

# Young Adult and Parent Willingness to Pay for Meningococcal Serogroup B Vaccination

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## Abstract

**Introduction.** Serogroup B (MenB) is the leading cause of invasive meningococcal disease among adolescents and young adults in the United States. The US Advisory Committee on Immunization Practices (ACIP) recommends MenB vaccination based on shared clinical decision making between patients and providers. However, suboptimal understanding of these recommendations could contribute to low vaccination awareness and coverage. Understanding young adult and parent expectations of their health care providers (HCPs) and the value they place on vaccine information could help inform a consistent approach to HCP MenB vaccination discussions and recommendations. **Methods.** Data collected via a discrete-choice experiment online survey were used to evaluate preferences and willingness to pay regarding MenB vaccination among US parents and young adults in 2019. **Results.** Of 2,388 respondents with valid data, 1,185 were parents of children aged 12 to 25 y, and 1,203 were young adults aged 18 to 25 y. Approximately 70% of parents and young adults indicated that they would react negatively if their HCP chose not to initiate a discussion with them about MenB vaccines. Neither parents nor young adults were willing to pay for additional time for MenB vaccine discussions with their HCP but were willing to pay an average of \$416 and \$282, respectively, for the vaccine. For parents and young adults, greater willingness to pay was associated with a provaccination attitude and the opinion that the HCP has a moral obligation to discuss the MenB vaccine with them. **Conclusion.** Both parents and young adults felt their HCP is responsible for initiating a discussion about MenB vaccination and disease risk and were willing to pay for the vaccine. These findings should help inform ACIP recommendations for meningococcal vaccination.

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### Highlights

- ACIP recommends shared clinical decision making for MenB vaccination.
- Data were collected from young adults and parents of adolescents by online survey.
- We measured values and consultation preferences on MenB disease and vaccination.
- Young adults/parents strongly preferred doctor-initiated MenB vaccine discussion.
- Respondents were willing to pay for a MenB vaccine.

### Keywords

contingent valuation method, meningococcal disease, serogroup B, shared clinical decision making, vaccines, willingness to pay

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Invasive meningococcal disease (IMD) is a serious infection caused by the bacteria *Neisseria meningitidis*, with the average case fatality rate ranging from 10% to 20%<sup>1</sup>; up to 20% of survivors can experience permanent or long-term sequelae, including severe neurologic, visual, or hearing impairments.<sup>1,2</sup> Adolescents and young adults are a particularly vulnerable population, with high meningococcal carriage rates that peak at 19 y of age.<sup>3,4</sup> The age-typical social-mixing behaviors of adolescents and young adults (eg, kissing, living in close quarters) contribute to the spread of the disease among this population.<sup>5</sup> According to the most recently available (2019)

US Centers for Disease Control and Prevention (CDC) Enhanced Meningococcal Surveillance data, most IMD cases in the United States are caused by serogroup B (MenB), including 49% of IMD cases among individuals 16 to 23 y of age and 26% of all IMD cases across age groups.<sup>6</sup>

Two vaccines are required for protection against the 5 predominant disease-causing meningococcal serogroups.<sup>7,8</sup> The US Advisory Committee on Immunization Practices (ACIP) recommends routine MenACWY vaccination at 11 to 12 y of age followed by a booster dose at 16 y of age.<sup>9</sup> MenB vaccination is recommended at 16 to 23 y of age (16–18 y preferred) on the basis of shared clinical decision making, and the CDC has provided guidance explaining this recommendation.<sup>9,10</sup> In 2021, MenACWY vaccination coverage was 89.0% for  $\geq 1$  dose and 60.0% for  $\geq 2$  doses, whereas MenB vaccination coverage was 31.4% for  $\geq 1$  dose.<sup>11</sup>

The ACIP uses the Evidence to Recommendations (EtR) framework, adopted in 2018, to gather and evaluate evidence to develop vaccination recommendations.<sup>12,13</sup> The EtR framework provides a structured and transparent way to inform clinical recommendations, coverage decisions, and health system or public health recommendations/decisions based on clinical evidence of vaccine effectiveness, patient values and preferences, comparative health benefits, and acceptability among stakeholders.<sup>13–16</sup> In 2011, the CDC engaged with representatives from stakeholder groups and members of the public regarding meningococcal vaccines in infants and toddlers, but not adolescents, to examine values about

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Patient Health and Impacts, Pfizer Inc, Collegeville, PA, USA (LH); Orbital Therapeutics, Cambridge, MA, USA (AS); Medical Development & Scientific Clinical Affairs, Pfizer Inc, Collegeville, PA, USA (AS); University of North Carolina at Chapel Hill, Kenan-Flagler Business School, Chapel Hill, NC, USA (AF); University of North Carolina at Chapel Hill, Gillings School of Global Public Health, Chapel Hill, NC, USA (DW); Duke University School of Medicine, Durham, NC, USA (RJ). The work was presented at IDWeek 2020, SAHM 2020. The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: LH is a Pfizer employee and may hold stock options. AS is currently employed by Orbital Therapeutics; he was a Pfizer employee at the time of manuscript development and may hold stock options. AF reports Pfizer research support for consulting services. DW has no conflicts to report. RJ reports Pfizer research support to Duke University. The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was sponsored by Pfizer Inc. The funding agreement ensured the authors' independence in designing the study, interpreting the data, writing, and publishing the report.

the use of licensed vaccines to protect children from rare but severe illness.<sup>17</sup> When MenB vaccines were first recommended in 2015, no formal studies were conducted as part of the EtR process to investigate the values and preferences of the adolescent vaccine population.<sup>18</sup> Now that the ACIP is placing more emphasis on patient values and preferences, including their willingness to pay (WTP) for vaccines, it is important to use stated-preference surveys to support the formal decision-making process.<sup>15</sup>

Our objective was to quantify the perceptions of young adults and their parents about serogroup B disease and vaccines and the value they placed on vaccination using standard stated-preference study methods recommended by the ACIP.<sup>19</sup> Specifically, given the ACIP recommendation for shared clinical decision making between the patient and their health care provider (HCP), this study examined the value families place on information shared by a provider regarding the option of MenB vaccination and quantified the amount patients would be willing to pay for a discussion with their HCP about MenB vaccination and the amount they would be willing to pay for the vaccine itself.

