HHS Public Access

Author manuscript

J Community Health. Author manuscript; available in PMC 2017 October 27.

Published in final edited form as:

J Community Health. 2016 October ; 41(5): 1069–1077. doi:10.1007/s10900-016-0191-9.

Promoting and Providing HPV Vaccination in Hawaii: Barriers Faced by Health Providers

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Abstract

Despite the availability of HPV prophylactic vaccines, uptake has been suboptimal in the US. In the state of Hawaii, HPV vaccine coverage has decreased among females and remains low among males aged 13–17. The reasons for low uptake are unknown and may indicate the existence of critical barriers to HPV vaccination. The purpose of this investigation was to identify policy, system and environmental barriers and promoters of pediatric HPV vaccination in Hawaii. An online 86-item survey addressing knowledge, attitudes, beliefs, practices, and barriers to HPV vaccination was distributed to practicing physicians in Hawaii specializing in Pediatrics, Family Medicine, and Obstetrics-Gynecology. Survey responses were received from a total of 120 physicians. Private practice physicians reported more concerns with vaccine ordering and stocking costs ($p < 0.0001$), reimbursement levels ($p < 0.0001$), and insurance coverage ($p < 0.0001$) compared to physicians in large group practices. Eighty-three percent of providers cited lack of parent knowledge and understanding of HPV infection as a barrier. Over half of physicians (58 %) reported that completion of the 3-dose schedule was a barrier. Most physicians did not use tracking or reminder systems to ensure dose completion. A majority (58 %) of providers cited the lack of school-based vaccination requirements as a barrier. Uptake of HPV vaccination in Hawaii may be

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Compliance with Ethical Standards

Conflict of Interest The authors have no financial disclosures or conflicts of interest to report.

impeded by physician perception of parent knowledge and attitudes. Cost-related system barriers are particular barriers among those in private practice. Completion of the 3-dose schedule also remains a challenge.

Keywords

Human papillomavirus; Barriers; Knowledge; Vaccination; Hawaii

Human papillomavirus (HPV) is the causative agent of cervical cancer and a substantial proportion of anal, vulvar, vaginal, penile, and oropharyngeal cancers as well as anogenital warts [1]. Worldwide, HPV is responsible for an estimated 600,000 incident cancers and 250,000 deaths [2]. HPV is the most common sexually transmitted infection with an estimated 80 % of individuals acquiring HPV at some point in their lifetime [3]. A majority of HPV cancers are attributed to high risk oncogenic genotypes 16 and 18, which cause 70 % of cervical cancers and 26 % of all head and neck cancers. [1, 4].

Widespread utilization of HPV prophylactic vaccination has the potential to substantially reduce the HPV disease burden. Three vaccines, Cervarix™ (bivalent), Gardasil® (quadrivalent), and the newly available Gardasil 9® (nonavalent) are approved for use in the U.S. [1, 5, 6]. Routine vaccination is recommended for children ages 11–12, with catch up vaccination recommended through age 21 for males and age 26 for females [5–7]. Vaccination is given in a 3-dose series over the course of 6 months [7]. The vaccine has proven to be safe and effective with the most common side effects being fainting, dizziness, nausea, and swelling or redness at the site of injection [8, 9].

Since its initial approval for use in girls in 2006 and subsequent approval for use in boys in 2009, HPV vaccination in the U.S. pediatric and adolescent population remains low and lags behind other routinely recommended adolescent vaccines [1, 10, 11]. Nationally, from 2011 to 2012, HPV vaccination coverage showed little improvement among females ages 13–17 [1]. Since then, coverage has improved with modest increases from 2013 to 2014. In girls and boys, uptake increased from 56.7 to 60.0 % and 33.6 to 41.7 % for ≥1 dose, respectively [1]. However, meager gains were seen in total completion of the 3-dose series in girls, from 36.8 to 39.7 % [1]. An increase in vaccination coverage of ≥3 doses was seen in boys, from 13.4 to 21.6 % [1]. Uptake continues to remain below targets set for Healthy People 2020, a national initiative to achieve 80 % HPV vaccination coverage [12]. In 2014, the President's Cancer Panel Report called for an urgent need to accelerate HPV vaccine uptake, making this a priority on the nation's public health agenda [13].

