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Why don't adolescents finish the HPV vaccine series? A qualitative study of parents and providers

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WHY DON'T ADOLESCENTS FINISH THE HPV VACCINE SERIES? A QUALITATIVE STUDY OF PARENTS AND PROVIDERS

by

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DEDICATION

I would like to dedicate this work to my brother, Ajay, and my parents, Venkat and Durga for all of their unrelenting support and love that they have provided me through my academic career.

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I would like to take this time to thank my advisor, Dr. Rebecca Perkins for all the patience and time she has taken to guide me through this project. Not only have you helped me craft this thesis, but you have transformed me into a better scientist. Thank you for taking me on!

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ABSTRACT

Purpose: To understand why adolescents who initiate the HPV vaccine series fail to complete all three shots.

Methods: Semi-structured interviews were performed with parents/guardians of 11-17 year old daughters and pediatric primary care providers in one inner-city public clinic and three private practices to determine why girls who received at least one dose of the HPV vaccine did or did not complete the series. The number of shots received was confirmed by electronic medical record review. Content analysis was used to identify themes related to series completion.

Results: 65 parents/guardians participated: 37 whose daughters received 1 or 2 doses of HPV vaccine and 28 whose daughters completed 3 doses. Most (n=24, 65%) parents/guardians failed to complete the series because they thought the clinics would remind them of subsequent doses. 9 (24%) cited logistical barriers. 4 (11%) decided to stop the vaccine series. 33 providers participated: 24 physicians, 3 nurse practitioners, and 6 registered nurses. 52% of providers told parents to schedule appointments, 41% scheduled the second dose at the time the first dose was given, and 7% tried to immunize patients when they returned

for other appointments; providers confirmed that few parents chose to stop the series. No practice had a system in place to ensure series completion.

Conclusions: Most failure to complete the HPV vaccine series occurred because providers expected parents to make appointments while parents expected to be reminded. Increased use of reminder/recall systems and clear communication of expectations regarding appointment scheduling could improve completion rates.

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LIST OF ABBREVIATIONS

CDC.....Center for Diseases and Prevention

HPV.....Human papillomavirus

QALY.....Quality-adjusted life year

STI.....Sexually transmitted infections

WHO..... World Health Organization

INTRODUCTION

Basics of HPV

Human papillomavirus virus (HPV) is the most common sexually transmitted infection.[1] People who are infected with HPV can be asymptomatic, since symptoms can develop years following the initial infection and most times the immune system is capable of suppressing detectable vaginal infection within a two year time span.[1–3] HPV consists of 150 viruses[1], which can be divided into low risk and high risk viruses.[4] These viruses have been associated with cancers of the vulva, vagina, penis, anus, and oropharynx.[5] Low risk viruses like HPV6 and HPV11 have been linked to genital warts and recurrent respiratory papillomas.[4] High risk viruses like HPV16 and HPV18 are the source of most, if not all cervical cancers.[6] The persistent association between HPV DNA and cervical cancer has been well documented.[2,4–7] It has been noted that the link between HPV and cervical cancer is one of the strongest associations within human cancers.[7]

Between the years of 2006 and 2010, there were 33,160 cancers diagnosed in the United States that were linked to HPV, of which females comprised of 20,589 (62%) of these cases, and the remaining 12,571 (38%) belonged to males.[8] Of these 33,160 cancers, 17,500 cases were linked to HPV16 and HPV 18.[8] Furthermore, around 31,351 woman of reproductive age passed away between the years of 1999-2010 due to some form of STD. A leading 60% of STD-related

deaths were caused by HIV and the second major contributor was HPV causing 34% of these deaths.[9]

Prevalence of HPV

It is estimated there will be 19.7 million new cases of sexually transmitted infections (STI) in the United States every year. Of these 19.7 million cases, 14.1 million will be HPV diagnosis.[2] Furthermore, nationally, it is estimated that when taking into account both new and existing STIs, there will be more people who are infected with HPV than any other STI, since a projected 79.1 million people have HPV of the 110 million who have STIs.[2]

The occurrence of HPV was higher among those living below the poverty level, lower education level, younger ages, age of sexual debut, number of lifetime sexual partners, and marital status.[10–12] One study reported that HPV had a prevalence of 56.5% in women who lived below the poverty level, whereas women who lived above the level had a HPV occurrence of 39.2%.[11] There was 31.4% incidence of HPV in women with a college education whereas women who possessed less than a high school education had a prevalence rate of 48%. [10] Within the female age group 18-59 years, 41.9% of the women tested positive for some form of HPV.[10] The risk of HPV infection was found to be higher with increasing age between the ages of 14 and 24, with the greatest prevalence of HPV in females between the ages of 20 and 24 years old with 44.8%.[12] It is this

troubling trend that further supports the need to vaccinate girls in their younger adolescent years. When comparing girls who started having sex before their 16th birthday versus after, the occurrence of HPV increased by 89% in those females who were sexually active prior to them turning 16.[10] Furthermore, women who had greater than 11 sexual partners in their lifetime are 8.9 times more likely to be infected with HPV as opposed to women who have had 0-1 partners in their lifetime.[10] The incidence of HPV was also found to be associated with marital status, where women who were married had the lowest prevalence rate of 29.4%, whereas as women who identified as single, divorced, or never married had an prevalence of greater than 47%.[10] Race was also associated with HPV incidence rates. Non-Hispanic black females were 2.3 times more likely to have HPV when compared to non-Hispanic white females.[10] Specifically, the highest HPV incidence rate of 59.2% belonged to the non-Hispanic black females. Mexican Americans had a prevalence of 44.2% and non-Hispanic whites had the lowest of the three groups with 39.2%.[11] However, the rate of HPV infection among all women is high.

HPV Vaccines

There are currently two vaccines that are being administered for HPV. Cervarix (Bivalent HPV, HPV2) provides protection against HPV16 and 18 and subsequently helps to prevent cervical cancer. It was approved for use only in women between the ages of 9 and 25 years. It is a 3 dose intramuscular

vaccination that is administered at 0, 1 and 6 month interval. The most common side effects that were associated with Cervarix were swelling, pain and redness at the injection site. Fatigue, headache, and gastrointestinal symptoms were also noted.[13]

Gardasil (Quadrivalent HPV, HPV4) is also a 3 dose vaccination that is administered at 0, 2 and 6 month interval. Unlike Cervarix, Gardasil can be administered in both males and females between the ages of 9 and 25 years. In both genders, Gardasil protects against HPV types 6, 11, 16, 18. In woman, it prevents cancers of the vulva, cervix, anus, vagina, and genital warts. In men, it protects against anal cancer and genital warts. Side effects that were noted included fever, headache, dizziness, nausea, and minor reactions including pain, swelling, and bruising at the injection site.[14]

The Advisory Committee on Immunization recommends that girls are administered either the HPV2 or the HPV4 vaccination when they are 11 or 12 years old. With both vaccines, the second dose should be administered 1 to 2 months after the first dose, and the third and final dose should be given 6 month following the first dose. These vaccinations can also be administered to women between the ages of 13 to 26 years. If the female does not complete the 3 does by the time she is 27 years old, the second and third dose can still be given to her. Additionally, if the vaccination is interrupted after the first dose, the series

does need not be restarted, the second dose can be administered and the third dose can be given after at least 12 weeks. Moreover, the HPV vaccine can be administered with other adolescent-appropriate immunizations.[8]