## Methods

### *Design and Respondents*

The study design followed good research practices for health-related choice-experiment studies.<sup>20</sup> A detailed description of the information provided to the respondents has been published elsewhere.<sup>21</sup> Briefly, this included information about both the disease and the vaccine to help protect against the disease (ie, the effect of the disease, how many people get the disease each year, how the disease spreads, how long the vaccine lasts and, finally, the cost of the vaccine). A draft survey was pre-tested and modified in 25 “think-aloud” interviews. Participants were paid \$75 for a 1-h interview.

The final survey was administered online by Ipsos Knowledge Panel, an international survey-research company. Respondents were recruited via e-mail or through a personalized online portal from the Ipsos Knowledge Panel. Respondents in the Ipsos Knowledge Panel received modest compensation in accordance with standard practice in the industry. This online national opt-in consumer panel is a probability-based, representative, random sample of US households. Young adults (18–25 y of age) or parents/guardians of young adults aged 12 to 25 y were eligible to participate and were required to be able to read and understand English. All respondents provided explicit consent before participating in

the study. The Web-enabled stated-preference survey<sup>22,23</sup> was conducted across the United States from August 22, 2019, to October 2, 2019.

### *Instrument*

The Web-enabled survey instrument used contingent-valuation (CV) questions to quantify the monetary value that young adults placed on 1) additional time to consult with their doctor about MenB vaccination and 2) being vaccinated with the MenB vaccine in general. For parents of young adults, the CV questions quantified the monetary value of 1) additional time to consult with their doctor about MenB vaccination for their teenage or young adult children and 2) MenB vaccination for their teenage and young adult children. A double-bounded CV format was used. Respondents were randomly assigned 1 of 5 starting bids/prices (\$50, \$100, \$200, \$500, or \$1,000). If they responded “Yes,” they were asked if they would pay an amount twice as large as the starting cost for additional time with their doctor to discuss MenB vaccination or for a MenB vaccine. If a respondent answered “No” to the initial bid, they were asked if they would pay an amount half as large. If they again responded “No,” they were asked if they would pay more than zero dollars.

The survey also collected data on respondents’ social and demographic characteristics and their opinions regarding vaccines in general (i.e., vaccine capabilities for preventing and protecting against a disease). Respondents were asked to rate whether they agreed or disagreed with the following statements:

1. “My doctor has a moral obligation to tell me about a disease like MenB and the vaccine that can prevent it.”
2. “I trust my doctor to tell me what I need to know to make good decisions about my [my child’s] health.”
3. “I do not need to consult with a doctor if I have questions about my [my child’s] health.”

Respondents also were asked to describe their reaction to a hypothetical situation in which their doctor did not discuss the possibility of MenB vaccination with them and they found out about the vaccine later. Respondents were asked to choose which of 8 possible reactions ranging from “unconcerned” to “angry or disgusted” best described how they would feel if this were to happen. The 3 statements above and the hypothetical-situation response categories were based on open-ended responses obtained in parent and young-adult interviews during the

qualitative research phase of the study. These questions are best interpreted as exploratory research.

Respondents also were asked a series of additional questions to evaluate their knowledge about vaccination and incidence rates of various infectious diseases (e.g., seasonal flu, whooping cough, meningitis, shingles). The study also included an additional module with a discrete-choice experiment focused on respondents' preferences for vaccines to protect against a generic disease with low incidence but severe outcomes, with results reported in a separate manuscript (questionnaire available upon request).<sup>21</sup>

### Data Analysis

Descriptive analyses were conducted to examine the probability of reactions to the doctor choosing not to discuss MenB vaccines with young adults and parents. We estimated several parametric and nonparametric WTP split-sample models for young adults, parents of a child younger than 18 y, and parents of a child 18 y and older using both the single-bounded and double-bounded CV data. A well-known problem with estimating CV models is that the WTP of respondents who accept the highest bid offered is in an open-ended interval. Hence, mean values can be sensitive to the shape of the right-hand tail of the assumed error distribution. We estimated parametric models using logistic, normal, log-logistic, log-normal, and Weibull distributions. Covariates were included to help explain variations in the probabilities. The means of the WTP for additional time with the doctor for discussing MenB vaccine and WTP for MenB vaccination also were examined. A multivariate analysis was further performed to explore factors associated with WTP. Confidence intervals were obtained by the Krinsky-Robb method with 10,000 draws on the variance-covariance matrix.<sup>24</sup>

## Results

### Study Population and Demographics

A total of 2,388 respondents were recruited from the Ipsos general-population panel and provided valid study data. Approximately 3% ( $n = 69$ ) of the respondents provided invalid preference data (ie, data in which respondents provided conflicting responses) and were excluded from the analysis. Table 1 shows that 1,185 were parents of children 12 to 25 y of age and 1,203 were young adults 18 to 25 y of age. Most respondents were

White (parent, 89.4%; young adult, 67.3%) and female (parent, 50.1%; young adult, 76.1%).

