PEDIATRICS

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abstract

BACKGROUND AND OBJECTIVES: In 2015, the Advisory Committee on Immunization Practices recommended that 16- to 23-year-olds may be vaccinated with the serogroup B meningococcal (MenB) vaccine on the basis of individual clinical decision-making (Category B). We assessed the following among US pediatricians and family physicians (FPs): (1) practices regarding MenB vaccine delivery, (2) factors influencing a decision to recommend the MenB vaccine, and (3) factors associated with discussing the MenB vaccine.

METHODS: We surveyed a nationally representative sample of pediatricians and FPs via e-mail and Internet from October 2016 to December 2016.

RESULTS: The response rate was 72% (660 of 916). During routine visits, 51% of pediatricians and 31% of FPs reported always or often discussing MenB vaccine. Among those who discussed often or always, 91% recommended vaccination; among those who never or rarely discussed, 11% recommended. We found that 73% of pediatricians and 41% of FPs currently administered the MenB vaccine. Although many providers reported not knowing about factors influencing recommendation decisions, MenB disease outbreaks (89%), disease incidence (62%), and effectiveness (52%), safety (48%), and duration of protection of MenB vaccine (39%) increased the likelihood of recommendation, whereas the Category B recommendation (45%) decreased likelihood. Those somewhat or not at all aware of the MenB vaccine (risk ratio 0.32 [95% confidence interval 0.25–0.41]) and those practicing in a health maintenance organization (0.39 [0.18–0.87]) were less likely, whereas those aware of disease outbreaks in their state (1.25 [1.08–1.45]) were more likely to discuss MenB vaccine.

CONCLUSIONS: Primary care physicians have significant gaps in knowledge about MenB disease and the MenB vaccine, and this appears to be a major driver of the decision not to discuss the vaccines.

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Dr Kempe conceptualized and designed the study, contributed to the data collection instrument design, and drafted the initial and final manuscript; Drs Allison, O'Leary, and Hurley and Ms MacNeil, Ms Lindley, and Mr Albert assisted in study design and the creation of the data collection instrument and reviewed and revised the manuscript; Dr Crane conceptualized and designed the study, designed the data collection instrument, and reviewed and revised the manuscript; Ms Beaty contributed to the study design, conducted the initial and further analyses, and reviewed and revised the manuscript; Ms Brtnikova contributed to the study

WHAT'S KNOWN ON THIS SUBJECT: In 2015, the Advisory Committee on Immunization Practices recommended 16- to 23-year-olds may be vaccinated with serogroup B meningococcal (MenB) vaccine on the basis of individual clinical decision-making (Category B). Little is known about how primary care physicians are adopting these recommendations.

WHAT THIS STUDY ADDS: A minority of physicians are discussing MenB vaccine during routine 16- to 18-year-old visits. Significant gaps in knowledge about MenB disease and the MenB vaccine exist and appear to be a major driver of decisions not to discuss the vaccine.

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Meningococcal disease has an overall case-fatality ratio of ~10% to 15%, and permanent severe sequelae are common among survivors,[1–3] heightening the importance of preventing this deadly infection. At the same time, meningococcal disease caused by any serogroup is uncommon in the United States and has been decreasing[4] since the mid-1990s because of a variety of reasons, including natural decline and, among adolescents and young adults, the use of a quadrivalent meningococcal conjugate vaccine against serogroups A, C, W, and Y meningococcal (MenACWY). The MenACWY vaccine has been licensed in the United States since 2005 and is recommended for routine use among adolescents from 11 to 18 years of age.

Meningococcal disease caused by serogroup B is also uncommon, with 130 cases in 2016, 41 of which were diagnosed in those aged 16 to 23 years.[5] However, numerous highly publicized outbreaks have occurred on college campuses since 2009. Two serogroup B meningococcal (MenB) vaccines have been licensed by the Food and Drug Administration in the United States and approved for use in persons aged 10 to 25 years: MenB-FHbp (Trumenba) and MenB-4C (Bexsero). Both vaccines were licensed under an accelerated approval process because of the outbreaks occurring on college campuses. Food and Drug Administration approval was based on safety and on demonstration of inferred efficacy by antibody responses to selected MenB strains rather than clinical effectiveness.[4] In October of 2015, the Advisory Committee on Immunization Practices (ACIP) recommended that 16- to 23-year-olds may be vaccinated with the MenB vaccine, with a preferred age for administration of 16 to 18 years (Category B recommendation).[4] In contrast, a Category A (routine) recommendation had already been made in June of 2015 for persons aged ≥10 years at increased risk for MenB disease.[6]