In Hawaii, HPV vaccines have been widely available to the state's pediatric population through publicly funded programs and private insurers. Nonetheless, HPV vaccination coverage has been suboptimal. From 2011 to 2013, HPV coverage decreased 28 % among Hawaii females aged 13–17, a trend which was counter to that of the US overall [14]. Although moderate improvement in coverage has been seen since 2013, uptake of all three doses in Hawaii continues to remain low, at 38.0 % for females and 30.9 % for males ages 13–17. [1, 14] Collectively, vaccination utilization data underscore significant barriers to vaccination among Hawaii's pediatric and adolescent population.

Multiple U.S. studies have demonstrated that a crucial predictor of HPV vaccination acceptance by parents and adolescents is the strength of the provider's recommendation [15–18]. A recent study of practicing pediatrics and family medicine physicians in Hawaii found that only 71 % of physicians surveyed strongly recommended the HPV vaccine to girls ages 11–12, and even less (57 %) strongly recommended the vaccine to boys ages 11–12 [19]. In addition, the study demonstrated physician perceived barriers with discussing vaccination including issues related to sexuality and parents' concerns about promoting initiation of sexual activity [19].

Provider perceived barriers are not the only barriers to HPV vaccination. Research has also demonstrated that financial barriers may be affecting physicians' recommendations. Financial and systems level challenges with insurance non-coverage, cost reimbursement, and considerations regarding storing, stocking, and administering the vaccine have been identified as significant barriers faced by physicians [20–22]. One study reported a lack of financial consistency, with wide variation in vaccine prices and reimbursements received by providers for the same vaccine [23]. In addition, service related barriers, such as the lack of patient reminder and tracking systems to prompt vaccine completion, are also reported [24–26]. These burdens illustrate the complexity of the challenges which may be affecting provider recommendations.

The objective of the study was to identify policy, system, and environmental (PSE) barriers and promoters of HPV vaccination in the pediatric setting in Hawaii. A community advisory group comprised of representatives from professional associations, including the Hawaii chapters of the American Academy of Pediatrics and the American Academy of Family Physicians, insurance providers, Native Hawaiian Health Care Systems, community health centers, and the Hawaii State Department of Health's Immunization Program, advised the project, provided input with the survey design, and assisted the study team with survey dissemination.

Methods and Materials

Survey Development and Design

The study was approved by the University of Hawaii Institutional Review Board. A two-part, 86-item survey addressing knowledge, attitudes, beliefs, practices, and barriers was developed using previously validated surveys tools. The survey was piloted by medicine faculty, residents, and clinical staff at the University of Hawaii John A. Burns School of Medicine (JABSOM), and revised accordingly prior to electronic dissemination.

The survey was divided into two parts. Part one was designed for physicians and included questions on provider demographics, HPV and vaccine knowledge, barriers to vaccination, and vaccine practices. System, provider, and patient barriers were assessed on a 5-point Likert scale; providers were asked to indicate how strongly they agreed/ disagreed to statements about barriers related to the immunization of their patients. Part two was recommended for completion by practice administrators or clinical staff responsible for vaccine ordering and/or immunization systems. Part two included questions on stocking,

ordering, and vaccine recommendation practices. Questions about patient reminder systems and vaccine education offered in clinic were also assessed.

Survey Deployment

The survey was disseminated electronically to professional networks which targeted practicing physicians in Pediatrics (PED), Family Medicine (FM) and Obstetrics-Gynecology (OB-GYN) within the state of Hawaii. A message about the online survey, including a link to the survey, as well as a letter of support from the director of the Hawaii Department of Health and an electronic copy of the form-fillable survey (PDF), which respondents were asked to return by mail or fax, was distributed by members of the project's advisory committee, including leaders of the American Academy of Pediatrics—Hawaii Chapters and Hawaii Academy of Family Physicians. No incentives were provided to physicians for completion of the survey and all responses remained anonymous. The online survey data were collected and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted at the University of Hawaii [27]. REDCap is a secure, web-based application designed to support data capture for research studies. The application allows for validated data entry, tracking, and automated export. In order to increase response rates, the survey was promoted at professional meetings and via door-to-door distribution at the invitation of select institutions.