### Respondents' Reaction If Doctor Did Not Discuss MenB Vaccines

Parents and young adults were asked to respond to the question, "Suppose your doctor did not discuss the vaccine with you, so you never knew it was an option. You found out later, when a friend asked whether you got the vaccine. How would you feel about this situation?" We found no differences between the parent groups, so we have combined them in this analysis. Figure 1 summarizes the similar reactions of parents and young adults. Although 30% of parents and 33% of young adults indicated they would feel "concerned," 41% and 28% of parents and 36% and 31% of young adults would feel more concerned ("disappointed," "anxious"/"afraid," "upset," or "angry"/"disgusted") and less concerned ("unconcerned," "calm," or "understanding"), respectively. Thus, approximately 70% of respondents indicated their reaction to a doctor choosing not to discuss MenB vaccines with them would be negative (concerned or more concerned).

The results from the multivariate analysis are found in Figure 2 and Supplementary Tables S1 and S2. Compared with parents who said they would be "unconcerned," parents who indicated they would be "upset" or "concerned" were more likely to 1) be women older than 55 y, 2) have answered knowledge questions about disease incidence accurately, 3) have agreed that doctors should provide information about MenB vaccines, 4) be willing to pay for more time with their doctor to discuss a MenB vaccine, and 5) be willing to pay for a MenB vaccine. Young adults who indicated a reaction of "concerned" were more likely to agree that doctors should provide information about MenB vaccines and be willing to pay for a MenB vaccine. Both parents and young adults who said they would be "concerned" were less likely to have had a personal discussion about MenB vaccines with their doctors. Parent and young adult respondents were also less likely to agree or strongly agree that they "don't need a doctor to answer their questions" if they indicated a response of "concerned" or "upset" compared with those who indicated that they would be "unconcerned." In addition, parents who indicated a response of "concerned" or "upset" and young adult respondents who indicated a response of "concerned" were more likely to accept any of the offered

**Table 1** Demographics

Characteristic	Parents ( <i>n</i> = 1,185)	Young Adults ( <i>n</i> = 1,203)
Sex, <i>n</i> (%)		
Male	578 (49.7)	261 (22.0)
Female	582 (50.1)	905 (76.1)
Race, <i>n</i> (%)		
Minority	125 (10.6)	392 (32.7)
White	1,059 (89.4)	806 (67.3)
Age of respondent, <i>y</i>		
$\bar{x} \pm s$	58.4 $\pm$ 12.5	21.8 $\pm$ 2.3
Median (range)	60.0 (26.0, 90.0)	22.0 (18.0, 25.0)
Age of child, <i>y</i>		
$\bar{x} \pm s$	20.9 $\pm$ 4.5	NA
Median (range)	23.0 (12.0, 25.0)	NA
Education, <i>n</i> (%)		
Less than high school	1 (0.1)	9 (0.8)
Some high school	4 (0.3)	39 (3.3)
High school or equivalent (such as GED)	159 (13.5)	304 (25.4)
Some college but no degree	234 (19.9)	378 (31.6)
Technical school	60 (5.1)	28 (2.3)
Associate's degree or 2-y college degree	161 (13.7)	124 (10.4)
4-y college degree (such as BA, BS)	294 (25.0)	228 (19.1)
Some graduate school but no degree	45 (3.8)	29 (2.4)
Graduate or professional degree (such as MBA, MS, MA, MD, PhD)	218 (18.5)	57 (4.8)
Income, <i>n</i> (%)		
Less than \$25,000	134 (11.3)	310 (25.9)
\$25,000 to \$49,999	247 (20.9)	315 (26.3)
\$50,000 to \$74,999	250 (21.1)	182 (15.2)
\$75,000 to \$99,999	222 (18.8)	124 (10.4)
\$100,000 to \$149,999	181 (15.3)	78 (6.5)
\$150,000 to \$199,999	56 (4.7)	28 (2.3)
\$200,000 or more	47 (4.0)	25 (2.1)
Do not know or not sure	1 (0.1)	67 (5.6)
Prefer not to answer	46 (3.9)	69 (5.8)

*n*, number of respondents in the specified group; NA, not applicable.

bids for a MenB vaccine compared with those who responded as “unconcerned.”

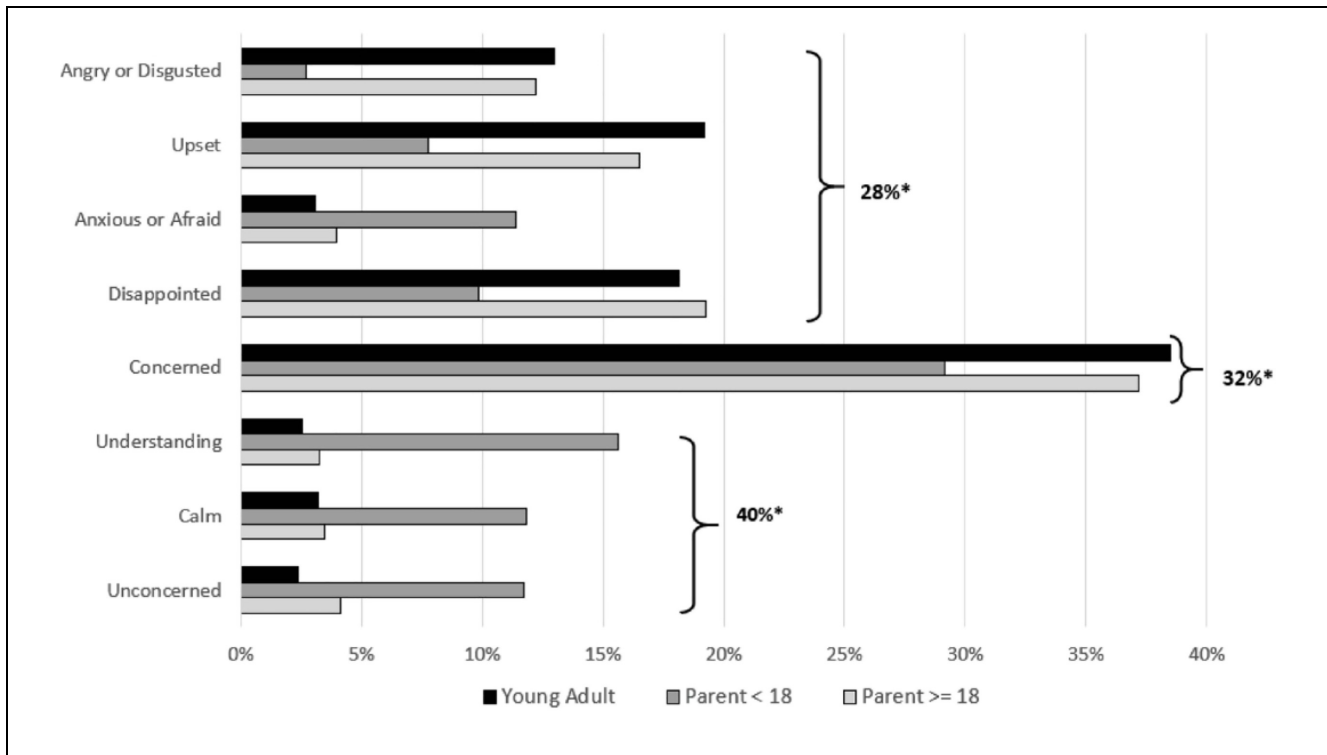
### *WTP for MenB Vaccination and for Additional Time with Their Doctor*