The definitions of Category A and B recommendations were based on the Grading of Recommendations Assessment, Development and Evaluation framework,[7] which had been used to guide decision-making by ACIP since 2012. Category A recommendations are made for all persons in an age or risk factor–based group, whereas for Category B recommendations, the decision whether to vaccinate was to occur "in the context of a clinician-patient interaction," with consideration of the balance between desirable and undesirable effects of the vaccine in question.[7] The language for ACIP's Category B recommendation for MenB vaccines incorporated the wording "may be administered," and the accompanying rationale identified the low prevalence of the disease, as well as insufficient data about vaccine effectiveness and safety, as reasons for not making a Category A recommendation. The Centers for Disease Control and Prevention (CDC) did not provide additional guidance on how to implement the ACIP recommendation. The American Academy of Family Physicians (AAFP) in February 2016 included frequently asked questions about the MenB vaccine on its Web site, providing some guidance to its members, but no specific talking points.[8] The American Academy of Pediatrics (AAP) Committee on Infectious Diseases published similar recommendations to ACIP's almost 1 year later in September 2016, 1 month before our survey. The AAP encourages pediatricians to discuss the benefits, risks, and costs with patients and families and then "work with them to determine what is in their best interest."[9] No national data are available about how state or local public health agencies advised implementing the MenB vaccine recommendations for healthy adolescents and young adults.

Given the relatively new ACIP recommendations for the use of the MenB vaccine and the fact that this is the first widespread use of a Category B recommendation, it was unclear how the MenB vaccine would be adopted. The objectives of this study were to assess the following: (1) current practices regarding MenB vaccine delivery in primary care, (2) reported influences on the decision to recommend or not recommend the MenB vaccine to healthy adolescent patients, and (3) factors related to initiating a discussion about the MenB vaccine at well visits for adolescents 16 to 18 years of age.

METHODS

We conducted a survey between October and December of 2016 among pediatricians and family physicians (FPs) who were part of sentinel networks within each specialty. The human subjects review board at the University of Colorado Denver approved this study.

Study Population

This survey was conducted as part of a collaboration with the CDC to perform rapid turnaround surveys to assess physician attitudes about vaccine-related issues. We developed national networks of primary care physicians by recruiting from the AAP and AAFP. We conducted quota sampling[10] to ensure network physicians were similar to the AAP and AAFP memberships with respect to region, practice location, and practice setting. Exclusion criteria included practicing <50% of the time in primary care, not practicing in the United States, or being in training. We have previously demonstrated that survey responses from network physicians compared with those of physicians randomly sampled from American Medical Association databases had similar demographic

characteristics, practice attributes, and attitudes about a range of vaccination issues.[10] No incentives were provided to the participating physicians.

Survey Design

We developed the survey in collaboration with the CDC and with input from the AAP and AAFP. A national advisory panel of pediatricians and FPs pretested the survey; it was then piloted among 45 pediatricians and 13 FPs nationally and further modified on the basis of this feedback. The survey began by specifying the 2 MenB vaccines with trade names, clarifying that the MenB vaccine currently has a Category B recommendation from the ACIP for use in healthy adolescents and young adults, and then specified that the survey was about the MenB vaccine, not the MenACWY vaccine. We used 4-point Likert scales for assessing reported frequency of initiating discussions regarding the MenB vaccine and recommendation practices at different ages. Although the MenB vaccine is not recommended for 11- to 12-year-olds, we included this age group to assess whether there was confusion about whether the MenB vaccine should be given at the same time as the first MenACWY vaccine. We also asked about how each of a list of factors affected the likelihood of recommending the MenB vaccine by using a 5-point scale.