Data Analysis

Microsoft Excel 2010 was used for data analysis and the 2-sided Fisher exact test was the primary statistical measure. P values <0.05 were considered statistically significant. In order to compare private practice provider barriers to large group practice provider barriers, the answers were dichotomized into two groups, agree or disagree; "unsure" answers were not included in calculations. In analyzing barriers reported among physicians, the answers were split into three groups "agree," "disagree," and "unsure." The percentages of each group were then calculated based on the number of respondents.

Results

Respondent Characteristics

Overall, 120 physicians completed part one of the survey and 104 respondents completed both parts one and two (Table 1). Of the 120 who completed part one, 27 % were providers from the outer islands (Kauai, Maui, and Hawaii Island); a majority of respondents (73 %) were from Oahu. The mean age was 47.5 years and ages ranged from 22 to 71 years. Most responding providers were female (59 %) and less than half were male (41 %). Responses received were nearly split among PED and FM providers; almost half of responding physicians (46 %) were practicing FM providers, and over a third (38 %) were PED providers. A small percentage of responses were also received from physicians in OB-GYN (12 %) and internal medicine (5 %). Over half (55 %) of physician respondents had over 15 years of practicing experience.

Vaccination Practices and Reminder Systems

A majority of physicians who responded to the survey (94 %) reported that they felt comfortable discussing issues of sexuality with their patients, with nearly three fourths (72 %) strongly agreeing with this statement. Most providers (67 %) felt that their adolescent patients felt comfortable discussing issues of sexuality with them, although a quarter of physicians (26 %) reported that their patients may not feel comfortable. When presenting the vaccine to patients, providers most strongly emphasized the prevention of cervical cancer (93 %). Strong emphasis was also given to sexual transmission of HPV (61 %), efficacy and safety of the vaccine (59 %). Less than half of providers reported strongly emphasizing prevention of other related cancers (46 %) and genital warts (49 %).

Half of physicians (51 %) reported that they “always” recommended the HPV vaccine with other vaccinations and 24 % reported they “often” recommended administering it with other vaccines. Vaccine recommendation for most practice settings was the responsibility of the physician (n = 98) or a medical assistant or nurse (n = 51). Most physicians reported introducing the vaccine at ages 9–12 for girls (90 %; n = 94) and boys (89 %; n = 92), and the vaccine was most likely to be presented during an annual physical exam (78 %).

Physicians reported challenges with ensuring completion of the three dose series. When asked to estimate the percentage of their patients who had not completed vaccination, 35 % estimated it was between 25 and 50 %. A fifth of providers estimated the number was even higher, between 51 and 75 %. Physicians were also asked to select strategies they use to ensure completion of the 3-dose vaccination series. Respondents were allowed to choose multiple options. A majority of providers reported they scheduled the patient ahead for the next visit, used patient appointment cards, or flagged the patient’s medical chart. A small number of providers reported using computerized tracking methods and some providers even reported that they did not use any methods to ensure completion of vaccination.

Vaccine and HPV Knowledge

Providers demonstrated good knowledge of HPV, with 80 % responding correctly to HPV knowledge questions. However, nearly a fifth (17 %) of providers reported they were unsure as to whether HPV caused head and neck cancers and almost half of providers (42 %) were incorrect as to whether incidence of HPV was highest in women in their thirties; 12 % of providers were unsure. Providers also seemed uncertain whether HPV infections resolved without treatment; 68 % true, 24 % false, and 8 % undecided. Physicians demonstrated better knowledge about the HPV vaccine itself, with nearly all providers (94 %) responding correctly to vaccine related questions.

Patient, Provider, and System Barriers

Several patient barriers were identified by physicians (Table 2). Providers overwhelmingly agreed that a parent’s belief that his/her child is not at risk (83 %), lack of parent and/or patient education/understanding of HPV (83 %), parent refusal of vaccine (71 %), and parent reluctance to discuss sexuality or sexually transmitted infections (60 %) were significant barriers to patient vaccination. Responses were divided amongst providers as to whether parental concern that the vaccine would encourage children to practice riskier sexual

behaviors was a barrier to vaccination. Over half of physicians (58 %) felt that loss of patient follow up due to the 3-dose vaccination requirement was also a major barrier to vaccination.

Providers reported little concern regarding safety and efficacy of the HPV vaccine; most disagreed, 93 % and 88 % respectively, that safety and efficacy were barriers. Most respondents (87 %) also disagreed that lack of physician education about the vaccine, as well as their comfort discussing sexuality or sexually transmitted diseases with their patients, were barriers to vaccination.