These vaccinations are further supported by the World Health Organization (WHO), who believe that this vaccine is of utmost priority in the battle to fight cervical cancer and other diseases associated with HPV.[15] Moreover, getting vaccinated for HPV is a financially sound decision. It was calculated that when 12 year old girls were vaccinated, the estimated cost per quality-adjusted life year (QALY) gained was between $3906 and $14,723.[16] Moreover in 1999, there were 1.6 deaths per 100,000 women related to HPV linked cancers, whereas in 2010, there were 1.3 deaths per 100,000, thereby reflecting a 19% decrease.[9]

Struggles with Vaccine Acceptance

Vaccinations are considered to be one of the biggest public health achievement of the twentieth century.[17,18] Over the years, the safety and effectiveness of vaccines have only improved, but contrarily, there is a decrease in the public's confidence in vaccines.[18] There have been warnings that if there continues to be declines in vaccination rates, then there is an increased risk of infectious diseases, thereby leading to higher rates of morality.[18,19] Recent outbreaks of immunization-preventable diseases are reminiscent of the disease outbreaks from the pre-vaccination era.[19] With these increasing doubts and risks, it is

important that there needs to be a clear message conveyed to parents that not only addresses their concerns, but it also highlights the essential benefits of the vaccine.[18] Over the decades, these vaccines that are currently viewed with skepticism helped to eradicate many of the infectious diseases. Many scientists believe that is the great success of these vaccines in eliminating these diseases is what is causing parents to be complacent about vaccinations.[18,19]

When the Center for Disease Control and Prevention (CDC) stated that the vaccinations were the biggest public health achievement of the twentieth century, they also warned that the full efficacy of vaccinations can only be achieved if the following requirements are met: (1) parents need to understand that they must get their children immunized because these vaccinations help protect their children against potentially harmful infectious diseases, (2) providers need to be up to date on all modifications in the immunization recommendations, (3) vaccine supply should be readily available and properly funded, (4) scientists must continue their research into the vaccines while continuously testing their safety and efficacy, and (5) technology needs to be put in place to ensure that the vaccinations are administered to the public in a timely manner.[17]

While battling the overall doubt in vaccinations, there is also troubling trend with vaccination rates in adolescents. Immunizations like the HPV vaccine need to be administered during the adolescent years.[8] However in order for this occur,

teenagers need to visit their providers for some form of healthcare visit. It has been found that adolescents in their later years make three times fewer preventative care visits then younger adolescents.[20] In females, these visits declined slowly after their 14th birthday, and continued to decline further ensuing their 17th birthday.[20] Therefore, it is of utmost importance that the HPV vaccine be administered to the girls in their early adolescent years when they visit their provider at a higher frequency than they would in the subsequent years.

Barriers to vaccination completion

Currently available HPV vaccines[21,22] prevent up to 98% of HPV 16/18-related cervical dysplasia, the precursor to cervical cancer, among unexposed patients, and the quadrivalent vaccine also prevents vaginal, vulvar and anal dysplasia as well as genital warts.[21,22] Since the licensures of these vaccines, vaccine-type HPV prevalence has decreased by over 50%, and rates of cervical cancer precursors have declined.[23,24] However, the overall rate of initiating and completing the HPV vaccine series among U.S. girls are only 54% and 33% respectively,[25] and vaccination rates have stagnated from 2011 to 2013.[8] The low rate of completion among those who start the series is of particular concern, as the long-term efficacy of incomplete vaccination is undetermined.[26–28] Several studies found a lower rate of completion among girls of minority races as opposed to white girls.[29–33] Moreover, girls of a lower socioeconomic status are less likely to complete the series when compared to those of higher socioeconomic classes.[34,35] These are concerning correlations because poor and

minority women are at the highest risk for cervical cancer.[36–38] Reasons for incomplete vaccination are not well understood.[39,40] Therefore we conducted in-depth interviews with parents/guardians whose daughters did and did not complete the HPV vaccine series and with pediatric providers to better understand barriers and facilitators of series completion.

METHODS

Setting: This study represents a subset of interviews previously analyzed to examine HPV vaccine series initiation.[41] The study took place in 2012-2013 at one inner-city public clinic serving low-income and minority patients and 3 sites (2 suburban, 1 urban) serving primarily white and affluent patients between September 2012 and July 2013. The inner-city public clinic cares for a diverse adolescent population including 48% Black, 26% Latino, 20% White and 6% other races. The private practice populations included 72% White, 12% Black, 5% Latino and 11% adolescents of other races. Eighty-four percent of patients at private practices had private insurance, compared with 25% at the inner-city public clinic.

Participants: Parents/guardians with daughters between the ages of 11-17 years were eligible to participate in this study. These subjects were recruited when they accompanied their daughters to the clinic for preventative care or other problem-related visits. Trained research assistants reviewed practice schedules to determine eligible patients and recruited parents in the waiting areas either before or after scheduled visits. Because Black and Latino girls are less likely to complete the vaccine series, we intentionally oversampled parents/guardians who self-identified as Black and Latino. The subjects who identified themselves as African-American, Afro-Caribbean, Haitian, and African were classified as Black. The parent/guardian interviews were conducted in English, Haitian-Creole or Spanish. All the interviews were audio-recorded and then transcribed

verbatim. Native speakers transcribed the Haitian-Creole and Spanish interviews which were then translated to English and then back translated to validate its accuracy. Parents/guardians received a $20 gift card for participation. We recruited physicians, nurse practitioners, and registered nurses who provided primary care including HPV vaccination at the inner-city public clinic and private practices. At each interview site, a physician involved in the study recruited additional participants. The physicians were not compensated. The Institutional Review Boards of Boston University Medical Campus and Harvard Vanguard Medical Associates approved this study.

Interviews aimed to determine reasons why girls who started the HPV vaccine series did or did not complete all three shots from the point of view of both parents/guardians and providers. Parent/guardian interviews elicited demographic information, vaccination status, perceptions related to parent-provider communication, and reasons for completing or failing to complete the HPV vaccine series. Provider interviews elicited practices that facilitated or hindered series completion. All interviews were coded by three to six researchers, and discrepancies were discussed to achieve consensus. Consistent with the methods of qualitative analysis, we used the data to generate codes that were revised following every coding meeting and accordingly recurring themes were identified. When multiple reasons for series non-completion were mentioned, transcripts were reviewed again by two researchers

to determine the primary reasons for failure to complete the series. Parent/guardian answers were compared across race/ethnicity, socioeconomic status, and practice settings (inner-city public clinic or private practice), to determine differences in primary reasons for completing or not completing vaccination. Provider responses were assessed to determine common themes that facilitated or hindered completion.

RESULTS

Parents/guardians motivations for vaccination

65 parents/guardians participated: 37 whose daughters received 1 or 2 doses of the HPV vaccine (Incomplete group) and 28 whose daughters completed 3 doses (Complete group) (Table 1). Parents were asked about their motivations to vaccinate and the reasons behind why they did or did not complete the series. Parents/guardians in both the Complete and Incomplete groups shared similar motivations for vaccinating their daughters (Figure 1; Table 2; Table 5). When asked why it was important that their daughter get this vaccine, 71% (n=20) of the parents in the Complete group and 70% (n=26) of those in the Incomplete group stated they felt that the benefits of HPV vaccination outweighed the risks: "I think if they can be protected from any diseases and the risks are low, then it outweighs the risks of not doing it, then I think they should do it. It's a good thing." (44 year old mother of 15 year old, private clinic, Complete group). Another strong motivator, mentioned by 43% (n=12) of parents in the Complete group and 38% (n=14) of parents in the Incomplete group was the belief that parents were responsible for protecting their children with HPV vaccination: "If anything we can do for our children—if we can do anything, we should try to protect them health-wise, to give them some type of future. That's why I do think it's important" (50 year old mother of 14 year old, private clinic, Complete group).

