# Pediatricians' Experiences With and Perceptions of the Vaccines for Children Program

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abstract

**BACKGROUND AND OBJECTIVES:** The Vaccines for Children Program (VFC) provides vaccines for children who may not otherwise be vaccinated because of financial barriers. Pediatrician participation is crucial to the VFC's ongoing success. Our objectives were to assess, among a national sample of pediatricians, (1) VFC program participation, (2) perceived burden versus benefit of participation, and (3) knowledge and perception of a time-limited increased payment for VFC vaccine administration under the Patient Protection and Affordable Care Act.

**METHODS:** An electronic and mail survey was conducted from June 2017 to September 2017.

**RESULTS:** Response rate was 79% (372 of 471); 86% of pediatricians reported currently participating in the VFC; among those, 85% reported never having considered stopping, 10% considered it but not seriously, and 5% seriously considered it. Among those who had considered no longer participating ($n$ = 47), the most commonly reported reasons included difficulty meeting VFC record-keeping requirements (74%), concern about action by the VFC for noncompliance (61%), and unpredictable VFC vaccine supplies (59%). Participating pediatricians rated, on a scale from −5 (high burden) to +5 (high benefit), their overall perception of the VFC: 63% reported +4 or +5, 23% reported +1 to +3, 5% reported 0, and 9% reported −1 to −5. Of pediatricians, 39% reported awareness of temporary increased payment for VFC vaccine administration. Among those, 10% reported that their practice increased the proportion of Medicaid and/or VFC-eligible patients served on the basis of this change.

**CONCLUSIONS:** For most pediatricians, perceived benefits of VFC participation far outweigh perceived burdens. To ensure the program's ongoing success, it will be important to monitor factors influencing provider participation.

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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, Hurley, and Vogt, Ms Lindley, Ms Stokley, and Mr Crawford assisted in the study design and 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 additional analyses, and reviewed and revised the manuscript; (Continued)

**WHAT'S KNOWN ON THIS SUBJECT:** The Vaccines for Children Program (VFC) provides vaccines for US children who may not otherwise be vaccinated. Participation in the VFC by pediatricians is crucial to its ongoing success.

**WHAT THIS STUDY ADDS:** The majority of pediatricians participate in the VFC, although numerous perceived burdens exist. Overall, pediatricians perceive that the benefits of VFC participation far outweigh the burdens.

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The Vaccines for Children Program (VFC) was created in 1993 to ensure that children would not suffer from vaccine-preventable diseases because of inability to pay for vaccines.[1,2] The VFC supplies >50% of vaccines for children in the United States.[3] Since its implementation in 1994, the VFC has been credited with increasing rates of vaccine uptake among US children, decreasing vaccine-preventable disease incidence, and reducing racial and socioeconomic disparities in vaccine uptake.[4,5] Children through age 18 years are eligible for the program if they are eligible for Medicaid, are uninsured, have insurance that does not cover vaccination, or are American Indians or Alaskan natives.[5] Each state or local immunization program purchases VFC vaccines with federal funds; vaccines are delivered to and administered by local VFC-enrolled providers. Although some VFC vaccines are administered in public health departments or similar venues, the majority are administered by primary care pediatricians.[6] Participation by pediatricians is therefore critical to the success of the VFC.

Although the vaccines provided by the VFC are made available at no cost to providers, providers must meet VFC participation requirements related to ensuring proper storage and handling, administration, and documentation of vaccines. In some cases, financial and administrative requirements of VFC participation may affect providers' willingness to participate in the program. For example, VFC providers may need to purchase and maintain storage equipment that conforms to VFC requirements, complete annual training, and participate in site visits conducted by the local public health staff every 24 months. Although providers can charge an administration fee to their state's Medicaid program for each VFC vaccine administered to a Medicaid-enrolled patient, reimbursement is often inadequate to cover costs.[7] The Patient Protection and Affordable Care Act (ACA) included a provision to temporarily increase Medicaid vaccine administration fees to Medicare levels in 2013 and 2014,[8] which was expected to address this issue.[9] The impact of that provision is unknown.