Survey Administration

We surveyed physicians via Internet (Verint, Melville, NY) or, if they preferred, by mail. We sent the Internet group an initial e-mail with up to 8 reminders, and we sent the mail group an initial mailing and up to 2 reminders. We sent Internet survey nonrespondents a mail survey in case of problems with e-mail correspondence. We patterned the mail protocol on Dillman's tailored design method.[11]

Statistical Analysis

We pooled Internet and mail surveys for analyses because studies have revealed that physician attitudes are similar when obtained by either method.[12–14] We compared respondents with nonrespondents using *t* tests and χ^2 analyses and compared pediatrician and FP responses by using χ^2 and Mantel-Haenszel χ^2 tests. We conducted a multivariable analysis with the dependent variable of "always, almost always, or often" initiating a discussion about the MenB vaccine during routine well visits for adolescents from 16 to 18 years of age. Because the outcome was common (42% of the cohort), we used a log binomial model to generate relative risks. Independent variables included provider and practice characteristics, whether the MenB vaccine is administered at the office, the level of awareness regarding the MenB vaccine, and the awareness of outbreaks of meningococcal disease or MenB disease specifically. We used a cutoff of $P < .25$ for inclusion of variables into the model. With our multivariable model, we used a backward elimination procedure in which the least significant predictor in the model was eliminated sequentially. At each step, estimates were checked to make sure other variables were not affected by dropping the least significant variable. This resulted in the retention of only those factors that were significant at $P < .05$ in the final model. Analyses were performed by using SAS software version 9.4 (SAS Institute, Inc, Cary, NC).

RESULTS

The overall response rate was 72% (660 of 916), 79% (374 of 475) among pediatricians, and 65% (286 of 441) among FPs. In Table 1, we compare respondents and nonrespondents within each specialty and describe additional characteristics available only for respondents. Some differences were seen between respondents and nonrespondents by region among pediatricians and by provider sex and practice setting among FPs.

Current Practices Regarding MenB Vaccine Delivery

As shown in Fig 1, 50% of pediatricians and 31% of FPs reported always or often initiating a discussion about the MenB vaccine during routine visits for 16- to 18-year-olds, and slightly more initiated discussions during precollege physical examinations. Pediatricians were more likely to initiate discussions than FPs among all age groups examined, with the exception of 11- to 12-year-olds. Among pediatricians, 34% reported strongly recommending the vaccine and 24% recommending, but not strongly, to 16- to 18-year-olds; comparable percentages for FPs were 29% and 21%, respectively (Fig 2). Strong recommendations for those entering college were ~10 percentage points higher than for the 16- to 18-year-old age group for both specialties. Overall, slightly higher percentages of providers in both specialties reported recommending the MenB vaccine compared with initiating a discussion, although initiating was highly correlated with recommending. Among those who reported initiating a discussion always or often during routine visits for 16- to 18-year-olds, 91% recommended the MenB vaccine (66% strongly); among those who never or rarely initiated a discussion, only 11% recommended the MenB vaccine (3% strongly). Not all who recommended the vaccine reported consistently initiating a discussion about it; among those who recommended the vaccine, 71% often, almost always, or always initiated a discussion and another 21% sometimes did. Comparable percentages among those who

TABLE 1 Respondent and Nonrespondent Characteristics

Characteristic	Pediatricians		FPs	
	Respondents (n = 374)	Nonrespondents (n = 101)	Respondents (n = 286)	Nonrespondents (n = 155)
Age in y, mean (SD)	50 (11)	51 (11)	55 (8)	56 (9)
Male sex, %	36	39	52**	63**
Region, %				
Midwest	22*	20*	30	25
Northeast	23*	11*	14	12
South	34*	47*	34	42
West	21*	23*	22	21
Location of practice, %				
Urban	54	52	38	36
Suburban	45	47	52	56
Rural	1	1	9	8
Setting, %				
Private practice	80	77	65**	76**
Hospital or clinic	17	18	25**	15**
HMO	3	6	10**	8*
Proportion of patients aged 16–23 y, %				
<10	15	N/A	57	N/A
10–19	39	N/A	31	N/A
≥20	46	N/A	12	N/A
Proportion of black or African American patients, %				
0–24	78	N/A	83	N/A
25–49	18	N/A	13	N/A
≥50	4	N/A	4	N/A
Proportion of non-Hispanic white patients, %				
0–24	19	N/A	14	N/A
25–49	29	N/A	19	N/A
≥50	52	N/A	67	N/A
Proportion of patients with Medicaid or CHIP, %				
0–24	43	N/A	66	N/A
25–49	27	N/A	21	N/A
≥50	30	N/A	13	N/A
Proportion of patients with private insurance, %				
0–24	21	N/A	19	N/A
25–49	18	N/A	25	N/A
≥50	61	N/A	56	N/A

CHIP, Children's Health Insurance Program; N/A, not applicable.