Approximately one third of parents in both groups (32% n=9 in the Complete group; 27% n=10 in the Incomplete group) stated that their trusting relationships with their providers were their primary reasons for vaccinating. A smaller percentage of parents in both groups (n=3, 11% in Complete group and n=5, 14% in Incomplete group) felt their daughters needed the vaccine because all adolescents are likely to have sexual intercourse at some point. Thirteen parents/guardians (46%) in the Complete group vaccinated specifically to prevent cervical cancer, while only 16% (n=6) of parents/guardians in the Incomplete group cited this reason. Television commercials were mentioned as a motivating factor by three (8%) participants in the Incomplete group but none in the Complete group.

Parents/guardians reasons for not completing the HPV vaccine series

Eighty-nine percent of participants' whose daughters did not complete the series had intended to complete it. Participants' reasons for not completing the vaccine series fell into three broad categories: expectation that their provider's office would remind them of future shots (expect reminder), inconvenience or access barriers (inconvenience), and changing their minds after the first shot (conscious decision) (Figure 2a Table 3, Table 4).

Expect reminder: Most girls (65%, n=24) did not obtain all three shots because the parents/guardians expected that the clinic would contact them regarding any

additional doses. Specific difficulties included in this category included: a lack of clinic reminders (n=5, 21%), subsequent appointments not being scheduled at the time of visit (n=5, 21%), and other missed opportunities, where the adolescent had an appointment but was not vaccinated (n=4, 17%), or where a parent/guardian forgot or missed an appointment and the appointment was not rescheduled (n=3, 17%). These parents/guardians felt that ensuring vaccine series completion is the responsibility of the healthcare system, not the patient: "It's a physician's job to discuss these things with parents. And you know, if it's not being done, then that's on them" (33 year old mother of 14 year old, public clinic, Incomplete group). The reliance on the medical system was clearly described by this parent: "It's in the system. They have all the records. So if it is important they will give it to her" (54 year old mother of 14 year old, public clinic, Incomplete group). Another parent added: "if they really are supposed to be given in six months, I would have hoped that they would call" (48 year old mother of 18 year old, private clinic, Incomplete group). Lack of knowledge also played a role. Most (57%) participants whose daughters did not complete the series were aware that three doses were needed, but only 11% accurately recalled the recommended dosing schedule. Seven participants (29%) incorrectly thought that they had already completed the vaccine.

Inconvenience: Nine parent/guardians (24%) mentioned access barriers or inconvenience as the primary reason for failing to complete the vaccine series

(Figure 2a, Table 3, Table 4). Barriers included in this category included parents/guardians' and adolescents busy schedules (n=5, 56%), other health problems that took precedence over completing HPV vaccine series (n=3, 33%), and long commutes to the clinic (n=1, 11%). These parents were asked whether they would accept alternative sites such as a pharmacy or school for delivery of the second and third vaccine dose. Sixty-three percent would allow their child's school nurse to administer the second or third doses, and 22% would feel comfortable with other community sites like pharmacies, boys and girls clubs, or churches.

Conscious decision: Conscious decisions to halt the series were reported by four participants (11%). Interestingly, no parent/guardian stopped the series due to a side effect or adverse event. One of the parents, who started the series was highly motivated to vaccinate: "Because I know that there'll be some point in time she'll be sexually active, so I'd rather [be] on board with it early to prevent what could or couldn't happen. That's why I choose to do it early." This parent is an immigrant single mother who completed high school in her country of origin. Her daughter is on public insurance and sees her physician at a public clinic. However, this 34 year old Black mother had a negative experience with the person who administered the first shot to her 15 year old daughter. After this first dosage, the mother stated: "We just never went back to get it and I personally didn't like the person that was giving the shot. I don't think they know what they

was doing that particular time." When asked if it would have made a difference if a different person had given the shot, she replied "Yea it would definitely make a difference. Definitely."

Another mother, stopped the vaccine series after the first shot due to negative media. This 35 year old, married, U.S-born, high school graduate with public insurance did not accompany her 16 year old daughter to her appointment where the daughter got the first shot of the HPV vaccine series; the physician spoke to the mother over the phone. When asked why she stopped the series, this mother stated, "I think I started hearing stuff, so I stopped." When pressed for details on what exactly she heard, the mother was vague: "I don't remember what I started hearing, but it was just… you know all the talk, I don't know." However, she later said she would support the HPV vaccine after receiving more education and when she perceived it as one of the "normal shots."

Another parent, decided to halt the vaccine series after her 16 year old daughter was given the first dose. She is a 52 year old Hispanic immigrant, college-educated mother with public insurance and sees her daughter's physician at a public clinic. One of her other children had a rash following chicken pox vaccination, and she therefore had concerns about the side effects of the HPV vaccine: "All I know you know is that they are putting a virus in her body, and to me a virus is not good. We are trying to keep the virus out of her body so I don't

understand why they would put a virus in her body to combat a virus that's gonna come later on." Initially the mother decided to vaccinate her daughter "because the doctor said she needed it, but I had doubts at the time."

The last of the four parents who decided to stop the series, did so because both the parents felt that vaccination was only needed after sexual debut. Their daughter got the first dose of the HPV vaccine when she was 11 or 12 years old. The father accompanied his daughter to this appointment, and he approved of the vaccine even though he did not have much information on it. When the clinic called home to remind the parents about the second shot, the mother found out about the HPV vaccine. After talking to her husband, both parents decided to postpone vaccination. Although the pediatrician has recommended the vaccine annually, the parents felt: "She is 17 she is very, I wouldn't say immature, but she does not have a boyfriend and uh, that's my- that's where I'm coming from with it. And that she is not sexually active, there is no need to have the HPV shots." Further along in the interview, the mother struggles with whether this vaccine is promoting sexuality in girls, "when parents hear 'I'm giving my 11 year old daughter vaccines for sexually transmitted disease'' it's just like, you know, with the mentality before you know, giving contraceptives to children, does it give them permission?"

Providers' impressions of reasons that patients do not complete the HPV vaccine series

33 providers participated: 24 physicians, 3 nurse practitioners, and 6 nurses. Among the physicians and nurse practitioners that prescribe HPV vaccination for patients (n=27), their series completion plans included telling parents to schedule appointments (52%), scheduling the second dose when the first dose was given (41%), and trying to immunize patients when they returned for other appointments (7%) (Figure 2b). Neither the inner-city public clinic nor the private practices had organized reminder systems at the time of the study. In the absence of standardized systems, individual providers used different approaches even within the same practices.

Expect parents to make appointment: Although most providers simply told parents to schedule subsequent appointments, many were concerned that this was not very effective: "We're dependent on parents and families remembering to come and get a painful shot… I have virtually no belief that we're very effective." Another provider at the inner-city public clinic described his typical experience with follow-up: "We leave it to the parents, we tell them they have to come back in two months to get a second dose and they don't have to see the doctor… but we can't really make a nurse visit. So parents have to call typically to get that visit and a large number of kids don't get their second dose on schedule. So it's pretty frequent that I would see a kid a year later [for the second

dose]." He also described the limitations in implementation of electronic medical records, "even though we've had an EMR for 12 years, we don't have an easy-to-use reminder/recall system for patients." This sentiment was echoed in the private practices: "We have a lot that forget their second one and they come in for their checkup next year."