We found that mean estimates varied considerably among assumed error distributions. Also, the single-bounded estimates were smaller than the double-bounded estimates. However, medians were similar between single- and double-bounded models, and a conservative measure of means based on truncating the distributions at the highest bid also was similar. For vaccination, distributions for our best lower-bound estimates based on model fit were logistic for the young-adult sample and normal for both parent samples. For more time with a doctor, distributions were log-normal

for young adults and parents with a child younger than 18 y and logistic for parents with a child 18 y and older.

Table 2a and b compare WTP for vaccination and time with doctor for the 2 parent groups with young adults. The truncated means are our best lower-bound value estimates of \$129, \$154, and \$157 for young adults, parents with a child younger than 18 y, and parents with a child aged 18 y or older, respectively. Note that the truncated means are very similar to the nonparametric estimates. Also, we clearly reject the hypothesis that parents of younger and older children have different vaccine and time values.

In Table 2b, large variances result in very long tails to the right for young adults and parents of children younger than 18 y, resulting in implausible mean values and extremely wide confidence intervals. However, similar to the vaccine results, the truncated means have



**Figure 1** Reaction to doctor choosing not to discuss MenB vaccine.

\*Average for the combined groups. Participants were asked on the survey, “Suppose your doctor did not discuss the vaccine with you, so you never knew it was an option. You found out later when a friend asked whether you got the vaccine. How would you feel about this situation?” Responses were then categorized by the interviewer as either “unconcerned,” “calm,” “understanding,” “concerned,” “disappointed,” “anxious or afraid,” “upset,” or “angry or disgusted.” MenB, meningococcal serogroup B.

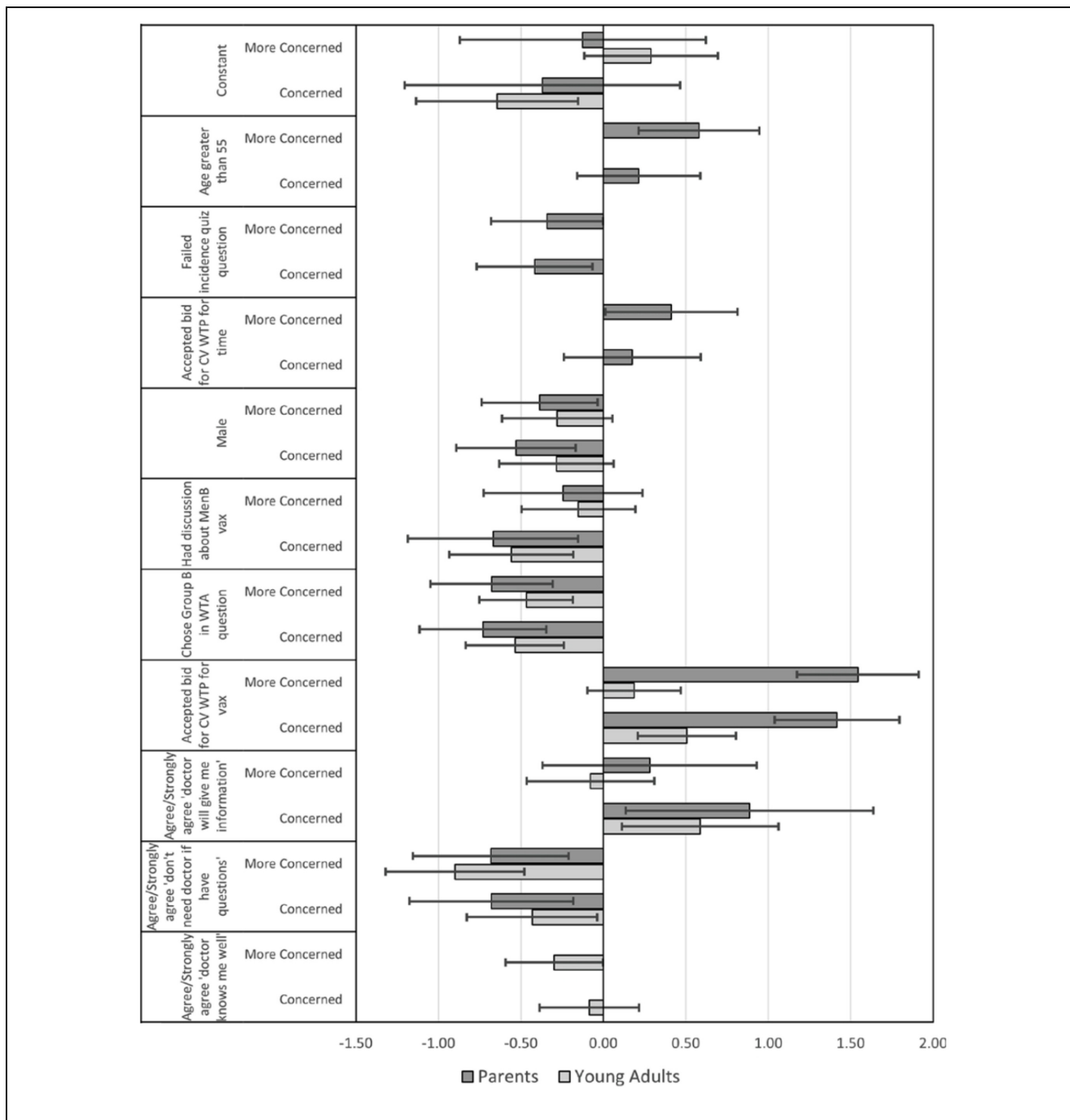
tighter confidence intervals. Also, the point estimates for the truncated means again are similar to the lower-bound nonparametric values. Our best lower-bound estimates for more time with the doctor are \$63, \$81, and \$88 for young adults, parents with a child younger than 18 y, and parents with a child 18 y or older, respectively.