Shortages of routine childhood vaccines and delays in the delivery of the influenza vaccine to providers have led to missed opportunities for vaccination and frustration for providers in the past.[10–15] Some reports suggest the timing of VFC influenza vaccine distribution lags behind the distribution of private-stock influenza vaccines.[16,17]

The aforementioned issues related to program requirements, payment, and delivery delays have the potential to impact pediatricians' participation in the VFC. Because pediatrician participation is crucial to the program's success, we sought to explore pediatricians' current attitudes and experiences with the program and how these attitudes and experiences are affecting participation. Our specific objectives were to assess the following among a nationally representative sample of pediatricians: (1) participation in the VFC, (2) perceived burden versus benefit of VFC participation, (3) experiences and practices related to vaccine stocking challenges, and (4) knowledge and perception of the effect of a time-limited increased reimbursement for VFC vaccine administration for Medicaid patients under the ACA.

## METHODS

We conducted a survey from June 2017 through September 2017 among pediatricians who were part of a sentinel network. The Human Subjects Review Board at the University of Colorado Denver approved this study as exempt research not requiring written informed consent.

### Study Population

We developed a national network of pediatricians by recruiting from a random sample of the American Academy of Pediatrics (AAP) membership roster. From this sample, on the basis of information available in the AAP membership roster with regard to region (Northeast, South, Midwest, or West), practice location (urban inner city, suburban, or rural), and practice setting (private, managed care, or hospital, university, or community health center), we conducted quota sampling[18] to ensure that network pediatricians were similar to the overall AAP membership. To do this, we determined proportions of US pediatricians falling into each cell of a three-dimensional matrix that crossed region, practice location, and practice setting. We then applied proportions for each cell in the 36-cell matrix to a sample size of 400 to create cell-sampling quotas. A sample size of 400 was chosen for a maximum estimated confidence interval of ±5% on point estimates. After the random sample was selected, physicians were contacted by mail with an explanation of the study and a request to participate and were asked if they preferred to participate by mail or e-mail. Pediatricians were excluded from participation if they practiced <50% of the time in primary care, practiced outside of the United States, or were in training. During the screening process, we also ask pediatricians if their practice site makes independent decisions about the purchasing and handling of vaccines or if these decisions are made as part of a larger system, although responses to this question did not impact selection into the network. We previously demonstrated that survey responses from sentinel network pediatricians, compared with those of pediatricians randomly sampled from American

Medical Association databases, had similar demographic characteristics, practice attributes, and attitudes about a range of vaccination issues.[18]

### Survey Design

We developed the survey in collaboration with the Centers for Disease Control and Prevention and with input from the AAP. A national advisory panel of pediatricians ($n$ = 7) pretested the survey, with modifications being made on the basis of their feedback. We then piloted the survey instrument among 41 pediatricians nationally with further modifications made on the basis of their feedback and survey responses. Questions regarding program participation and current practice were assessed with categorical response options. Attitudinal questions were assessed by using 4-point Likert scales from "strongly agree" to "strongly disagree." We assessed perceived burden versus benefit of VFC participation on an 11-point scale (−5 [high burden] to +5 [high benefit]). Questions regarding vaccine delays were assessed by using a 4-point Likert scale ("not a problem" to "major problem").

### Survey Administration

We surveyed physicians by Internet (www.verint.com; Verint Systems, Melville, NY) or by mail on the basis of previously reported physician preference. The Internet group was sent an initial e-mail with up to 8 reminders, and the mail group was sent 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 e-mail and mail protocol on the basis of Dillman's Tailored Design Method.[19]

### Statistical Analysis

We pooled Internet and mail surveys for analyses because studies have shown that physician attitudes are similar when obtained by either method.[20] We compared respondents with nonrespondents using $t$ tests, Wilcoxon rank tests, and $\chi^2$ analyses and compared subcategories of respondents using $\chi^2$ tests. In a sensitivity analysis, we compared responses from pediatricians in practices where vaccine decisions were made independently versus at a larger system level. Analyses were performed by using SAS software version 9.4 (SAS Institute, Inc, Cary, NC).