A number of key system barriers were identified including upfront costs associated with ordering and stocking the vaccine, difficulty ensuring that patients will complete the 3-dose schedule, insurance non coverage for specific ages, and inadequate provider reimbursement (Table 3). There were mixed responses regarding barriers related to upfront costs associated with ordering and stocking the vaccine, insurance non coverage of the vaccine for specific ages, and patient completion of the 3-dose series. The absence of school-based HPV vaccination policy appeared to be a major challenge for providers. Over half of physicians who responded (58 %) agreed that the lack of policies requiring HPV vaccination for school entry was a barrier. Overall, obtaining vaccine supplies, adding another vaccine to the schedule, and lack of provider information about the vaccine were not considered barriers by the majority of physicians who responded to this survey.

Comparison of Private Practice and Large Group Practice Providers

When comparing survey-reported barriers of private practice physicians to large group practice physicians, private practice physicians reported significantly more system related barriers specific to HPV vaccination (Table 4). Compared to large group practice physicians, barriers were cited more frequently by private practice physicians included upfront costs ($p < 0.0001$), insurance non coverage ($p < 0.0001$), inadequate provider reimbursement ($p < 0.0001$), and vaccine expiration before use ($p = 0.04$). Large group practice physicians more frequently reported the addition of another vaccine to the pediatric vaccine schedule as a barrier ($p = 0.02$).

Improvement in Vaccination Practices

When respondents were asked whether they felt their vaccination practices had improved since the HPV vaccine was first introduced in 2006, 73 % reported that they felt their vaccination practices had improved over time. A question was also included in the survey regarding whether providers had heard of the recent approval of the nonavalent vaccine. Half of responding providers (50 %; n = 60) reported they knew of the nonavalent vaccine as of March 2015. Of the half that responded, a vast majority (78 %; n = 46) reported that the availability of the new vaccine would likely influence their current HPV vaccination practices, with 46 % (n = 27) reporting that it would “very likely” influence current recommendation practices.

Discussion

To our knowledge, this is the most comprehensive environmental scan to date regarding providers’ knowledge, attitudes, and HPV vaccination practices in the state of Hawaii. The

study has provided insight into vaccination practices and barriers faced by child and adolescent providers statewide.

Our findings are consistent with prior studies which demonstrate that provider-perceived barriers of parent knowledge of HPV and parent reluctance to discuss sexuality with their children are considered major challenges by providers to vaccination [21, 28–30]. A recent study reported that providers felt additional time must be spent when discussing the HPV vaccine due to their belief that the vaccine has less parental support [31]. However, a study which compared physician and parent perspectives of vaccination found discrepancies between parent and provider beliefs, demonstrating that providers overestimated parental concerns of vaccine administration [28].

Financial burdens are also major barriers reported by providers. Providers reported challenges with upfront costs associated with ordering and stocking the vaccine as well as provider non coverage or reimbursement. This finding is consistent with several other studies which demonstrate that reimbursement concerns and practical issues with storing and cost of the vaccine are of primary concern for providers [21, 22, 32, 33]. Furthermore, our findings demonstrated that these challenges are especially burdensome for private practice physicians who reported significantly more concerns with vaccine cost, expiration, and reimbursement. Private practice physicians likely face more financial risk with covering these cost related burdens and other system related expenses. Financial barriers may also affect provider recommendation of vaccination. Inadequate reimbursement has been shown to negatively impact a physician’s willingness to offer the vaccine [22].

Most providers agreed that completion of the three-dose schedule was both a major patient and provider barrier. Although this appeared to be a top concern reported by physicians, the survey demonstrated a lack of reminder or tracking systems employed by providers to ensure completion of vaccination. Most physicians used either paper based reminders or forward scheduling to ensure patients completed vaccination. A small number of physicians reported using an electronic health record (EHR) system to track patients and ensure completion. Some physicians reported that they did not use any system at all to ensure vaccination completion.

More than half of providers agreed that the absence of mandatory school admission policies requiring HPV vaccination was a critical barrier to vaccination. In the U.S., school entry mandates requiring HPV vaccination have only been implemented in a two states and the District of Columbia. In countries such as Spain and programs in the UK, where school-based vaccination policies have been implemented, high completion rates and coverage have been demonstrated amongst children ages 9–13 [34–36].

