



Published in final edited form as:

J Cancer Educ. 2022 October ; 37(5): 1519–1524. doi:10.1007/s13187-021-01992-6.

HPV Vaccine Experiences and Preferences among Young Adult Cancer Survivors and Caregivers of Childhood Cancer Survivors

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Abstract

Cancer survivors are at higher risk of developing HPV-associated cancers later in life, yet their HPV vaccination rates remain lower than the general population. Improving HPV vaccination uptake among survivors is essential to preventing second malignancies. We interviewed HPV vaccine-eligible adolescent and young adult (AYA) cancer survivors (18–26 years) and caregivers of HPV vaccine-eligible childhood cancer survivors approaching the AYA age range (9–17 years) about their HPV vaccine experiences and preferences as informed by the HPV Vaccination Roundtable Best Practices. Interviews (N=20) were recorded, transcribed, and analyzed using interpretive description. Of AYA survivors (n=10), 50% had received at least one HPV vaccine dose. Of caregivers (n=10), 30% reported their child had received at least one HPV vaccine dose. Three distinct categories emerged including: 1) HPV vaccine knowledge, 2) HPV vaccination recommendation preferences, and 3) HPV vaccination reminder preferences. The first two categories were oncology focused. Participants lacked knowledge regarding HPV vaccine safety and applicability due to their complex cancer history. Most participants strongly preferred that their oncologist provide an HPV vaccine recommendation. The third category was mixed, with some participants preferring oncology-based HPV vaccine reminders while others preferred primary care-based reminders. Almost all participants preferred digital reminders (e.g., text messages). Our results suggest that oncologists play an essential role in recommending the HPV vaccine and providing information to assist survivors and caregivers with vaccine decision-making. Additionally, HPV vaccination uptake among pediatric and childhood and AYA survivors could be improved through the use of tailored, electronically delivered vaccine reminders.

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Authors' contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Austin R. Waters, Karely Mann, and Perla L. Vaca Lopez. The first draft of the manuscript was written by Austin R. Waters and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Ethics approval

All study materials and procedures were approved by the University of Utah IRB (IRB# 00113603)

Consent to participate

Informed consent was obtained from all participants prior to participation in the interview.

Keywords

HPV Vaccine; Survivorship; Caregiver; Survivorship Guidelines; Text Messaging

Background

Survivors of pediatric, adolescent and young adult (AYA) cancer face a variety of potential health issues due to their cancer treatment such as second cancers, including human papillomavirus (HPV)-related malignancies [1–3]. HPV is the most common sexually transmitted infection in the United States, with an estimated 80 million individuals currently infected with at least one strain of HPV [4]. Contracting the HPV virus is a real and significant risk for cancer survivors. HPV-associated cancers later in life are 40% higher among female cancer survivors and 150% higher among male cancer survivors compared to the general population [3]. However, this risk can be greatly mitigated. The HPV vaccine is effective in protecting against most strains of HPV that lead to cancer [5]. Yet, vaccination rates remain low among cancer survivors. One recent study found that only 23.8% of young survivors of childhood cancers initiated HPV vaccination, compared to 40.5% of the general population [6].

Vaccination, including the HPV vaccine, is traditionally viewed as the responsibility of primary care providers (PCP) and is often not part of routine oncology care. Some cancer survivors experience a delay in returning to a PCP after their cancer treatment ends, while others never return to primary care [7]. Young cancer survivors may find themselves receiving neither primary care nor oncology care during HPV vaccine age-eligible years (9–26 years), likely decreasing their access to this vaccine [8]. In particular, because a provider recommendation for the HPV vaccine increases uptake in the general population and among cancer survivors [9–13], fragmented care transitions may mean that a survivor does not receive a provider recommendation. At the same time, caregivers of childhood cancer survivors reported a lack of knowledge, concerns about safety, and concerns about which vaccines to receive post-cancer therapy as the most common reasons their child had not received the HPV vaccine [14].

The American Cancer Society HPV Vaccination Roundtable has found that in primary care for the general population, strong and presumptive provider recommendations [9–11], provider prompts [15], vaccination standing orders [15], and patient reminder systems [16] have improved HPV vaccination rates [17]. However, whether these practices could be adapted for cancer survivors who sometimes see both oncologists and PCPs remain unknown. Also, little is known about survivor and caregiver preferences regarding receiving information and reminders on the HPV vaccine and whether recommendations should come from oncology providers, PCPs, or both.