* $P < .05$ for overall comparison of respondents and nonrespondents within pediatricians.

** $P < .05$ for overall comparison of respondents and nonrespondents within FPs.

made no recommendation were 6% and 16%, respectively. Eighty-one percent of pediatricians and 56% of FPs recommended the vaccine to children ≥10 years old with an increased risk for meningococcal disease.

Seventy-three percent of pediatricians and 41% of FPs reported currently administering the MenB vaccine in their practices; 2% of pediatricians and 11% of FPs did not know if the MenB vaccine was being administered. Although 6% of pediatricians and 26% of FPs and those who were not solo providers did not know the practices of other providers in their practice, the majority of physicians who reported knowing indicated that either a minority or none of the other providers were routinely recommending the MenB vaccine to 16- to 23-year-olds (Fig 3).

Reported Influences on the Decision to Recommend or Not Recommend the MenB Vaccine to Healthy Adolescent Patients

As shown in Fig 4, many providers, especially FPs, responded "I don't know" to questions about factors influencing their likelihood of recommending the MenB vaccine. The most commonly reported issues that were associated with a higher likelihood of recommending were the fact that MenB outbreaks had occurred, the incidence of the MenB disease, the effectiveness and safety of the MenB vaccine, and the duration of protection of the MenB vaccine. The existence of a recommendation for another meningococcal vaccine (MenACWY) and the consistency of reimbursement were related to a lower likelihood of recommendation.

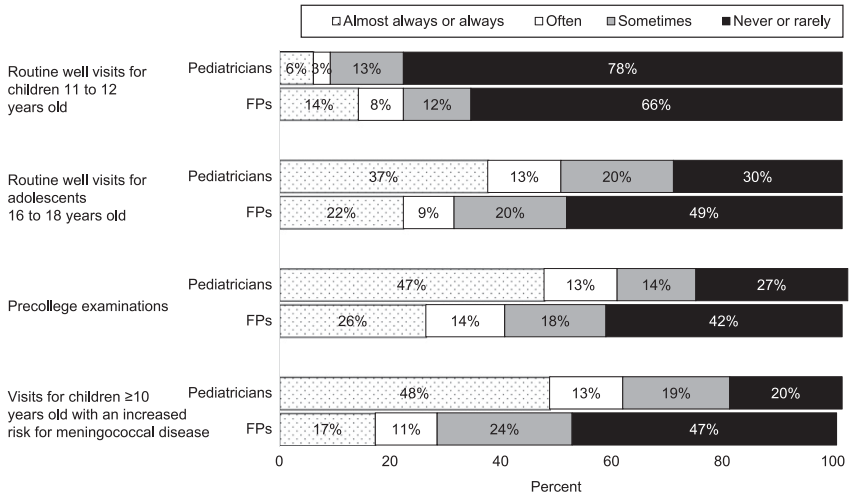

FIGURE 1

Frequency of initiating a discussion about the MenB vaccine (pediatricians n = 374, FPs = 286). $P < .001$ for comparison between specialties (Mantel-Haenszel χ^2). Analyses exclude those who do not see patients in each age group: 1% of pediatricians and 9% of FPs for 11- to 12-year-olds, 1% of pediatricians and 6% of FPs for 16- to 18-year-olds, 6% of pediatricians and 4% of FPs for precollege examinations, and 16% of pediatricians and 11% of FPs for children ≥10 years old with an increased risk for meningococcal disease. Some percentages do not add up to 100% because of rounding.