Scheduling second dose when the first dose is given: Providers described more success when the second dose was scheduled at when the first dose was given: "I find that being proactive about it and saying, 'We're going to make you an appointment for you,' or 'We're going to call you to make this appointment,' tends to be more effective [than telling them verbally] for them actually completing the series in the time that it should be completed." (Pediatrician, inner city clinic). Some even scheduled additional follow-up appointments for other medical problems at the time when the second shot was due. Yet scheduling alone was imperfect: "So we schedule the second one at the time of the first. We don't schedule the third one because… enough people don't show up for the second one that then you'd have this bogus third appointment scheduled which couldn't be done… and it does clog up the nurse's schedule." Nurses at the private practices who did see patients for second dose appointments discussed difficulties scheduling the third appointment because their schedules only went out two months.

Catching up vaccination at other visits: A minority of providers were unaware of any systems related to vaccine series completion: “We let the patients know, “You need to come back in two months for this vaccine you can book an appointment at the front desk.” From there…. I don't know if they go on a list and they get called or if it’s something that just gets dropped, I have no idea.” These providers relied on giving patients the next vaccine when they returned for a subsequent visit, but realized that competing priorities made this challenging: “when you're not busy occasionally [you review the immunization record]… but I'd say in reality, most of us don't do that and we’re busy.” Another provider added: “some of these HPV’s are on the one year plan. You know, they get number 2 a year later, number 3 a year later.”

Similar to parents/guardians, providers also stated that most failures to complete were due to a lack of systems, not a conscious decision to stop the series: “I’ve had maybe a half a dozen that I can think of off the top of my head… that have had one HPV and the parents refuse to continue the series and they’ve had no adverse reaction to it, none.” Another provider concurred: “I think I’ve only had like one patient ever [stop the series]... They just get busy. They forget. They don’t schedule it.” Providers stated that completing the series was harder for older adolescents because they less often presented for care, and had more competing demands on their time: “The later teens, if for some reason they’ve pushed it off [are less likely to complete the series]. They’re just busier with

sports and school work and what not. Which is unfortunate because they are probably the ones who really need it to be done." Other providers commented on the difficulty with vaccinating older teens: "The big no show rate and then a lot of teenagers don't think they need to come in because there are no real required shots after 11… and then they feel kind of invincible." Clinic systems that providers stated could facilitate vaccine series completion included standing orders for second and third doses, walk-in appointments, and reminder cards with the due dates of each subsequent dose. Some practices had partially implemented some of these ideas.

Table 1. Demographic characteristics of parents/guardians

Variable	Complete	Incomplete	P value*
Total	28	37	
Age of parent/guardian Mean (range)	49.2 (32-65)	41.7 (27-54)	<0.001
Race n (%)			
White	19 (68)	5 (14)	
Black	4 (14)	20 (54)	<0.001
Hispanic	4 (14)	6 (16)	
Other	1 (4)	6 (16)	
Interviewee is			
Mother	23 (82)	35 (95)	
Father	3 (11)	1 (3)	0.34
Guardian	2 (7)	1 (3)	
Interviewee is			
Male	3 (11)	1 (3)	0.31
Female	25 (89)	36 (97)	
Marital status			
Married	18 (64)	14 (38)	
Single	3 (11)	12 (32)	0.11
Divorced/Widowed/Separated	6 (21)	8 (22)	
Non-marriage partners	1 (4)	3 (8)	
Country of origin			
US	26 (93)	24 (65)	0.008
Other	2 (7)	13 (35)	
Religious affiliation			
No	12 (43)	18 (49)	0.64
Yes	16 (57)	19 (51)	
Education			
Less than high school	2 (7)	6 (16)	
High school graduate	6 (21)	15 (41)	0.009
Some college	7 (25)	8 (22)	
College graduate	8 (29)	6 (16)	
Post-college	5 (18)	2 (5)	
Household income			
<$20000	4 (15)	15 (42)	
$21-40000	6 (22)	7 (19)	<0.001
$41-60000	4 (15)	7 (19)	
$61-100000	2 (7)	4 (11)	
>$100000	11 (41)	3 (8)	
Insurance			
Public	12 (43)	25 (68)	0.046
Private	16 (57)	12 (32)	

Table 2. Motivating Reasons to Vaccinate

	Complete (n=28)		Incomplete (n=37)	
	n	%	n	%
Vaccine Benefits Outweighs Risks	20	71%	26	70%
Cervical Cancer Prevention	13	46%	6	16%
Parent Responsibility to protect children with vaccine	12	43%	14	38%
Trusts Physician	9	32%	10	27%
Teen Sexuality is inevitable	3	11%	5	14%
Positive Media Influence	0	0%	3	8%

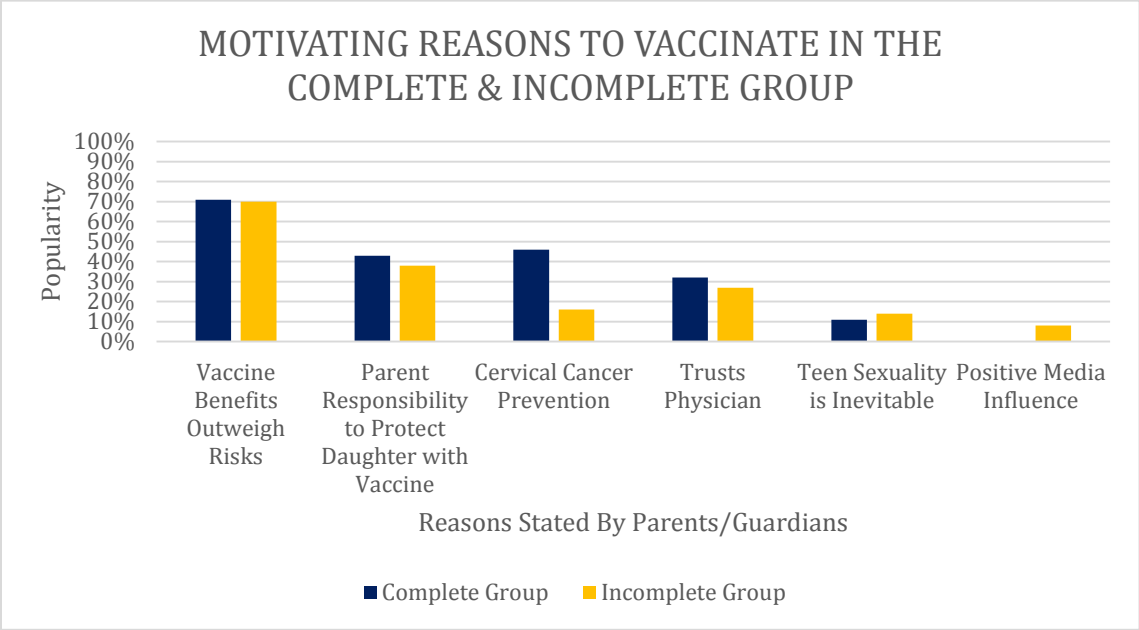

Figure 1. Motivating Reasons to Vaccinate in the Complete & Incomplete Groups - In their interviews, parents in both the Complete and Incomplete groups stated various reasons as to why they were motivated to have their daughters complete the HPV vaccination series. A majority of these parents stated more than one motivating reason behind their decision to vaccinate their daughter, and each reason was factored in when computing these percentages.