Figure 3 shows how WTP was influenced by various factors. There were no significant differences among the 3 subsamples except for income less than \$30,000 and having had a discussion with a doctor. The low-income effect was negative for parents with older children, and the doctor-discussion effect was positive for young adults. Provaccination attitude, income >\$100,000, being willing to pay for more time with the doctor, and having a doctor who knows them positively influenced parents’ WTP for a MenB vaccine for their child. Antivaccination attitude (vaccine hesitancy) and income <\$30,000 negatively influenced parental WTP for a MenB vaccine. For young adult respondents, significant covariates that positively influenced WTP for a MenB

vaccine included provaccination attitude, an opinion that the doctor has a moral obligation to discuss the vaccine, and having a discussion with the doctor. An antivaccination attitude and being married negatively influenced young adults’ WTP for a MenB vaccine. For estimation details, see Supplementary Table S3. Because of the relatively poor estimates for time with the doctor, we are not reporting the covariate analysis. However, full model estimates can be found in Supplementary Table S4.

## Discussion

To our knowledge, this is the first formal assessment of population preferences for MenB vaccination in the United States using ACIP-prescribed methodology. We examined how respondents would feel if their HCP failed to discuss with them serogroup B disease and MenB vaccination, as required by the ACIP recommendation for shared clinical decision making. We also estimated respondents’ WTP for 1) additional time to discuss these



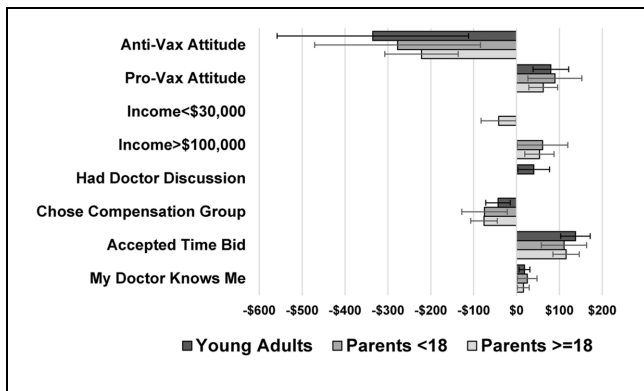
**Figure 2** Multinomial-logit log-odds estimates of “upset” or “concerned” versus “unconcerned.” Shown are the multinomial-logit estimates for a response of “upset” or “concerned” versus “unconcerned.” Values on the x-axis indicate the strength of the association between each demographic variable or characteristic and the likelihood that a respondent would indicate that they would be “upset” or “concerned” rather than “unconcerned” if their doctor neglected to discuss MenB vaccination. The responses of “disappointed,” “anxious or afraid,” “upset,” and “angry or disgusted” were grouped into a single “more concerned” category, and responses of “unconcerned,” “calm,” and “understanding” were grouped into a single “less concerned” omitted category. Error bars indicate 95% confidence intervals. CV, contingent valuation; MenB, meningococcal serogroup B; vax, vaccine; WTP, willingness to pay.

**Table 2 a.** Willingness to Pay (United States Dollars) for MenB Vaccination and 95% Confidence Intervals Compared with Statistical and Nonparametric Models

Willingness-to-Pay, MenB Vaccination							
Sample	Untruncated Mean	Confidence Interval	Truncated Mean	Confidence Interval	Median	Confidence Interval	Nonparametric Turnbull
Young adults ( <i>n</i> = 1,173)	187	170–211	129	123–135	167	152–185	134
Parents (child < 18 y) ( <i>n</i> = 358)	225	194–287	154	144–163	220	190–275	151
Parents (child ≥ 18 y) ( <i>n</i> = 818)	213	196–236	157	150–163	211	194–232	154

**Table 2 b.** Willingness to Pay (United States Dollars) for More Time with the Doctor and 95% Confidence Intervals Compared with Statistical and Nonparametric Models

Willingness-to-Pay, More Time with Doctor							
Sample	Untruncated Mean	Confidence Interval	Truncated Mean	Confidence Interval	Median	Confidence Interval	Nonparametric Turnbull
Young adults ( <i>n</i> = 1,173)	2,180	5–100,876	63	56–70	15	3–29	60
Parents (child < 18 y) ( <i>n</i> = 358)	506	0–246,730	81	0–201	43	0–2,088	99
Parents (child ≥ 18 y) ( <i>n</i> = 818)	116	104–133	88	80–96	72	45–91	81



**Figure 3** Factors associated with WTP for MenB vaccination. Statistically significant participant characteristics associated with WTP are shown. The change from the average WTP estimate for each statistically significant covariate is shown. The vertical line indicates the mean WTP. Error bars indicate 95% confidence intervals. MenB, meningococcal serogroup B; vax, vaccine; WTP, willingness to pay.

issues with their physician and 2) MenB vaccination. The principal findings from this study were 1) most respondents would have a negative reaction if their doctor neglected to discuss MenB vaccination with them, indicating that they placed primary responsibility upon their doctor to initiate such a discussion; 2) most respondents felt entitled to such a discussion with their doctor without having to pay extra for the additional time that

this required; and 3) young adults’ WTP for MenB vaccination was nearly \$300 and parents’ WTP was more than \$400 to vaccinate their teenage or young adult child.