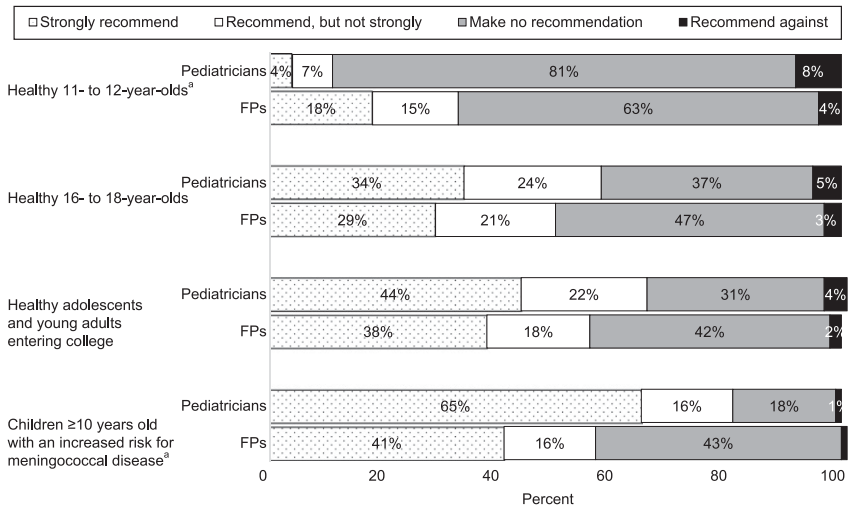

FIGURE 2

Current practice regarding recommending the MenB vaccine (pediatricians n = 374, FPs = 286). Analyses exclude those who do not see patients in each age group: 10% of pediatricians and 1% of FPs for 11- to 12-year-olds, 6% of pediatricians and 1% of FPs for 16- to 18-year-olds, 3% of pediatricians and 3% of FPs for healthy adolescents or young adults entering college, and 9% of pediatricians and 12% of FPs for children ≥10 years old with an increased risk for meningococcal disease. Some percentages do not add up to 100% because of rounding. [a] $P < .001$ for comparison between specialties (Mantel-Haenszel χ^2).

The fact that the MenB vaccine was given a Category B as opposed to a Category A recommendation by the ACIP was the major issue identified by both specialties associated with not recommending the MenB vaccine. Additional issues (not shown) endorsed by a majority as "not a factor" for influencing the decision to recommend the MenB vaccine included the following: the number of vaccines given to adolescents ("not a factor" for 76% of pediatricians and 59% of FPs), parents' attitudes about the MenB vaccine in our practice (59% and 52%), the fact that the MenB vaccination requires multiple doses (79% and 53%), marketing by pharmaceutical companies for the MenB vaccine (74% and 66%), and the time it would take me to discuss what a Category B recommendation means (69% and 50%).

Factors Related to Initiating a Discussion About the MenB Vaccine at Well Visits for Adolescents 16 to 18 Years of Age

As shown in Table 2, being aware of MenB disease outbreaks that have occurred in the providers' state was associated with always or almost always or often initiating a discussion of MenB vaccine for adolescents 16 to 18 years of age, whereas being only somewhat or not at all aware of the MenB vaccine and practicing in a health maintenance organization (HMO) compared with a private practice setting were associated with a lower frequency of initiating a discussion. FPs were much less likely to have been aware of the MenB vaccine before taking the survey, and specialty and level of awareness were both independently associated with the outcome. However, when both variables were included in the model, specialty became nonsignificant, so only awareness of the MenB vaccine was retained in the model. There was no evidence of a significant interaction between these 2 variables.

DISCUSSION

This is the first national US survey of which we are aware in which researchers assess reported practices related to MenB vaccine delivery since the ACIP's Category B recommendation for its use. With our findings, we indicate that one-half of pediatricians and approximately one-third of FPs report often or always initiating a discussion about the MenB vaccine for 16- to 18-year-olds. Greater awareness about outbreaks of disease was associated with a higher likelihood

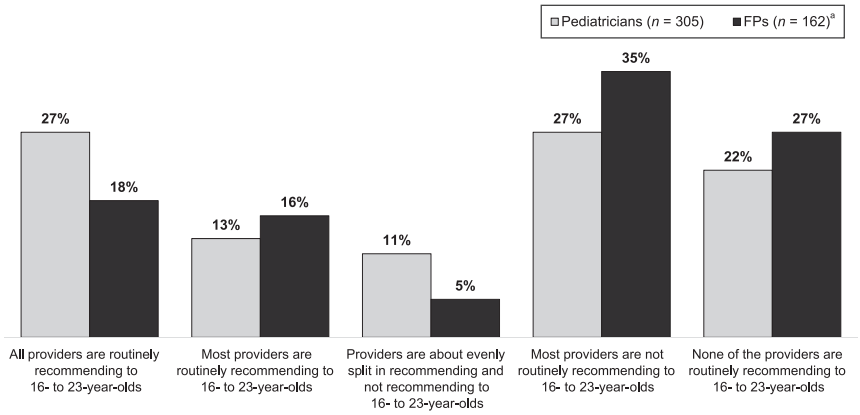

FIGURE 3
Agreement about whether to recommend the MenB vaccine for 16- to 23-year-olds among providers in practice. Excluded response categories include "I am the only provider in my office" (39 FPs and 31 pediatricians) and "I don't know other providers' practices regarding recommending the MenB vaccine to 16- to 23-year-olds" (70 FPs and 23 pediatricians). [a] Thirty providers did not respond to this question.