Table 3. Categories of Barriers Faced by Parents in the Incomplete Group

CATEGORY	REASON	n	%
Expect Clinic Reminder (n=24, 65%)	Lack of knowledge/ Inaccurate knowledge of dose and/or schedule	12	50%
	Failure to complete not intentional: Thought to complete or thought incorrectly that they completed	7	29%
	No clinic reminders	5	21%
	Subsequent appointment not scheduled	5	21%
	Ensuring completion is physician's/clinic responsibility	4	17%
	Missed Opportunities: Adolescent had another appointment but was not vaccinated	4	17%
	Forgot/Missed Appointments	3	13%
Inconvenience (n=9, 24%)	Busy Schedule/Job	5	56%
	Other Underlying Health Conditions- Vaccination not a priority	3	33%
	Long Commute	1	11%
Conscious Decision (n=4, 11%)	Negative Experience with First shot	1	25%
	Misconceptions/Rumors	2	50%
	Intend to delay until they feel daughter is at risk for sexual activity	1	25%

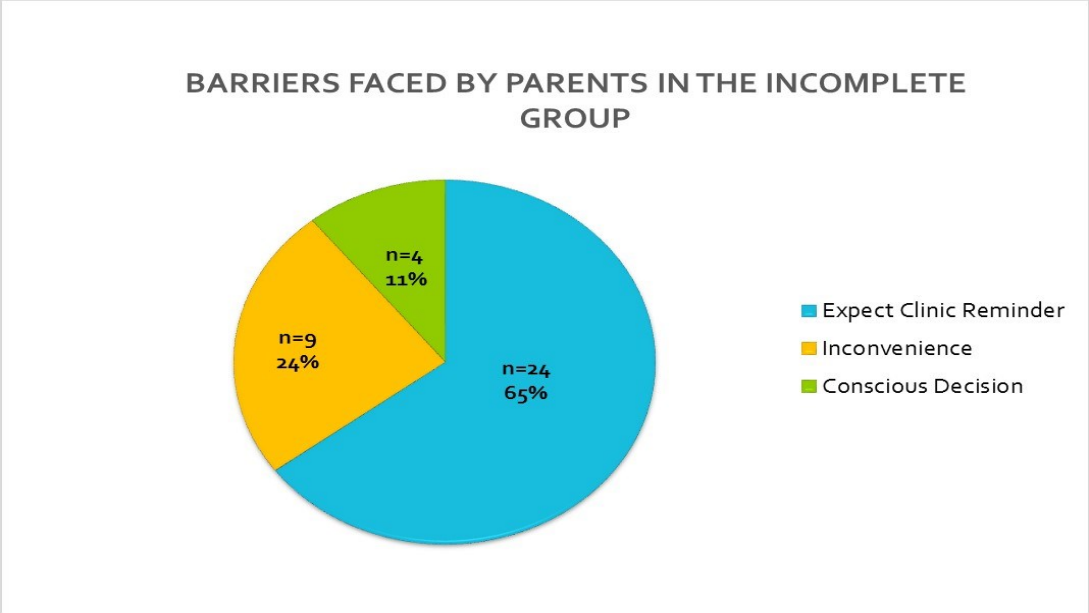

Figure 2a: Barriers Faced By Parents in the Incomplete Group- The parents in the incomplete group listed numerous barriers that they faced in their efforts to have their daughters complete the HPV vaccine. Each parent stated fell under one of the three main categories of barriers: Expect Clinic Reminder, Inconvenience, and Conscious Decision.

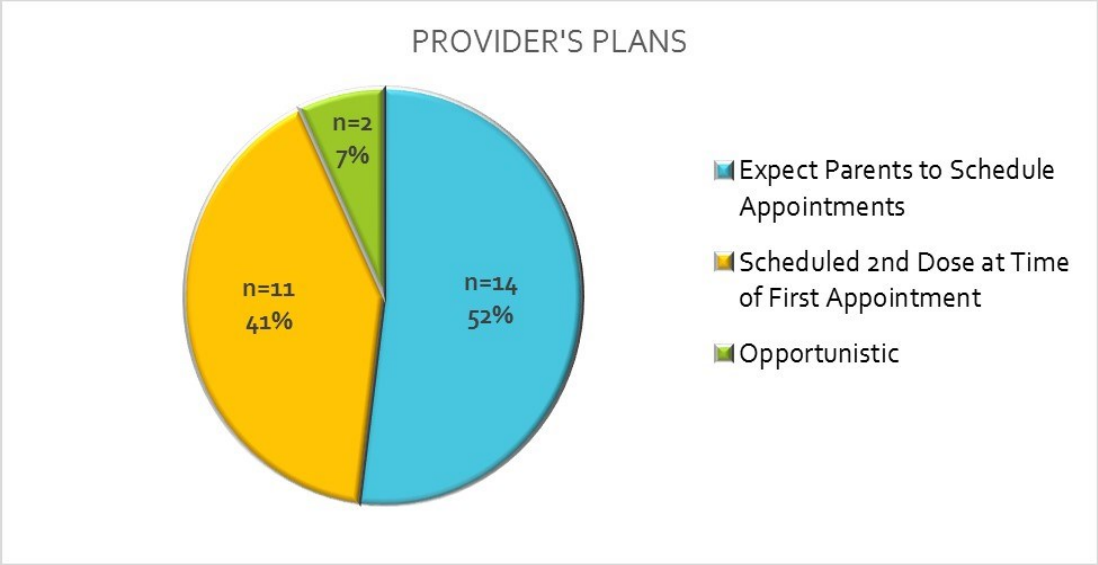

Figure 2b: Provider's Plans- The 27 providers who administered the HPV vaccination made their attempts to ensure that the adolescents complete the vaccine series. Their stated efforts fell into the three main categories: Expect Parents to Schedule Appointments, Schedule 2nd Dose at time of First Appointment, or Opportunistic.

Table 4. Summary of Barriers

Difficult to come back for all three shots/Forget "I think it's just one of those things. You get busy and then you put it off and the next thing you know, you never went back to have a follow-up. I'm guilty of it so I can see that happening. It's unfortunate that it can't be done in one shot." *--Caucasian mother of 14 year-old, private practice, Complete Group* "A lot of people are, you know, it's not that they don't want to do things, it's just that we're busy, we forget, don't realize the importance" *-- Caucasian mother of 15 year-old, private practice, Complete Group* "I forgot that she had the second appointment. Typically normally she is a healthy child and she has always been up to date on immunizations and because she's not sexually active it didn't seem emergent to me for her to have it…have it like that." *–Black mother of 11 year-old, public practice, Incomplete Group* "I'm a procrastinator, and what can I do to improve it, uh I don't know, but I am going to let her finish it. But I don't know why people would start it and not finish it, other people. Maybe they had a bad experience with the first one and they just scared to go back to the second one, or maybe they have scheduling problems , I don't know" *– Black mother of 13 year-old, private practice, Incomplete Group* "I almost missed the third one just because of the time frame but I think it probably that people forget or they don't schedule that appointment right away and if you're like me three months goes by in woop, and you miss the window"*—Caucasian mother of 15 year old, private practice, Complete Group*
Lack of Reminders/ Clinic Responsibility "Because parents today they are very busy working, keeping the schedule, send the kids to school, keep the kids in school, it's too much stress for parents today. Then you know to keep in track all of the appointments and everything, it's very difficult so if the staff at least can remind them when they go to visit the doctor that what vaccine they missing so that way they keep a track of the kids vaccinations and that way they can help the kids to prevent this." *--Hispanic mother of 17 year-old, private practice, Complete Group* "I want to come, I want to be there. If it's to be given, let them phone the parent to bring them. Because sometimes they don't know. They cannot remember. They are busy with their lifestyle or whatever." *– Black mother of 13 year-old, public practice, Incomplete Group*