In the United States, the first example of a nonroutine “clinical decision making” ACIP recommendation for an entire age group (i.e., adolescents) was for MenB vaccines in 2015.<sup>18,25</sup> Since 2005, routine vaccination with conjugate MenACWY vaccines continues to be recommended for all adolescents.<sup>18,25</sup> For nonroutine recommendations, ACIP’s terminology has evolved from “permissive” to “category B” and to “individual clinical decision-making.”<sup>25,26</sup> As of June 2019, the term has been referred to as “shared clinical decision-making.”<sup>25,26</sup> Subsequently, shared clinical decision-making recommendations have been applied to additional vaccines and age groups, such as human papilloma virus vaccines for individuals >26 y of age and pneumococcal conjugate vaccines for individuals ≥65 y of age.<sup>27,28</sup>

Shared clinical decision making is now used in multiple clinical situations and is probably a familiar concept to most providers. However, barriers to effective MenB vaccination discussions between physicians and patients can include limitations on physicians’ time, some patients’ general vaccine hesitancy, and clinical assumptions about the relevance of vaccines for diseases with low incidence, even those with severe consequences.



Health care discussions involve shared decision making between the clinician and the patient and are considered essential for ensuring that clinical care is in agreement with the patients' values and preferences.<sup>29</sup> Vaccine discussions and decisions in the United States are driven by the ACIP's recommendations, which rely on evidence on the balance of benefits and harms, the type or quality of the evidence, the values and preferences of the people affected, and health economic analyses.<sup>12</sup> Recognizing the uniqueness of the vaccination discussion, the ACIP's EtR framework requires gathering available evidence on target population values and preferences related to vaccination and comparative health benefits and risks.<sup>15</sup>

Our results suggest that, specifically within the context of MenB vaccination, young adults and parents expect their doctors to proactively inform them about MenB disease and the option to vaccinate. Respondents were not, however, willing to pay for additional time for such a discussion, which may indicate that they presume this should be covered during their existing routine visits. This expectation appears consistent with the shared clinical decision-making recommendation for the MenB vaccine. Thus, given the limited time available for such visits, HCPs might consider reevaluating priorities for how to use this time. More generally, the growing use of clinical decision-making recommendations and accumulating evidence regarding the implementation experience with MenB vaccination necessitate empowering HCPs with clear guidelines and developing a cohesive set of outcome measures (eg, patient satisfaction, rates of disease, disparities among demographic groups) that can be used to evaluate the practice of shared clinical decision making and the public health impact of these recommendations.<sup>30</sup> Furthermore, when we grouped the parents according to the age of their child (<18 y old v. ≥18 y old), we found no evidence of a difference in vaccine values between the subgroups. It is possible that in both cases, parents act in a similar "consulting" role within the shared clinical decision-making process, although future studies are necessary to clarify this result. This finding can, however, inform vaccine-policy decisions beyond those surrounding MenB vaccination as shared clinical decision making becomes a more common recommendation.

Studies have shown that a recommendation from an HCP is the most influential variable associated with vaccination.<sup>31–33</sup> Parents rely on their providers for vaccination recommendations, and 5 y of implementation experience with the ACIP nonroutine recommendation for MenB vaccination has shown a lack of understanding among providers and parents, that discussion can be

limited, and disparities exist.<sup>31,34–36</sup> Meningococcal disease is preventable with vaccination; however, the experience with MenB vaccination indicates that physicians struggle with the interpretation, communication, and implementation of ACIP's clinical decision-making recommendation, leading to disparate vaccine-prescribing practices.<sup>35–37</sup> Consequently and despite parental willingness to vaccinate, evidence shows sociodemographic inequities in MenB vaccine access and vaccine receipt.<sup>34,38,39</sup> In a nationally representative survey, parental awareness of MenB vaccines was low (43%) and significantly lower among males, those of Hispanic or non-White race, and parents with less educational attainment.<sup>39</sup> Regional studies examining immunization records have also shown that MenB vaccination was positively associated with White race, having private insurance, and MenACWY vaccine receipt.<sup>38</sup>

All stated-preference studies are limited by the hypothetical nature of the scenarios in the survey and the possibility that respondents could make different choices if faced with the complexities of real-life decisions. To minimize hypothetical bias, the survey instrument used in this study was designed to simulate choices respondents could be asked to make and to ensure that the decision context aligned with their lived experiences. Although we took care to explain that costs shown in the choice questions were personal out-of-pocket costs, it is possible that respondents incorrectly assumed the WTP question was referring to an increased insurance cost rather than a direct out-of-pocket expense. While the Knowledge Panel is representative of the general US population, a potential limitation is that individuals who opted in to participate in this survey may not have been representative of the population. However, given the large sample size of more than 2,000 respondents, the survey sample was highly diverse, which facilitated extensive covariate analysis to understand how preferences are affected by vaccine attitudes and knowledge as well as sociodemographic characteristics.