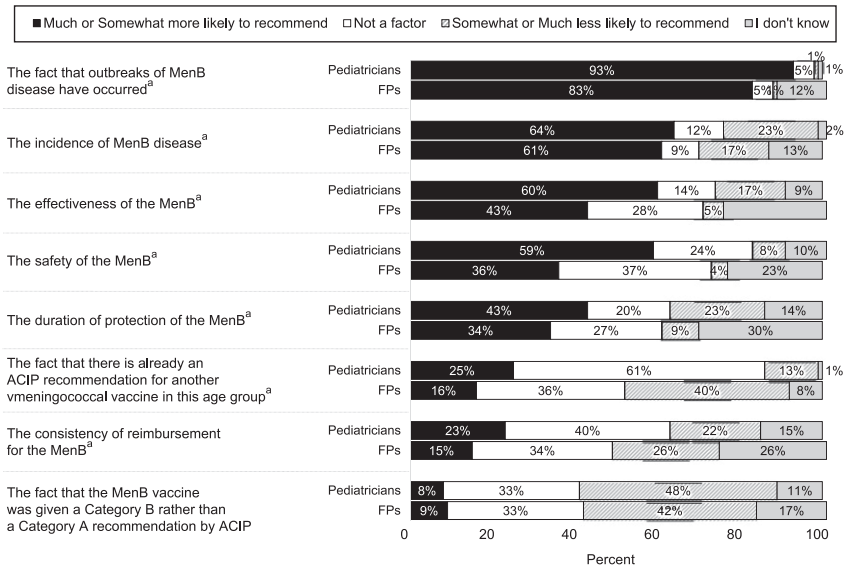

FIGURE 4
Factors influencing the decision to recommend the MenB vaccine to healthy adolescent patients (pediatricians n = 374; FPs = 286). Some percentages do not add up to 100% because of rounding. [a] $P \leq .001$ for comparison between specialties (Mantel-Haenszel χ^2).

of discussing the vaccine, whereas lower awareness about the vaccine and working in an HMO setting were associated with a lower likelihood. Those physicians who reported initiating a discussion almost always reported making a recommendation to vaccinate, whereas those who rarely initiated discussions were unlikely to recommend vaccination. Providers most often cited outbreaks of MenB disease, incidence of disease, and effectiveness, safety, and duration of protection of the MenB vaccine as reasons for increasing their likelihood of recommending the MenB vaccine, although many providers reported a lack of knowledge regarding these potential influences. Two factors many providers reported would make them less likely to recommend the MenB vaccine were the fact that the MenB vaccine was given a Category B recommendation and inconsistency of reimbursement.

Whether our data indicate a level of discussion regarding the MenB vaccine that is consistent with a Category B recommendation depends on one's interpretation of how such a recommendation should be implemented. According to the original definition of a Category B recommendation based on the Grading of Recommendations Assessment, Development and Evaluation approach used by the ACIP, such recommendations are supposed to result in individual clinical decision-making "in the context of a clinician-patient interaction."[7] In line with this interpretation, the authors of the AAP's policy statement, as previously discussed, encouraged pediatricians to discuss the MenB vaccine with parents and patients.[9] Others have stressed that a Category B recommendation is different from "no recommendation at all" and should consistently result in a discussion with parents and patients because individual decision-making "cannot occur if a patient does not know about the vaccine and the disease."[15]

However, physicians may interpret "individual clinical decision-making" to reflect their own decision about whether to initiate a discussion of the MenB vaccine, given their assessment of the risks and benefits of vaccinating, without involving parents or patients in decision-making. Providers may choose not to initiate a discussion with parents or patients if they do not intend to recommend the MenB vaccine because of issues such as the low burden of the MenB disease in the United States or the lack of data about the effectiveness of the MenB vaccine, its duration of protection, or its safety.[4] In our study, the fact that those providers who reported initiating a discussion were overwhelmingly also likely

TABLE 2 Multivariable Model Predicting Often, Almost Always, or Always Initiating a Discussion Regarding the MenB at Routine Well Visits for 16–18-Year-Olds (n = 638)