"I didn't know it was three shots. Maybe if they don't do it on the visits, they don't call you back and say this is what happened then you know you don't really know" -- *Black mother of 12 year-old, public practice, Incomplete Group*

"I would have probably brought her if I had gotten something just to remind me" –*Caucasian mother of 11 year-old, private practice, Incomplete Group*

"Like I said um we moved and changed doctors and um…cause I just wasn't aware of how often she had to have a shot I never had it done again" –*Hispanic mother of 14 year-old, public practice, Incomplete Group*

"I think it all really depends on the physician being on top of it. And if the physicians are not on top of it—that's kind of what probably plays it. Because, like I said, I was told that they're fine until February. So, you know what I mean? Like, if I don't receive an appointment and I try to make one and they don't, like, really mention it, then—I'm making it, you know what I mean?... It's a physician's job to discuss these things with parents. And you know, if it's not being done, then that's on them." –*Caucasian mother of 14 year-old, public practice, Incomplete Group*

"They should have scheduled it I guess, they should have told me to schedule it" – *40 year old mother of 14 year old, public clinic, incomplete Group*

Lack of Information

"Talk to them more about that vaccine, let them know what other, you know consequences, if you get your vaccine, what does it do to your body, what does it protect you from, and if you don't get the vaccine, what else can happen if you can't get it, I mean if you don't get the vaccine. Give them the pros and cons" —*Hispanic mother of a 17 year-old, public practice, Complete Group*

"I also think that there's a lot of preconceived notions that vaccines in general are the cause of the rise in autism and you hear a lot of crazy theories out there as to people want to blame everything on vaccines" -- *Caucasian mother of a 15 year-old, private practice, Complete Group*

"You know like the parents are probably not fully educated, um they forget, they don't have all the correct information or know the importance of it to continue the whole series" *–Hispanic mother of 14 year-old, public practice, Incomplete Group* "More information. Explain more. No one explained it to me, honestly and I'm really pissed about that." *--Caucasian mother of 11 year-old , public practice, Incomplete Group*
Economic Reasons/Copays "You mean why they didn't finish it? Could be a thousand reasons. Like me, I'm lucky I'm here today because I have no gas and I have no money and I couldn't pay my rent. You know, it's a tough economy right now. Having co-payments are always an issue"*--Caucasian mother of 16 year-old, private practice, Complete Group* "My husband obtained employment, and we got our health insurance back. And then we got my daughter back to see her doctor again and we got caught up on everything…Hey, if it comes down to buying milk, bread and meat for my house, or, give—unfortunately—coming to give 20 dollars for a shot, when I can feed my daughter, I'm gonna to feed my daughter. And postpone the shot until I'm able to come. I got the shot, she got them. She has them all. But I had to make the decision to delay it or to feed her" *--Caucasian mother of 14 year-old, private practice, Complete Group*

Table 5. Summary of Motivators

Vaccine Benefits Outweigh Risks "Because it's a harmless vaccine that can be lifesaving." *–Black mother of 16 year old, public clinic, Complete Group* "Because the side effects are minimal to non-existent. It's not going to hurt her. It's going to help her. And I don't know what they are going to do in the future" *–White father of 17 year old, private clinic, Complete Group* But from what she was saying, it seems that there's more good to it than bad. Period. So, I accepted that." *–Black mother of 17 year old, public clinic, Incomplete Group* "As long as you look for a solution now to something that could be a problem for you in the future, it's better for you. You can't wait to give

a child a vaccine when they are all grown up." –*Black mother of 13 year old, public clinic, Incomplete Group*

"They basically talked about preventing this disease from occurring. They also told me uh... she doesn't have to take it but they have done more studies and it's coming out that they could be at more of a risk later. So I said to myself, it's been studied, it's been here for a while. I see nothing bad come out of it. I did check with the CDC just to see if there is anything crazy out of it and it seemed fine. I said why not." –*35 year old father of 16 year old, public clinic, Incomplete Group*

Parent Responsibility to Protect Child with HPV Vaccine

"I'd be more concerned not vaccinating her. If it was something she was exposed to and I could have protected her, I'd feel bad if she got something that I could have vaccinated her for" –*White mother of 11 year old, private clinic, Incomplete Group*

"I cannot be at home 7 days a week, and 24 hours a day watching them, behind them. So it is better for me to them to get protected then let them by themselves and then they get this type of thing" –*Hispanic mother of 17 year old, private clinic, Complete Group*

Trusts Physician

"Basically we just, whatever our doctor recommends we go with it. I figure that he's the person that you know is taking care of their healthcare and whatever and if he recommends something, he wouldn't recommend something that isn't good for them" –*Black mother of 13 year old, public clinic, Incomplete Group*

"Whatever the doctor thinks. I put my faith in him" –*White mother of 16 year old, private clinic, Complete Group*

Teen Sexuality is Inevitable

"I think it's really important cause like I said, girls these days, they need all the vaccinations they can get, they are too sexually active out there and like I told you, you can still have the vaccine for the HPV but it still doesn't protect you, you could still get warts or whatever the case may be" –*Hispanic mother of 17 year old, public clinic, Complete Group*

"I mean I think that vaccine exists for a reason and if there is a way to prevent sexually transmitted diseases its worth doing" –*White mother of 15 year old, private clinic, Complete Group*

Cervical Cancer Prevention

"I'd never want wake up one day and she has cervical cancer. And I had the opportunity to prevent or slow it down or whatever" –*Black father of 16 year old, public clinic, Incomplete Group*

"I want them to be protected. I mean I don't want my girls to get cancer. I mean it does run in my family and if I could prevent it I'm going to do it as long as it doesn't harm my girls, I mean I understand there are side effects from everything. Everything that we do, we eat, the shots so if that's going to help them, prevent them from getting cancer, I'm going to do it. " –*White father of 15 year old, public clinic, Incomplete Group*

DISCUSSION

Most parent/guardians intended to complete the HPV vaccine series. However, 65% of parents/guardians expected to be reminded of any needed doses, while 52% of providers relied on parents to schedule subsequent shots, and no practice had a functional reminder or recall system for adolescent vaccinations. Because medical practices frequently reach out to patients with appointment reminders and other information, many parents/guardians were expecting to be reminded of the timing of subsequent doses. Some of the parents believed in the efficacy of the vaccine, but because they had an inaccurate knowledge of the schedule and dosage of vaccine, they did not know when to schedule the shots. This expectation mismatch that led to a large percentage of the daughters not completing the series. Literature shows that a variety of reminder and recall systems can be effective for improving vaccination rates. Interventions with proven efficacy include phone calls, educational brochures, letters, and text messages.[42–47] Some states support centralized immunization information systems or registries also provide useful tools for reminder and recall systems, and have also been shown to increase vaccination rates.[48]