## RESULTS

### Response Rates and Study Sample

The response rate was 79% (372 of 471). Respondents were similar to nonrespondents with respect to age, sex, region, location (urban, suburban, or rural), setting (private, hospital or community health center based, or health maintenance organization), and decision-making (independent versus larger system level; Table 1). Three respondents (1%) reported not administering vaccines in their practice and were excluded from further analysis.

### Participation in the VFC

Eighty-six percent of pediatricians reported that they currently participate in the VFC, 9% reported that they did not and never had, and 5% reported that they did not but had previously. Among those reporting they did not currently participate ($n$ = 51), the most commonly cited reasons included nonparticipation in the Medicaid program (65%), not having enough low-income patients (56%), the burden of keeping separate stocks of VFC and private vaccines (44%), the difficulty of VFC record-keeping requirements (39%), and the administrative burden of VFC participation (37%). Among those not currently participating, only 14% reported that they would consider participation in the future.

Respondents currently participating in the VFC were asked to report to what extent their practices had considered stopping participation in the past year. Eighty-five percent

**TABLE 1** Characteristics of Respondents and Nonrespondents to a National Survey Among Pediatricians Regarding the VFC

| Characteristic | Respondents ($N$ = 372) | Nonrespondents ($N$ = 99) | $P$ |
|---|---|---|---|
| Male sex, % ($n$) | 37 (136) | 33 (33) | .55 |
| Setting, % ($n$) | | | .71 |
| Private practice | 80 (297) | 77 (76) | |
| Hospital or clinic | 17 (62) | 18 (18) | |
| HMO | 4 (13) | 5 (5) | |
| Location of practice, % ($n$) | | | .79[a] |
| Urban | 55 (203) | 51 (50) | |
| Suburban | 44 (165) | 49 (48) | |
| Rural | 1 (4) | 5 (5) | |
| Region, % ($n$) | | | .06[b] |
| Midwest | 23 (84) | 18 (18) | |
| Northeast | 22 (82) | 14 (14) | |
| South | 37 (136) | 38 (38) | |
| West | 19 (70) | 29 (29) | |
| Decision-making, % ($n$) | | | .63 |
| Independent | 70 (255) | 68 (65) | |
| Larger system level | 30 (108) | 32 (31) | |
| Age, y, mean (SD); median | 51 (10); 51 | 51 (12); 50 | .85 |
| No. providers in practice, mean (SD); median | 11 (26); 6 | 15 (51); 5 | .83[a] |

All $P$ values are from $\chi^2$ tests except when noted. HMO, health maintenance organization.
[a] Fisher's exact test.
[b] Wilcoxon rank test.

reported that they had never considered or discussed this, 10% reported that they had considered or discussed it but not seriously, and 5% reported that they had seriously considered or discussed it. Among those who had considered or seriously considered no longer participating ($n$ = 47), the most commonly reported reasons included the difficulty of VFC record-keeping requirements (74%), concern about action by the VFC for noncompliance (61%), unpredictable VFC vaccine supplies (59%), inadequate payment for vaccine administration fees (57%), and the burden of keeping separate stocks of VFC and private-stock vaccines (46%).

## Pediatrician Perceptions of the VFC

In general, pediatricians who administered vaccines in their practice reported favorable attitudes toward the VFC (Table 2; includes all respondents [$n$ = 369]). Almost all pediatricians strongly agreed that participation in the VFC is valuable because it allows practices to administer vaccines to children regardless of ability to pay (93%), that the VFC improves access to childhood vaccines (90%), and that the VFC is valuable because it allows children to be vaccinated in the medical home (88%). Just over half of pediatricians (54%) also agreed (strongly or somewhat) that payment for VFC vaccine administration was less than payment for vaccine administration from private plans; 42% reported not knowing. Substantial proportions of pediatricians also endorsed statements about whether specific aspects of VFC participation were burdensome or challenging, such as requirements regarding monitoring, tracking, and recording of VFC storage temperatures (23% strongly agree and 45% somewhat agree); requirements to replace lost doses of VFC vaccines (20% strongly agree and 28% somewhat agree); and keeping separate stocks of VFC and private vaccines (16% strongly agree and 36% somewhat agree). Results were similar when limited to providers currently participating in the VFC.