Variable	Never, Rarely, or Sometimes n = 367 (58%), % (n)	Often, Almost Always, or Always n = 271 (42%), % (n)	Biv. P	MV RR (95% CI)
Practice type				
Family medicine	50.1 (184)	30.3 (82)	<.0001	—
Pediatrics	49.9 (183)	69.7 (189)		
Sex				
Male	45.0 (165)	60.5 (164)	.17	—
Female	55.0 (202)	39.5 (107)		
Setting				
Private practice	68.9 (253)	81.6 (221)	<.0001	Ref
Hospital or clinic	21.5 (79)	16.6 (45)		1.00 (0.81–1.23)
HMO	9.5 (35)	1.9 (5)		0.40 (0.18–0.89)
Census location				
Urban	48.0 (176)	45.8 (124)	.58	—
Suburban or rural	52.0 (191)	54.2 (147)		
Region				
Midwest	26.4 (97)	25.1 (68)	.92	—
Northeast	20.2 (74)	18.8 (51)		
South	32.7 (120)	34.0 (92)		
West	20.7 (76)	22.1 (60)		
Mean (SD), median age in y	51.9 (10.1), 53.0	51.7 (9.4), 51.0	.86	—
No. providers in practice				
1–5	47.8 (175)	47.0 (127)	.85	—
6 or more	52.2 (191)	53.0 (143)		
Before taking this survey, how aware were you of the MenB vaccines described above?				
Very aware	29.9 (105)	76.7 (197)	<.0001	Ref
Somewhat aware	55.8 (196)	21.0 (54)		0.35 (0.27–0.45)
Not at all aware	14.3 (50)	2.3 (6)		0.19 (0.09–0.40)
I am aware of patient(s) in my practice who have had meningococcal disease				
Yes	36.1 (127)	41.3 (107)	.19	—
No	63.9 (225)	58.7 (152)		
I am aware of MenB outbreaks that have occurred in my state				
Yes	23.3 (82)	42.9 (111)	<.0001	1.25 (1.07–1.45)
No	76.7 (270)	57.1 (148)		Ref
I am aware of MenB outbreaks that have occurred on college campuses in the United States				
Yes	68.2 (240)	84.9 (220)	<.0001	—
No	31.8 (112)	15.1 (39)		
Proportion of patients who are 16–23 y old				
<10	39.4 (141)	22.2 (59)	<.0001	—
≥10	60.6 (217)	77.8 (207)		
Proportion of black or African American patients				
0–24	80.2 (284)	80.5 (210)	.94	—
≥25	19.8 (70)	19.5 (51)		
Proportion of Hispanic patients				
0–24	80.2 (283)	76.5 (198)	.27	—
≥25	19.8 (70)	23.6 (61)		
Proportion of patients with Medicaid or CHIP				
0–24	51.9 (182)	53.4 (141)	.70	—
≥25	48.2 (169)	46.6 (123)		

Biv, bivariate; CHIP, Children's Health Insurance Program; CI, confidence interval; MV RR, multivariate relative risk; Ref, reference; —, nonsignificant variable.

to recommend the MenB vaccine, whereas those not initiating a discussion were unlikely to recommend, is consistent with this second interpretation. Providers not initiating a discussion may not think the time required to discuss the MenB vaccine is justified by the risks posed by the disease or the benefits offered by these vaccines. Alternatively, they may have a low level of awareness regarding the disease or the MenB vaccine and feel insufficiently knowledgeable to have an informed discussion about the pros and cons of vaccination. They also may have been entirely unaware of the ACIP recommendation for

MenB vaccination. Why providers working in an HMO setting were less likely to initiate a discussion is unclear. This may reflect different decisions regarding the cost-benefit ratio of the MenB vaccination in an HMO as opposed to other practice settings or may reflect more centralized decision processes in HMO settings.