Overall, Hawaii providers demonstrated relatively good knowledge of HPV, but appeared uncertain regarding the virus and its oncogenic potential in other anatomical sites. Other studies have found similar results regarding provider knowledge of HPV and cancer in non-cervical sites. [37, 38] This gap in understanding may contribute to low vaccine recommendation, especially among males [37]. One study demonstrated a relationship between decreased provider recommendation in males and low awareness of other HPV-

related diseases [37]. Uncertainty about the virus' increased incidence in older women and ability of the virus to resolve on its own without treatment were also reported.

The study findings are limited by a relatively low response rate. We received responses from an estimated 21 % of practicing pediatricians and family medicine physicians in Hawaii based on the 2015 Hawaii Physician Workforce Assessment Project [39]. Survey respondents included physicians from all the major islands statewide practicing in diverse settings with the majority from providers on Oahu, which is consistent with practicing demographics in Hawaii.

Our study findings may not reflect evolving vaccination practices given that it coincided with important recent changes that may impact HPV vaccination uptake in Hawaii in the immediate future. The survey was distributed just shortly after the FDA approval of Gardasil 9. A majority of physicians responded that the vaccine would affect their current vaccination practices. A state law enacted in May 2015, provides pharmacists with the authority to vaccinate adolescents ages 14–17 with a prescription from a physician (Sect. 461–11.4, Hawaii Revised Statutes) [40]. This new law may potentially relieve some of the barriers identified in our survey resulting in expanded access to HPV vaccines and improved vaccination coverage.

Studies have shown that a strong recommendation from a provider is crucial to ensuring HPV vaccination uptake [15–18]. Our survey findings suggest, however, that Hawaii's providers are facing several barriers that may be impeding their efforts to promote and provide HPV vaccines. Private practice physicians may bear a greater burden with respect to system and financial barriers. Also contributing to low vaccination completion rates is the lack of EHR tracking prompts, as Hawaii's physicians are instead choosing to utilize paper reminders and forward scheduling to track doses. Hawaii physicians may also be overestimating parental concerns relating to HPV vaccination; strategies and tools are needed to assist physicians in their efforts to respond to these concerns.

Acknowledgments

The authors gratefully acknowledge Noel T. Brewer, Ph.D. of the University of North Carolina Chapel Hill and Susan Vadaparampil, Ph.D, MPH of the Moffitt Cancer Center for their scientific discussions and Steve Hankins, MD, MPH and Youngju Jeong, MS of the John A. Burns School of Medicine, John Baleix MD, MPH, and Teresa Michaud for their technical contributions to the project.

Funding Sources This project is supported by the National Cancer Institute, Grant number 3 P30 CA071789-15S4.

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Table 1

Characteristics of physician respondents

Variables	Completed part I no. (%)	Completed part II no. (%)
Total	120	104
Island of primary practice		
Outer islands	32 (27)	29 (28)
Oahu	88 (73)	75 (72)
Gender		
Female	71 (59)	61 (59)
Male	49 (41)	43 (41)
Age		
Mean	47.5	47.1
Range	27–71	27–71
Primary clinical specialty		
Family medicine	55 (46)	47 (45)
Pediatrics	45 (38)	41 (39)
Obstetrics-Gynecology	14 (12)	12 (12)
Internal medicine	6 (5)	4 (4)
Years practicing medicine		
I am still in residency training	5 (4)	4 (4)
Fewer than 5 years	16 (13)	15 (14)
5–9 years	16 (13)	15 (14)
10–14 years	17 (14)	13 (13)
15–19 years	17 (14)	16 (15)
20+ years	49 (41)	41 (39)