Of VFC participants, most pediatricians felt that the benefits of participating in the VFC outweighed the burdens (Fig 1). Using the −5 to +5 scale regarding the degree to which participating in the VFC represented a burden or a benefit, among VFC participants ($n$ = 309), 63% reported a score of +4 or +5, 23% reported +1 to +3, 5% reported 0 (the middle of the scale), and 9% reported a negative response (−1 to −5).

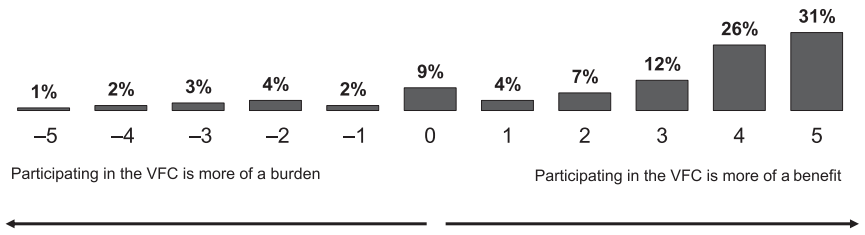


**FIGURE 1**
Pediatricians' perceived benefit versus burden in participation in the VFC ($n$ = 309).

## Experiences and Practices Related to Vaccine Stocking Challenges

Eight percent of participating VFC providers reported being in states where all vaccines, both private and VFC, come as 1 supply from the state, so there is no distinction between VFC and private-stock vaccines; they were not asked questions about delays. Among the remaining respondents ($n$ = 288), in the event of a noninfluenza vaccine being out of stock, 39% reported that they did not borrow between VFC and private-stock vaccines because they were not allowed to do so, 14% reported that they did not do this because they

**TABLE 2** Pediatrician's Attitudes Regarding the VFC ($n$ = 369)

| | Strongly Agree, % ($n$) | Somewhat Agree, % ($n$) | Somewhat Disagree, % ($n$) | Strongly Disagree, % ($n$) | Do Not Know, % ($n$) |
|---|---|---|---|---|---|
| Participating in the VFC program is valuable because it allows practices to administer vaccines to children regardless of ability to pay. | 93 (338) | 4 (15) | 1 (3) | 0 (1) | 2 (7) |
| The VFC improves access to childhood vaccines. | 90 (328) | 7 (24) | 0 | 1 (3) | 2 (8) |
| The VFC is valuable because it allows children to be vaccinated in the medical home. | 88 (320) | 7 (25) | 1 (2) | 1 (3) | 4 (13) |
| On average, the payment for VFC vaccine administration is less than the payment from private health plans. | 34 (123) | 20 (74) | 3 (12) | 1 (2) | 42 (151) |
| The requirements regarding monitoring, tracking, and recording of VFC storage temperatures are a burden on practices. | 20 (73) | 28 (101) | 17 (61) | 11 (39) | 25 (89) |
| Keeping VFC stock separate from private vaccine stock is a major burden on practices. | 16 (57) | 36 (130) | 18 (66) | 22 (80) | 8 (30) |
| Billing for vaccine administration fees for Medicaid patients is challenging with the VFC. | 9 (34) | 18 (64) | 28 (102) | 20 (72) | 25 (89) |

generally did not need to, 32% reported that they borrowed between stocks less than once per month, 10% borrowed less than once per week but more than once per month, and 5% borrowed more than once per week.

For influenza vaccine, providers were asked to report how much of a problem they had with delays in the receipt of private-stock and VFC vaccines in the previous 3 seasons. For private-stock vaccine, 3% reported delays as a major problem, 18% reported delays as a moderate problem, 32% reported delays as a minor problem, and 48% reported delays as not a problem. In contrast, for the VFC influenza vaccine, 15% reported delays as a major problem, 32% reported delays as a moderate problem, 33% reported delays as a minor problem, and 20% reported delays as not a problem. To handle influenza vaccine delays, 56% of pediatricians reported postponing influenza vaccination for patients whose vaccine is not in stock, 19% reported referring these patients elsewhere to be vaccinated, 18% reported borrowing between stocks in this setting, and 7% reported postponing vaccination for all patients.