This study was conducted before the onset of the COVID-19 pandemic, so the preference assessments do not account for the effects of the pandemic on perceptions and attitudes related to infectious disease and vaccination. Had this survey been fielded today, the results may be different. In the COVID-19 era, vaccine hesitancy is likely exacerbated, which could affect how respondents answer survey questions related to vaccine preferences.<sup>40</sup> This is particularly true for the emotional responses, which were already considered exploratory prior to the pandemic. The COVID-19 pandemic has sensitized regulators to the importance of the public's



preferences, and every ACIP recommendation in the last 2 y has included information on vaccine preferences.<sup>41</sup> Future studies should take into account the impact of COVID-19 on vaccine preferences to best inform ACIP recommendations.

Overall, our results demonstrate that young adults and their parents place a high value on the MenB vaccine and expect their HCP to initiate a discussion with them regarding vaccination. This highlights the importance of provider engagement in informing their patients of vaccination options and reemphasizes the need for substantial provider support and education to enable them to implement the ACIP recommendation for shared clinical decision making with respect to MenB vaccination. Results also demonstrate the usefulness of including formal stakeholder preference data using ACIP-prescribed methodology in the EtR process. These findings help to close the evidence gap between patient preferences related to MenB vaccination and shared clinical decision making. Our hope is that the results of this survey will support future development of ACIP recommendations by improving the application of input from all stakeholders not only for the next-generation pentavalent meningococcal vaccines but also for other vaccines for which shared clinical decision-making policies are implemented (or being considered).

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### Supplemental Material

Supplementary material for this article is available online at <https://doi.org/10.1177/23814683241264280>.

### References

1. Martínón-Torres F. Deciphering the burden of meningococcal disease: conventional and under-recognized elements. *J Adolesc Health*. 2016;59:S12–20. DOI: 10.1016/j.jadohealth.2016.03.041
2. Peterson ME, Li Y, Bitá A, et al. Meningococcal serogroups and surveillance: a systematic review and survey. *J Glob Health*. 2019;9:010409.
3. Christensen H, May M, Bowen L, Hickman M, Trotter CL. Meningococcal carriage by age: a systematic review and meta-analysis. *Lancet Infect Dis*. 2010;10:853–61. DOI: 10.1016/S1473-3099(10)70251-6
4. Burman C, Serra L, Nuttens C, Presa J, Balmer P, York L. Meningococcal disease in adolescents and young adults: a review of the rationale for prevention through vaccination. *Hum Vaccin Immunother*. 2019;15:459–69. DOI: 10.1080/21645515.2018.1528831
5. World Health Organization. Meningococcal meningitis. 2018. Available from: <http://www.who.int/en/news-room/fact-sheets/detail/meningococcal-meningitis>. [Accessed 3 October, 2020].
6. Centers for Disease Control and Prevention. Enhanced meningococcal disease surveillance report. 2019. Available from: <https://www.cdc.gov/meningococcal/downloads/NCIRD-EMS-Report-2019.pdf>. [Accessed 27 December, 2022].
7. Centers for Disease Control and Prevention. Recommended child and adolescent immunization schedule for ages 18 years or younger: United States 2021. 2020. Available from: <https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf>. [Accessed 23 March, 2021].
8. Purmohamad A, Abasi E, Azimi T, et al. Global estimate of *Neisseria meningitidis* serogroups proportion in invasive meningococcal disease: a systematic review and meta-analysis. *Microb Pathog*. 2019;134:103571. DOI: 10.1016/j.micpath.2019.103571
9. Mbaeyi SA, Bozio CH, Duffy J, et al. Meningococcal vaccination: recommendations of the Advisory Committee on Immunization Practices, United States, 2020. *MMWR Recomm Rep*. 2020;69(9):1–41.
10. Centers for Disease Control and Prevention. ACIP shared clinical decision-making recommendations. 2020. Available from: <https://www.cdc.gov/vaccines/acip/acip-scdm-faqs.html>. [Accessed 23 January, 2023].
11. Pingali C, Yankey D, Elam-Evans LD, et al. National vaccination coverage among adolescents aged 13-17 years - National Immunization Survey-Teen, United States, 2021. *MMWR Morb Mortal Wkly Rep*. 2022;71:1101–8. DOI: 10.15585/mmwr.mm7135a1
12. Centers for Disease Control and Prevention. Evidence-based recommendations—GRADE. 2018. Available from: <https://www.cdc.gov/vaccines/acip/recs/grade/about-grade.html>. [Accessed 17 August, 2020].
13. Lee G, Carr W; ACIP Evidence-Based Recommendations Work Group. Updated framework for development of evidence-based recommendations by the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep*. 2018;67:1271–2. DOI: 10.15585/mmwr.mm6745a4