A majority of the patients assumed that they would get reminders from the clinic, whereas the clinic expected the parents to remember their own appointments. This issue can easily be addressed. Practices and clinics can instill a reminder system where they can reach out to their patients to remind them of upcoming

vaccines that they might be due for. Resources like the Immunization Information Systems (IIS) can be utilized to support electronic individual patient records. IIS have been proven to increase the vaccination rates.[48] These systems are effective in not only providing reminders to the patients, but are also helpful in keeping records of the patients' vaccination status.[48] Reminder and recall systems are another method that have been implemented in various ways to being about positive results. One study found that the reminder or recall system is effective in 80% of the cases to help complete their vaccinations.[42] Another study noted that when patients received a combination of a reminder phone call and an educational brochure, they were 22.5 times more likely to complete the HPV vaccine than those patients who did not receive the reminder and brochure.[43] In addition to phone reminders, reminder letters were also found to be successful in increasing the completion rates of the HPV vaccine.[44] Text messages have also been noted to be an effective intervention to increase HPV vaccine completion and immunization coverage in patients.[45–47] Regardless of the type of reminder that is sent out to patients, multiple studies have found the effectiveness of a Reminder or Recall system intervention in increasing the completion rates of vaccinations.

The second most common reason parents cited for not completing the series was inconvenience, specifically difficulty finding time in their busy schedules to make clinic appointments to complete the series. Literature indicates that

adolescents older than age 14 have fewer medical visits than younger adolescents, with an especially strong age-related decline in preventive visits at which vaccines are often administered.[20] Alternative sites for vaccine delivery, such as schools and pharmacies, could increase completion of the three dose series. Two-thirds of parents/guardians interviewed would allow their children to complete the vaccine series in school. Expanding the settings in which vaccines can be delivered may be a promising avenue to improve completion of adolescent vaccine series.

Healthcare access is often cited as a reason for non-adherence to a variety of medical recommendations. However, study participants did not cite access as barrier to completing the vaccine series, specifically denying financial costs of the vaccine, transportation to the clinic, and the ability to cancel and reschedule medical appointments. This study took place in Massachusetts however, where universal healthcare has been in place since 2006, which may have overcome some access-related barriers. In states where access to primary care, including vaccination, is more limited, financial barriers may be more problematic. Studies in other areas have found significant relationships between out-of-pocket vaccine costs and rates of HPV vaccination.[49–52]

The cost of the HPV vaccine is a significant barrier to vaccination.[49–52] Adolescents may not have access to healthcare or if they have the healthcare,

they might not be using it.[53] The costs of immunizations are increasing and it is challenging for the adolescents to find ways to finance their healthcare.[53] Females are more likely to be infected with HPV if they do not have health insurance, or a place to obtain health care.[10] One study found that the most common reason why the HPV vaccine was refused was due to concerns about insurance coverage for this vaccine and those who had insurance coverage for the HPV vaccine had five times the odds of having had it.[49] Furthermore, it has been noted that parents with higher incomes are willing to cover the cost of the HPV vaccine, whereas parents who have declined medical care due to either its cost or their health insurance status are less likely amenable to cover the costs of the vaccine.[51] If the patient knew that the HPV vaccine was going to be covered, then this was the strongest predictor of vaccine acceptance.[49]

Our study took place in an urban and city setting where the subjects had many transportation options, ranging from their personal cars to an extensive public transportation system. However, transportation is a major barrier to health care access.[54–60] In one study, 51% of the families stated that the chief reason for missing their appointment was connected to transportation problems.[60] People with a driver's license had 1.92 times more regular doctor appointments compared to those people who did not possess a license.[56] The importance of a driver's license and access to a car is highlighted when considering that in one study, 82% of the people who made it to their appointments had a car, whereas

in the patients who missed their appointments, only 58% of them had access to a car.[59] In the absence of a car, people tend to rely on public transportation to travel to their appointments. However, the public transportation system also posed problems to people. In one study, people stated that the public bus system was unreliable, inefficient, and some reported that they had trouble affording the public transportation.[58] Moreover, people faced higher rates of transportation barriers when they had a lower socioeconomic status when compared to those with a higher socioeconomic status.[54] Furthermore, people in rural areas faced more barriers in that rural residents are 4 times more likely to travel 30 miles or more than their urban counterparts to access care.[57] Due to the location of our study and the proximity to public transportation, our subjects report that transportation was not a barrier in their efforts to complete the HPV vaccination. Although our suburban practices were not near to public transportation, the parents attending this practice reported that transportation was not a barrier.

Another common barrier to healthcare access is the flexibility of the patient's schedule. As stated above, the subjects in this study did not face this hurdle. However, it has been reported that people have difficulty in getting time off of work. This trouble was more prevalent in parents with a lower socioeconomic status.[55] Although there were working parents within this study, they stated that this barrier did not play a significant role.

Only four of the 37 parents interviewed who did not complete the series made the conscious decision to stop the vaccination series, and their beliefs were distinct: a negative experience with a staff person, misconceptions regarding vaccine side effects, and lack of understanding of the reasons for vaccinating in advance of sexual debut. Of note, neither parents/guardians nor providers mentioned personal experiences with side effects as reasons why parents stopped the vaccine series. Many of the concerns voiced by parents could potentially be addressed by discussions with their providers. When providers treat questions and hesitation by parents as opportunities for education, vaccine hesitant parents are more likely to vaccinate.[61–65] If hesitant parents are given the opportunity to voice their concerns and opinions, and the provider can address them systematically, the parents may be more likely to react positively.[62]

One woman halted the vaccine series because of a negative experience that she had with the staff, but if she was informed by her physician that she can advocate for herself, then her daughter could have finished the vaccine series. Two parents halted the series because of the misconceptions or rumors they have had or heard concerning the vaccine. If the providers had taken the opportunity to probe the parents' reasoning that's fueling their doubts, then these misconceptions may have been amenable to education that could have been provided by the physicians. When providers are faced with misconceptions such as these, they should attempt to understand and analyze the sources of these

concerns and then address them accordingly.[64] Furthermore, it has been previously shown that when a physician uses a participatory tone with the parent when discussing vaccinations, then the chances are greater that the vaccine hesitant parents will initiate the vaccine.[62] When the provider uses a participatory tone, he is opening up room for discussion by asking the parents if they want their child to be vaccinated. This allows the parents to participate and have an equal role in the decision-making process. Through these discussions, they will have the opportunity to voice their concerns and opinions, which the provider can then address.[62]

The last of the four parents halted the series because she deemed her daughter too young for the vaccination, yet despite her hesitance, the pediatrician is reminding the parents at every annual physical about the HPV vaccine and the benefits it can provide for their daughter. This pediatrician's pursuance of educating the parents is what is recommended by multiple studies.[61–65] A strong and trusting relationship should be present between the physician and the parent. This trust will allow the parents to share their concerns and questions with the physicians. Moreover, vaccine hesitant parents accredit their doctors when they change their mind and decide to vaccinate their children.[61] Parents were 2 times more likely to believe the vaccines were safe for their kids if they reported that their physicians influenced their decisions to support immunizations.[65] It has been noted in previous studies how important of a role a

physician plays in influencing a parents' decision on vaccinating their children. Physicians should address the concerns of parents by using evidence-based data, but they should simplify the language so that it can be easily understood. This dissemination of knowledge by the providers will help the parents make an informed decision.[64] A trusting relationship between a physician and a parent is vital especially when the parent refuses a vaccination. If the physician provides the proper education for their questions and is nonjudgmental when listening to the parent's concerns, then the parent is more amenable to the idea of vaccinations.[63] This pediatrician's pursuance of the HPV vaccine at every physical is the perfect example of what providers should do when faced with parents who are hesitant about the HPV vaccine, because this pediatrician has had a positive impact on this mother because she wants her daughter to not only start the vaccine series but also to complete it.