Pediatricians who reported not borrowing between noninfluenza vaccine stocks ($n$ = 151) were asked how they handled a situation in which 1 or more VFC vaccines are out of stock. The most commonly reported practices in this situation were asking patients to return for vaccination at a later time (78%) and keeping a list of patients who need the vaccine and calling them back when it is available (71%). Other practices that pediatricians reported using included asking patients to call back to find out when the vaccine was available (48%) and sending these patients to a public health department (35%). Nine percent reported that this situation had never happened in their practice, 5% reported sending these patients to a pharmacy, and 3% reported sending patients to another provider.

### Knowledge and Perceptions Regarding Increased Payment for VFC Vaccine Administration

All pediatricians who reported accepting Medicaid in the last 10 years ($n$ = 335) were asked to read a descriptive statement regarding increased payment for VFC administration fees authorized by the ACA for the years 2013 and 2014. Forty percent of pediatricians reported previous awareness of this increased payment. Among those ($n$ = 132), 10% reported that their practice increased the proportion of Medicaid and/or VFC-eligible patients on the basis of this specific change, and 90% reported that they did not.

### Independent Versus System-Level Decisions

In general, responses were similar from pediatricians in both practices that made independent vaccine decisions versus those that made decisions as part of a larger system, although there tended to be more "do not know" responses from physicians in practices where vaccine decisions were made as part of a larger system. Questions with notable differences included, "Requirements regarding monitoring, tracking, and recording of VFC vaccine storage temperatures are a burden on practices," (strongly agree: 25% independent and 11% system; $P$ = .04) "Billing for vaccine administration fees for Medicaid patients is challenging with the VFC," (strongly agree: 11% independent and 2% system; do not know: 16% independent and 27% system; $P$ = .02) and "The payment for VFC vaccine administration is less than the payment from private health plans" (strongly agree: 40% independent and 29% system; do not know: 29% independent and 57% system; $P < .001$).

## DISCUSSION

In this national survey of pediatricians, we found that almost all pediatricians participate in the VFC and believe that the benefits of participation substantially outweigh the burdens. However, large percentages of providers identify several factors as burdensome for their practices, such as requirements for monitoring, tracking, and recording of VFC storage temperatures; VFC vaccine administration payments that may not cover costs to vaccinate; and the need to keep VFC vaccine stocks separate from private vaccine stocks. We also found that in the past year, 15% of current participants have discussed no longer participating in the VFC, primarily because of record-keeping requirements, compliance concerns, perceived unpredictable supplies, perceived inadequate payments, and the need to maintain separate VFC and private vaccine stocks. Finally, less than half of the respondents were aware of the temporarily increased payments for VFC vaccine administration, and only 10% of those who were aware increased the proportion of Medicaid patients in their practice as a result.

The benefits of the VFC for children have been well documented[4,5,21,22]; however, to our knowledge, this is the first study to document program benefits from the perspective of pediatricians. This perspective is important to follow because a high level of participation among pediatricians is crucial to the ongoing success of the program. Although a small percentage do not participate, and a similar percentage have considered no longer participating, enthusiasm for the program generally remains strong. However, in this study, we also document many concerns pediatricians have with the program. Action at the state and federal levels to monitor these concerns and ameliorate them when feasible will be important to the ongoing success of the VFC.

The burden most frequently endorsed was related to VFC requirements regarding monitoring, tracking, and recording of VFC vaccine storage temperatures. Much of this dissatisfaction is likely in response to tighter requirements imposed by the VFC in recent years. In 2012, the Office of the Inspector General (OIG) released a report of an audit that was performed of 45 VFC providers from the 5 states and cities with the highest volume of vaccines ordered: California, Florida, Georgia, New York City, and Texas.[23] The OIG reported that "VFC vaccines stored by 76% of the providers were exposed to inappropriate temperatures for at least 5 cumulative hours" and that "providers generally did not meet vaccine management requirements or maintain required documentation." In response to the OIG's report, VFC administrators issued interim guidance recommending increased frequency and documentation of vaccine storage temperatures for VFC participants.[24] Although these guidelines were not immediately mandatory and were phased in over years, many immunization programs began enforcing these requirements more quickly. Although it is likely that much of the burden reported by pediatricians related to the VFC is in response to these tightened requirements, it is reassuring that providers seem to have remained with the program.