14. Alonso-Coello P, Schunemann HJ, Moberg J, et al. GRADE Evidence to Decision (EtD) frameworks: a systematic and transparent approach to making well informed healthcare choices. 1: Introduction. *BMJ*. 2016;353:i2016. DOI: 10.1136/bmj.i2016
15. Advisory Committee on Immunization Practices. ACIP evidence to recommendations framework. 2018. Available from: <https://www.cdc.gov/vaccines/acip/recs/grade/downloads/ACIP-evidence-rec-frame-508.pdf>. [Accessed 3 October, 2020].
16. Soekhai V, Whichello C, Levitan B, et al. Methods for exploring and eliciting patient preferences in the medical product lifecycle: a literature review. *Drug Discov Today*. 2019;24:1324–31. DOI: 10.1016/j.drudis.2019.05.001
17. Centers for Disease Control and Prevention. Engagement project report: meningococcal vaccines and infants/toddlers. 2011. Available from: <https://www.cdc.gov/vaccines/vpd-vac/mening/engagement-proj-infants-toddlers.htm>. [Accessed 24 January, 2023].
18. MacNeil JR, Rubin L, Folaranmi T, Ortega-Sanchez IR, Patel M, Martin SW. Use of serogroup B meningococcal vaccines in adolescents and young adults: recommendations of the Advisory Committee on Immunization Practices, 2015. *MMWR Morb Mortal Wkly Rep*. 2015;64:1171–6. DOI: 10.15585/mmwr.mm6441a3
19. Ahmed F. *U.S. Advisory Committee on Immunization Practices (ACIP) Handbook for Developing Evidence-Based Recommendations*. Version 1.2. Atlanta (GA): Centers for Disease Control and Prevention; 2013.
20. Bridges JF, Hauber AB, Marshall D, et al. Conjoint analysis applications in health—a checklist: a report of the ISPOR Good Research Practices for Conjoint Analysis Task Force. *Value Health*. 2011;14:403–13. DOI: 10.1016/j.jval.2010.11.013
21. Johnson FR, Fairchild A, Whittington D, et al. How does the public evaluate vaccines for low-incidence, severe-outcome diseases? A general-population choice experiment. *Patient*. 2023;16(2):139–51. DOI: 10.1007/s40271-022-00602-x
22. Johnston R, Boyle K, Adamowicz W, et al. Contemporary guidance for stated preference studies. *J Assoc Environ Res Econ*. 2017;4:319–405.
23. Whitty JA, Lancsar E, Rixon K, et al. A systematic review of stated preference studies reporting public preferences for healthcare priority setting. *Patient*. 2014;7:365–86. DOI: 10.1007/s40271-014-0063-2
24. Krinsky I, Robb AL. On approximating the statistical properties of elasticities. *Rev Econ Stat*. 1986;68:715–9. doi:10.2307/1924536
25. Centers for Disease Control and Prevention. June 2019 ACIP meeting – welcome and introductions. 2019. Available from: <https://www.cdc.gov/vaccines/acip/meetings/slides-2019-06.html>. [Accessed 29 August, 2019].
26. Niccolai LM, Hansen CE. Suboptimal uptake of meningococcal vaccines among older adolescents: barriers, solutions, and future research directions. *Hum Vaccin Immunother*. 2020;16:3208–12. DOI: 10.1080/21645515.2020.1754052
27. Meites E, Szilagyi PG, Chesson HW, Unger ER, Romero JR, Markowitz LE. Human papillomavirus vaccination for adults: updated recommendations of the advisory committee on immunization practices. *Am J Transplant*. 2019;19:3202–6. DOI: 10.1111/ajt.15633
28. Matanock A, Lee G, Gierke R, et al. Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine among adults aged  $\geq 65$  years: updated recommendations of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep*. 2019;68:1069–75. DOI: 10.15585/mmwr.mm6846a5
29. Beach MC, Sugarman J. Realizing shared decision-making in practice. *JAMA*. 2019;322:811–2. DOI: 10.1001/jama.2019.9797
30. Fergie J, Howard A, Huang L, Srivastava A. Implementation experience with meningococcal serogroup B vaccines in the United States: impact of a nonroutine recommendation. *Pediatr Infect Dis J*. 2021;40:269–75. DOI: 10.1097/INF.0000000000003033
31. Srivastava A, Dempsey A, Galitsky A, Fahimi M, Huang L. Parental awareness and utilization of meningococcal serogroup B vaccines in the United States. *BMC Public Health*. 2020;20:1109. DOI: 10.1186/s12889-020-09181-8
32. Costa-Pinto JC, Willaby HW, Leask J, et al. Parental Immunisation Needs and Attitudes Survey in paediatric hospital clinics and community maternal and child health centres in Melbourne, Australia. *J Paediatr Child Health*. 2018;54:522–9. DOI: 10.1111/jpc.13790
33. Ames HM, Glenton C, Lewin S. Parents’ and informal caregivers’ views and experiences of communication about routine childhood vaccination: a synthesis of qualitative evidence. *Cochrane Database Syst Rev*. 2017;2:CD011787. DOI: 10.1002/14651858.CD011787.pub2
34. Basta NE, Becker AB, Li Q, Nederhoff D. Parental awareness of meningococcal B vaccines and willingness to vaccinate their teens. *Vaccine*. 2019;37:670–6. DOI: 10.1016/j.vaccine.2018.11.078
35. Kempe A, Allison MA, MacNeil JR, et al. Knowledge and attitudes regarding category B ACIP recommendations among primary care providers for children. *Acad Pediatr*. 2018;18:763–8.
36. Huang L, Goren A, Lee LK, Li VW, Dempsey A, Srivastava A. Disparities in healthcare providers’ interpretations and implementations of ACIP’s meningococcal vaccine recommendations. *Hum Vaccin Immunother*. 2020;16:933–44. DOI: 10.1080/21645515.2019.1682845
37. Brady MT. Strength and clarity of vaccine recommendations influence providers’ practice. *Pediatrics*. 2018;142:e20181633. DOI: 10.1542/peds.2018-1633
38. Watkins E, Feemster K. Factors associated with uptake of meningococcus B vaccination after an ACIP category B recommendation. *Open Forum Infect Dis*. 2018; 5(suppl 1): S737.

39. Huang L, Goren A, Lee L, Li VW, Dempsey A, Srivastava A. Disparities in healthcare providers' interpretation and implementation of ACIP's meningococcal vaccine recommendations. *Hum Vaccin Immunother.* 2020;16(4):933–44.
40. Wiysonge CS, Ndwandwe D, Ryan J, et al. Vaccine hesitancy in the era of COVID-19: could lessons from the past help in divining the future? *Hum Vaccin Immunother.* 2022;18(1):1–3. DOI: 10.1080/21645515.2021.1893062
41. Advisory Committee on Immunization Practices. ACIP meeting information. 2022. Available from: <https://www.cdc.gov/vaccines/acip/meetings/index.html>. [Accessed 27 December, 2022].