LIMITATIONS

This analysis reports on a subset of previously described interviews.[41] The limitations of this qualitative study include geographic constraints which may impact its breadth of applicability across the United States and the small and non-random sample size of subjects. Nevertheless, this study included urban and suburban families belonging to diverse cultural, linguistic, racial/ethnic, and socioeconomic backgrounds and a diverse array of providers who serve them.

CONCLUSION

Most cases of non-completion are unintentional, usually resulting from parents expecting reminders from healthcare systems and providers expecting parents to schedule appointments. Therefore, reminder and recall systems have great potential to improve completion rates. Inconvenience, the second most common reason for not completing the series, could be addressed by increasing alternative settings for vaccination, such as schools or pharmacies.

LIST OF JOURNAL ABBREVIATIONS

Am J Manag Care	American Journal of Managed Care
Am J Prev Med	American journal of preventive medicine
Am J Public Health	American Journal of Public Health
Arch Pediatr Adolesc Med.	Archives of pediatrics & adolescent medicine
BMC Health Serv Res	BMC health services research
BMC Res Notes	BMC Research Notes
Cancer Epidemiol Biomarkers Prev	Cancer epidemiology, biomarkers & prevention
Centers Dis Control Prev.	Centers for Disease Control and Prevention
Clin Pediatr (Phila)	Clinical pediatrics
Emerg Infect Dis	Emerging Infectious Diseases
Fam Med.	Family Medicine
Heal Soc Care Community	Health and Social Care in the Community
IARC Monogr Eval Carcinog Risks to Humans	IARC Monographs on the Evaluation of Carcinogenic Risks to Humans
J Adolesc Heal	Journal of Adolescent Health
J Am Med Assoc.	Journal of American Medical Association
J Clin Pathol	Journal of Clinical Pathology
J Clin Pharm Ther.	Journal of clinical pharmacy and therapeutics

J Community Health	Journal of community health
J Epidemiol Community Health	Journal of epidemiology and community health
J Health Care Poor Underserved.	Journal of health care for the poor and underserved
J Immigr Minor Health.	Journal of immigrant and minority health
J Infect Dis.	The Journal of Infectious Diseases
J Pathol	Journal of Pathology
J Pediatr Heal Care	Journal of Pediatric Health Care
J Public Health Manag Pract.	Journal of public health management and practice
J Rural Heal.	The Journal of Rural Health
J Women's Heal.	Journal of Women's Health
JAMA	Journal of the American Medical Association
Matern Child Health J.	Maternal and child health journal
Mayo Clin Proc.	Mayo Clinic proceedings
MMWR Morb Moral Wkly Rep	Morbidity and Mortality Weekly Report
N Engl J Med.	The New England Journal of Medicine
Obstet Gynecol.	Obstetrics and gynecology
Pediatr Infect Dis J.	The Pediatric infectious disease journal
Prev Med (Baltim)	Preventive medicine
Sci Transl Med	Science Translational Medicine

Wkly Epidemiol Rec	Weekly Epidemiological Record

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CURRICULUM VITAE

Nagasudha L. Chigurupati

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Objective

To broaden my experiences in the job world while improving my science education and my informatics skills

To gain work experience relevant to my eventual goal of becoming a physician and a well-informed scientist

Education

HIGH SCHOOL DIPLOMA | JUNE 2010 | WALTHAM HIGH SCHOOL

BACHELOR OF ARTS | MAY 2013 | BOSTON UNIVERSITY

Major: Neuroscience

MASTER OF SCIENCE | MAY 2015 | BOSTON UNIVERSITY GRADUATE MEDICAL SCHOOL

Major: Medical Sciences

Experience

REGISTRATION COORDINATOR/BED CONTROL COORDINATOR | NEWTON-WELLESLEY HOSPITAL | DECEMBER 2010-SEPTEMBER 2013

- Must be able to prioritize tasks between the two jobs of being a registration coordinator and a bed control coordinator
- Check-in expectant mothers for a variety of appointments
- Admit newborns upon their birth
- Admit babies to the special care nursery
- Process patients' paperwork and update their files
- Process the death paperwork for all fetal demises and all deaths on the maternity floor
- Admit patients from the emergency room and other direct admissions
- Responsible for interface with nursing supervisor and hospitalists.
- Facilitate and act as a central contact for any issues with admissions into the hospital.
- Depending on patient's diagnosis, I had to place them on a suitable floor. With most patients, discussions with the hospitalist, nursing supervisor, and charge nurses on the units were needed to determine a patient's placement. Placement not only depends of the patient's current diagnosis, but on also his or her medical history, and

the staffing limitations on the floors. Upon confirming a room, I process the paperwork
- Handle the death paperwork and verify its accuracy before releasing the body to their designated place
- Resourceful and communicate with all levels of administration and colleagues

TUTOR | BOSTON UNIVERSITY EDUCATIONAL RESOURCE CENTER | APRIL 2012-MAY 2013

- Tutor Calculus II, Spanish I, II, III
- Develop custom methods to capture the data needed to properly assess and address learning needs of students
- Have to be capable of explaining any concept in various manners

RESEARCH ASSISTANT | BOSTON UNIVERSITY APHASIA RESEARCH LABORATORY | JUNE 2011-NOVEMBER 2012

- Analyze the data that comes in from the online surveys on Amazon mTurk
- Had to develop my own method of analyzing the results depending on which data sets were provided and compile these final results into a Microsoft Excel worksheet to be passed on to another member in the lab
- The results from my analysis are used to construct future therapy exercises for prospective patients
- Construct surveys using html code to launch on Amazon mTurk
- Ability to meet deadlines for projects
- Develop training modules on analysis techniques to enable anyone with a raw data set to analyze it using my methods

EMERGENCY ROOM VOLUNTEER | NEWTON-WELLESLEY HOSPITAL | JUNE 2010-AUGUST 2010

- Aided patients with their problems as they await to be seen by the doctors and nurses
- If the patient had visitors, I had to verify the patients' availability with the nurses. Depending on the nurse's response, I would either take the family to the patient or convey to them that they could not visit
- Regardless of the difficulty of the situations, everything must be dealt with poise and respect

VERNON CANCER CENTER VOLUNTEER | NEWTON-WELLESLEY HOSPITAL | JUNE 2010-AUGUST 2010

- Guide visitors around the clinic, whether they were there for doctors’ appointments, or one of their numerous chemotherapy sessions

AMERICAN RED CROSS VOLUNTEER | AMERICAN RED CROSS | SEPTEMBER 2006-DECEMBER 2012

- Worked in events like the Jimmy Fund Walk, Walk for Hunger, and the Boston Marathon

- Help treat participants with minor injuries
- work alongside nurses and doctors to help treat world-class runners
- Trained to take even the most stressful situations in stride and have been taught to handle all problems with composure and patience.

EVENTS MANAGEMENT VOLUNTEER | SEASON'S HOSPICE| DECEMBER 2014-ONGOING

- Coordinating the marketing aspect of Camp Kangaroo, a children's Bereavement Camp that will take place in June 2015