.2	1.6–6.3
Knows a lot about hepatitis B recommendation	3.5	1.8–6.5
Predictors of physician adoption of recommendation		
Reports that parents resist hepatitis B vaccine	0.2	0.1–0.5
Thinks vaccine may not give long-term protection	0.3	0.2–0.5
Believes patients are at low-risk for hepatitis B	0.4	0.2–0.7
Feel parents resist multiple injections at one visit	0.5	0.3–0.8
Knows a lot about hepatitis B recommendation	6.8	3.5–13.2
Reports that parents request hepatitis B vaccine	11.3	4.3–29.8

OR denotes odds ratio; CI, confidence interval.
NOTE: All values significant at P<.01.

Table 5. Predictors of Pediatricians' Agreement with and Adoption of Universal Hepatitis B Immunization

Variable	OR	95% CI
Predictors of physician agreement with recommendation		
Practices in health department of public clinic	0.1	0.0–0.4
Solo practitioner	0.3	0.2–0.6
Believes patients are at low risk for hepatitis B	0.3	0.1–0.5
Thinks vaccine may not give long-term protection	0.3	0.2–0.4
Female gender	0.4	0.2–0.7
Knows "a lot" about hepatitis B recommendation	5.0	1.7–14.8
Predictors of physician adoption of recommendation		
Thinks vaccine may not give long-term protection	0.1	0.1–0.3
Reports that parents resist hepatitis B vaccine	0.2	0.1–0.5
≥50% of patients in health maintenance organizations	6.0	2.2–17.0
Reports that parents request hepatitis B vaccine	6.7	1.8–24.6
Knows "a lot" about hepatitis B recommendation	26.6	5.6–126.2

OR denotes odds ratio; CI denotes confidence interval.
NOTE: All values significant at P<.01.

cantly associated with each outcome at the $P<.01$ level are presented in Tables 4 and 5. For both specialties, concern over long-term protection was a strong predictor of not agreeing with or adopting the recommendation. Perceived parental resistance to hepatitis B vaccine or to an increased number of injections at a single office visit decreased the likelihood of adoption. Likewise, the belief that parents request hepatitis B immunization was a strong positive predictor of adoption. For pediatricians, having ≥50% of patients enrolled in managed care plans was a positive predictor for adoption.

Discussion

This study was conducted 6 to 8 months after our last assessment of agreement and adoption of the universal hepatitis B vaccine recommendation among physicians in North Carolina.[6] Greater agreement was found in this study compared with our previous study among pediatricians (78% vs 66%) and family physicians (55% vs 32%). Adoption of the recommendation into practice was also greater for respondents of this multistate study, compared with our previous study, among pediatricians (87% vs 53%) and family physicians (62% vs 23%).

This nine-state study confirms the findings of our previous single-state reports that pediatricians and family physicians have different rates of agreement with and adoption of this recommendation. Child health advocates and those who draft and promulgate immunization recommendations should be concerned that 2 years after the initial ACIP recommendation for universal hepatitis B immunization of infants, less than two thirds of family physicians have adopted this recommendation and that more physicians have adopted it than actually agree with it.

The gap in vaccine recommendation adoption rates between pediatricians and family physicians is difficult to explain. Perhaps these specialties have different perspectives regarding patient care, allowing for differential consideration of such issues as long-term protection, parent resistance to multiple vaccines, risk of hepatitis among a physician's patient population, and willingness to follow preventive guidelines based on public health rationale. Since few family physicians were unaware of the recommendation, the issue is not one of being uninformed. Rather, many family physicians remain unconvinced that

universal hepatitis B immunization of infants is in the best interest of their patients.

Several factors may influence physicians to implement a policy of universal hepatitis B immunization, even when they do not agree with that policy. First, some practice settings do not allow physicians a great deal of individual decision-making. Our data show that for pediatricians, having ≥50% of patients enrolled in managed care plans was associated with higher rates of adoption but not agreement; in this instance, adoption of hepatitis B vaccine may have been a decision dictated by the managed care organization, sometimes in conflict with the personal opinions of contracting physicians. As managed care patients become a greater part of each physician's patient population, managed care policy may become an increasingly important determinant of immunization practices.

Another factor influencing physician adoption is perceived parental opinion. Although the majority of respondents reported that parents know little about this recommendation, our data show that parental request of hepatitis B vaccine was associated with greater likelihood of adoption by both pediatricians and family physicians. Conversely, perceived parental resistance, whether rooted in objections about the hepatitis B vaccine or about their children receiving multiple injections at a single office visit, was negatively associated with adoption of the vaccination recommendation. This suggests a need for greater efforts toward educating parents about new immunization recommendations, both to enhance their own immunization-related knowledge and to create parent demand, which, in turn, influences physician adoption of this vaccine.

Over one half of the physicians in this study perceive their infant patients to be at low risk for hepatitis B disease; these physicians were less likely to either agree with and adopt the universal hepatitis B recommendation. Although the population-based epidemiologic evidence provided by the Centers for Disease Control and Prevention (CDC) demonstrates considerable lifetime risk for the disease, many physicians apparently do not believe that the risk justifies infant immunization. The CDC and others should make a greater effort to offer a convincing rationale for this recommendation.

Physician concern about the long-term efficacy of hepatitis B vaccine was also associated with a lower likelihood of agreeing with and adopting the recommendation. This will be a more difficult issue to overcome for those who want to see long-term data regarding vaccine effectiveness. More longitudinal data are available each year. It may be helpful to remind physicians that the long-term efficacy of other vaccines, such as those for measles and polio, was not known at the time they were initially recommended.

Among family physicians, the belief that immunization recommendations are contradictory was associated with a reduced likelihood of agreement with and adoption of the hepatitis B vaccine recommendation. There have been numerous changes in the immunization schedule over the last 5 years, and since family physicians care for a broader spectrum of patients than pediatricians do, they may have less time to evaluate recommendations from multiple sources. The coordinated schedule put forth recently by the AAP, AAFP, and ACIP is a step toward solving this problem. Family physicians were also more likely to agree with universal hepatitis B immunization if they felt their specialty society or colleagues kept them informed of new recommendations. This finding underscores the need for effective dissemination efforts.

It is commonly believed that greater knowledge of immunization recommendations produces higher rates of agreement and adoption. Our data provide support for this belief. It is possible, however, that physicians who agree with the recommendation perceive themselves as having greater knowledge and as making an informed decision.

There are other limitations to this study. First, only self-reported rates of agreement and adoption were used. Chart reviews of practices will be necessary to assess adherence to the recommendation. Second, agreeing with and adopting recommendations are dynamic processes, and this study captures data at only one point in time.

Conclusions

Data from this nine-state study demonstrate that physicians' agreement with and adoption of universal hepatitis B immunization has increased over time. We believe, however, that this rate remains lower than the levels of adoption for other vaccines in the primary immunization series. If we are to overcome the substantial influence of parental and economic barriers to immunization and reach the *Healthy People 2000* goal of 90% immunization coverage for all 2-year-old children in this country,[9] nearly every physician who cares for children must adopt immunization recommendations.

Each vaccine introduced into the primary immunization schedule has unique features of interest to physicians and parents. Research into the determinants of adoption for each new immunization recommendation is needed to identify critical issues and potential barriers. Additionally, the dissemination of recommendations to parents and physicians should be evaluated to ensure that information is provided in a convincing, easy-to-understand, and timely manner. Otherwise, children will continue to suffer unnecessarily from preventable diseases.

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