Table 2

Physician-reported patient barriers

"How strongly would you agree or disagree that the following are PATIENT BARRIERS related to immunizing your patients against HPV?"	
Total	**120**
	no. (%)
Parent believes child is not at risk for HPV infection	
Somewhat/strongly agree	99 (83)
No opinion	6 (5)
Somewhat/strongly disagree	15 (13)
Lack of parent and/or patient education/understanding about HPV infection	
Somewhat/strongly agree	99 (83)
No opinion	5 (4)
Somewhat/strongly disagree	16 (13)
Parents of patients refuse HPV vaccine	
Somewhat/strongly agree	85 (71)
No opinion	13 (11)
Somewhat/strongly disagree	22 (18)
Parent reluctance to discuss sexuality and/or sexually transmitted infections	
Somewhat/strongly agree	72 (60)
No opinion	12 (10)
Somewhat/strongly disagree	36 (30)
Patient loss of follow up due to the HPV vaccination requirement of 3 doses	
Somewhat/strongly agree	70 (58)
No opinion	9 (8)
Somewhat/strongly disagree	41 (34)
Too few patients want the HPV vaccine	
Somewhat/strongly agree	57 (48)
No opinion	10 (8)
Somewhat/strongly disagree	53 (44)
Parent concern that vaccinated child will practice riskier sexual behaviors	
Somewhat/strongly agree	54 (45)
No opinion	22 (18)
Somewhat/strongly disagree	44 (37)

Table 3

Physician-reported system barriers

"How strongly would you agree or disagree that the following are SYSTEM BARRIERS related to immunizing your patients against HPV?"	
Total	**120**
	no. (%)
HPV is not required for school attendance	
Somewhat/strongly agree	70 (58.3)
No opinion	15 (12.5)
Somewhat/strongly disagree	35 (29.2)
Up-front costs of ordering and stocking the HPV vaccine	
Somewhat/strongly agree	53 (44)
No opinion	22 (18)
Somewhat/strongly disagree	45 (38)
Difficulty ensuring that patients will complete the 3-dose HPV vaccination series	
Somewhat/strongly agree	50 (42)
No opinion	8 (7)
Somewhat/strongly disagree	61 (51)
Insurance non coverage for HPV vaccine for patients of specific ages	
Somewhat/strongly agree	46 (38)
No opinion	22 (18)
Somewhat/strongly disagree	52 (43)
Difficulty ensuring that patients will complete the 3-dose HPV vaccination series	
Somewhat/strongly agree	50 (42)
No opinion	8 (7)
Somewhat/strongly disagree	61 (51)
Inadequate provider reimbursement for HPV vaccination	
Somewhat/strongly agree	35 (29)
No opinion	26 (22)
Somewhat/strongly disagree	59 (49)
Lack of information about the HPV vaccine	
Somewhat/strongly agree	11 (9)
No opinion	5 (4)
Somewhat/strongly disagree	104 (87)
Adding another vaccine to the vaccine schedule	
Somewhat/strongly agree	22 (18)
No opinion	9 (8)
Somewhat/strongly disagree	89 (74)
Difficulty obtaining adequate vaccine supplies	
Somewhat/strongly agree	11 (9)
No opinion	28 (23)
Somewhat/strongly disagree	81 (68)

Table 4

Comparison of private practice and large group practice system barriers

"How strongly would you agree or disagree that the following are SYSTEM BARRIERS related to immunizing your patients against HPV?"			
no. (%)	**Private practice**	**Large group practice**	***p* value***
Total	38	31	
Up-front costs of ordering and stocking the HPV vaccine			<0.0001
Somewhat/strongly agree	28 (74)	3 (10)	
No opinion	1 (3)	7 (23)	
Somewhat/strongly disagree	9 (24)	21 (68)	
Inadequate provider reimbursement for HPV vaccination			<0.0001
Somewhat/strongly agree	21 (55)	2 (7)	
No opinion	5 (13)	5 (16)	
Somewhat/strongly disagree	12 (32)	24 (77)	
Insurance non coverage for HPV vaccine			<0.0001
Somewhat/strongly agree	22 (58)	3 (10)	
No opinion	4 (11)	4 (13)	
Somewhat/strongly disagree	12 (32)	24 (77)	
Insurance non coverage for HPV vaccine for patients of specific ages			0.0018
Somewhat/strongly agree	21 (55)	6 (19)	
No opinion	5 (13)	4 (13)	
Somewhat/strongly disagree	12 (32)	21 (68)	
Vaccine expiring before use			0.0415
Somewhat/strongly agree	14 (37)	3 (10)	
No opinion	2 (5)	8 (26)	
Somewhat/strongly disagree	22 (58)	20 (65)	
Adding another vaccine to the vaccine schedule			0.0193
Somewhat/strongly agree	2 (5)	9 (29)	
No opinion	4 (11)	0 (0)	
Somewhat/strongly disagree	32 (84)	22 (71)	