Our data reveal a lack of familiarity with many aspects of the MenB disease and the MenB vaccine among primary care providers. For example, the incidence of the MenB disease, the vaccines' effectiveness, and the duration of protection afforded by the vaccines were among the top 5 reasons supporting a higher likelihood of provider recommendation. In truth, the low incidence of the MenB disease might be expected to be a likely reason for not recommending these vaccines. The vaccines' effectiveness against clinical disease had not been demonstrated at the time but was inferred on the basis of an immunologic marker of protection, and the 2 licensed vaccines were not expected to provide protection against all serogroup B strains circulating.[4] In addition, the duration of protection provided by the MenB vaccines is unknown, and studies have revealed a rather steep decline in antibodies for both vaccines, suggesting protection may in fact be short-lived.[16,17] Finally, sizable portions of respondents, especially FPs, reported they "didn't know" how these factors influenced recommendation decisions. Providers were also more likely to recommend the MenB vaccine at precollege visits rather than routine 16- to 18-year-old health maintenance visits, as recommended by the ACIP, possibly as the result of the extensive publicity around college outbreaks of the MenB disease. They were more likely to initiate a discussion regarding the vaccine if they were aware of the MenB disease outbreaks in their state, despite the fact that most cases are not outbreak-related.[9] Approximately 10% of pediatricians and one-third of FPs reported recommending the MenB vaccine to healthy 11- to 12-year-olds, indicating confusion with timing for the first MenACWY vaccine. In addition, 19% of pediatricians and 43% of FPs reported making no recommendation regarding the MenB vaccine for children aged ≥10 years who were at increased risk for meningococcal disease. MenB vaccination in this group is a Category A, rather than Category B recommendation; therefore, this is an important misunderstanding among primary care physicians. These findings suggest a need to develop methods of better highlighting differential recommendations for the same vaccine in different patient groups.

The rather substantial differences in awareness regarding the MenB vaccine and in delivery practices seen between pediatricians and FPs reflect previous literature. Similar to previous studies regarding childhood[12–14,18–20] and adolescent vaccines,[21–26] FPs were much less likely to have been aware of the MenB vaccine before our survey and were less likely to report initiating a discussion or recommending the MenB vaccine or to administer the MenB vaccine in their office. The multivariable model suggests that the lack of knowledge regarding the MenB vaccine was a major contributing factor in not initiating vaccine discussions. FPs were also more likely to report they didn't know about many of the factors queried as reasons for recommending or not recommending the MenB vaccine. As discussed in previous literature, FPs may have different attitudes and practices than pediatricians related to the fact that they may see fewer or less severe cases of certain childhood diseases, have more competing demands given their focus on both children and adults, and may face more barriers related to vaccine financing and vaccine supply.[19,27]

There are strengths and limitations to our data. We surveyed large, nationally representative samples of pediatricians and FPs and achieved high response rates. The responses of our sentinel physicians may not be fully generalizable, especially because participating providers are aware they are going to be surveyed about vaccine-related issues. However, authors of previous work have demonstrated the sampling methods described yield similar responses to the most commonly employed method of sampling physicians nationally.[10] Nonrespondents may have had different views than respondents, although the high response rates somewhat mitigate against this source of bias. The survey was conducted a year after the Category B recommendations were made, and results might differ if a longer time frame after the recommendations had been used. Finally, physicians' reported frequency of initiating a discussion about the MenB vaccine or recommending it were based on self-report rather than direct observation and responses may reflect social desirability bias.

Primary care physicians are responding to the new Category B recommendation for the MenB vaccine in a variety of ways, which might be expected from this type of recommendation. Our data suggest that a lack of knowledge about MenB disease or awareness of the MenB vaccine may be a primary motivation for not initiating a discussion for many, rather than clinician or parent and patient assessment of the risk and benefit of these vaccines. Many primary care physicians do not appear to be familiar enough with the

data required to have a well-informed discussion with parents and patients about the pros and cons of the MenB vaccination in healthy adolescents. In addition, sizable percentages are unaware of the routine recommendation for MenB vaccination in children aged ≥10 years at increased risk. Lack of awareness about the MenB vaccine may not be surprising given the competing demands of primary care, the low prevalence of MenB disease, and the relative newness of the recommendation. With our data, we highlight the challenges providers face with implementing recommendations for vaccination based on individual clinical decision-making when they have limited experience with a disease and limited knowledge of a new vaccine. Because category B recommendations are likely to continue to occur in certain situations, it will be key for national clinical organizations such as the AAP and AAFP to provide as specific guidance as possible about how to implement Category B recommendations for different vaccines, including talking points, to assist in the complex decision-making that such a recommendation requires.

ABBREVIATIONS

AAFP: American Academy of Family Physicians
AAP: American Academy of Pediatrics
ACIP: Advisory Committee on Immunization Practices
CDC: Centers for Disease Control and Prevention
FP: family physician
HMO: health maintenance organization
MenACWY: serogroups A, C, W, and Y meningococcal
MenB: serogroup B meningococcal

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