This study provides new information regarding how pediatricians handle shortages of the VFC vaccine and updates information we reported previously regarding delays in the VFC influenza vaccine,[15] showing that when experiencing a delay in influenza vaccine shipments, most pediatricians delay vaccination for eligible patients, causing missed opportunities for influenza vaccination. Regarding noninfluenza vaccines, practices vary, with some pediatricians reporting borrowing private-stock vaccines fairly frequently and many not at all, thus leading to missed opportunities. At least to some pediatricians, this appears to be a problem; among those who had considered no longer participating in the VFC, more than half stated that 1 of the reasons was the unpredictability of the VFC vaccine supply. The ability to borrow private-stock vaccines in the event of a delay or shortage of VFC vaccines is a possible solution to this problem, yet for both influenza and noninfluenza vaccines, many report not borrowing, most often because they report that they are not allowed to. Although there is no federal prohibition on borrowing a private-stock vaccine to administer to VFC-eligible children and replacing it with the VFC vaccine once it is available, each state immunization program has the authority to impose additional requirements as needed to best steward its VFC vaccine supply. Certainly, elimination of delays would be the best solution, but reasons behind any delays are likely multifactorial and not easily solved. Additional work is needed to better understand systematic issues that may be causing delays in VFC vaccine distribution.

Provider participation in the VFC could be expected to be sensitive to policy changes, such as the time-limited increased payment for vaccine administration to Medicaid-enrolled children authorized by the ACA, which was expected to incentivize primary care providers to accept more VFC-eligible children. Payment for vaccine administration is an important source of revenue for pediatric practices.[7,25,26] Although most pediatricians in this study were not aware of the increased payment, among those who were, 10% reported that they increased the proportion of Medicaid- and/or VFC-eligible children they accepted in their practices. It is unclear from our data why this number was not higher. We suspect that it is because such business decisions are multifactorial, and VFC administration fee payment is only 1 consideration. That said, although 10% is a relatively small proportion, even small gains matter when considering that such gains might mean that more impoverished children find access to a medical home. To date, no cost-effectiveness analysis of this policy change has been performed. However, given that $1 spent on vaccination results in $10 saved in societal costs,[27] this change may have been cost-effective even with only a small proportion of pediatricians increasing their acceptance of VFC-eligible patients.

This study has several limitations. First, the sample for this study was designed to represent general pediatricians practicing primary care in the United States; we did not specifically seek those pediatricians who managed VFC programs in their practices, for example. Thus, it is likely that if we had surveyed only pediatricians in leadership or vaccine management roles, our findings regarding certain knowledge questions would have differed from those we present here. Although this is an important limitation of this study, our primary objective was to assess the benefits and burdens of the VFC on practicing pediatricians in general. We attempted to account for this limitation with our sensitivity analysis, showing that those in larger systems were more likely to report "do not know" to several questions. Also, although our response rate was high, as with any survey, nonrespondents may have had different attitudes and experiences than respondents. Finally, results are based on reported practice; actual practice was not observed.

## CONCLUSIONS

The VFC relies on pediatricians for vaccine delivery. Pediatricians perceive that the benefits of VFC participation strongly outweigh the burdens. Pediatricians' perception of the benefit versus burden of VFC

participation should continue to be monitored, and perceived burdens should be addressed when feasible. Solutions to these burdens are not necessarily straightforward but could include increased payment for vaccine administration, uniform rules allowing borrowing between VFC vaccine and private stocks, and incentivizing the purchase of proper storage and monitoring equipment.


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## ABBREVIATIONS

AAP: American Academy of Pediatrics
ACA: Patient Protection and Affordable Care Act
OIG: Office of the Inspector General
VFC: Vaccines for Children Program


Dr Brtnikova and Ms McBurney contributed to the study design and data collection instrument design, coordinated and supervised all data collection, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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