To address these gaps, we conducted semi-structured interviews with HPV vaccine eligible cancer survivors (18–26 years) and caregivers of younger eligible survivors (9–17 years), as ages 9–26 years are the recommended ages for HPV vaccination. We sought to describe participants' experiences with the HPV vaccine. We also solicited participants' perspectives on whether HPV vaccination should be under the purview of oncology or primary care

and their recommendations on communication strategies to increase HPV vaccination rates among age eligible cancer survivors.

Methods

Participants, Recruitment, and Data Collection

Potential participants were identified through 1) screening clinic schedules at Primary Children's Hospital (PCH) and Huntsman Cancer Institute (HCI), 2) an established research cohort of participants from previous studies that had agreed to be contacted for future research, and 3) referrals from the Huntsman-Intermountain Adolescent and Young Adult (HIAYA) Cancer Care Program's patient navigators. Eligible participants were either an HPV vaccine eligible cancer survivor (18–26 years) or a caregiver of a younger HPV vaccine eligible cancer survivors (9–17 years). Eligible survivors had completed treatment and received care during 2013–2018. Eligible caregivers were at least 18 years of age, and the caregiver of a survivor under 18 years of age who had completed treatment at PCH between 2013–2018.

Participants were sampled using stratified purposeful sampling to achieve an equal number of survivors and caregivers [18]. We approached participants either in person prior to an outpatient oncology appointment or via phone call after an initial email contact by study staff or patient navigator. Of the 32 survivors and caregivers approached, N=20 participated (n=10 survivors and n=10 caregivers), resulting in a 63% participation rate. Of those who did not participate, n=4 declined and n=8 were lost to follow up. Once consented, participants completed an online survey using REDCap and participated in a semi-structured individual interview. Recruitment, consent, surveys, and interviews occurred between June-August 2019. Each participant received a \$20 gift card in appreciation of their time. All study procedures were approved by the University of Utah Institutional Review Board (IRB# 00113603).

Survey Measures and Interview Guide

The survey included items on survivor and caregiver demographics (e.g., age, gender, household income, health insurance status and education), as well as information on their diagnosis or their child's cancer diagnosis, time since diagnosis, and HPV vaccination status. Descriptive statistics were calculated for survivor and caregiver demographics using STATA 14 (StataCorp, College Station, Texas). The semi-structured interview guide was informed by the HPV Vaccination Roundtable Best Practices [9–11,19,16]. We asked about barriers to HPV vaccination, HPV vaccine experiences, HPV vaccine recommendations, preferences for HPV vaccine receipt location, and acceptability of text messaging reminders.

Qualitative Data Analysis

Interviews lasted between 6–19 minutes and were recorded, transcribed, and quality checked with audio files to rectify discrepancies. Interview length varied according to whether participants expressed concerns about the HPV vaccine, with some interviews being very short if the participant had already received the vaccine and experienced no barriers or concerns. Data were analyzed using interpretive description, an analytic inductive

framework commonly used to explore phenomenon while taking into account that such phenomena are embedded in existing clinical knowledge [9–11,19,16]. We performed two cycles of coding to generate categories and sub-categories using NVivo 11 (QSR International, Melbourne, Australia) [20].

During first cycle coding, two members of the research team (ARW, KM) read and employed initial coding on a total of 20% of the interviews to capture first impressions of emerging categories and to build the initial NVivo coding structure. An additional 20% of the interviews were coded phrase by phrase to refine the coding scheme. During second cycle coding, 10% of the interviews were double coded by ARW and KM using focused coding, a coding technique that searches for the most frequent or salient ideas and categorizes them based on similarity. Focused coding was compared between ARW and KM resulting in high interrater reliability ($\kappa=.92$, agreement 99.7%).[21] Results are described in aggregate and then by HPV vaccination status where the categories diverged.

Results

Survivors (N=10) were on average 21.2 years of age (range 18–23), primarily female (60%), non-Hispanic white (90%), and all were insured (100%, Table 1). Half had received at least one dose of the HPV vaccine (50%). Caregivers (N=10) were primarily ages 30–59 years (60%), female (90%), and non-Hispanic white (80%). Of caregivers, 30% reported their child had received at least one dose of the HPV vaccine. For caregivers, their survivors were on average 13.8 years of age (range 10–17), half were female (50%), mostly non-Hispanic white (60%), and all had health insurance (100%). The most common type of diagnosis among all survivors was lymphoma (35%), followed by leukemia (25%), sarcoma (25%), and central nervous system cancers (15%). Three categories emerged from the qualitative analysis: 1) HPV vaccine knowledge and concerns, 2) HPV vaccination recommendations preferences, and 3) HPV vaccination reminder preferences.

HPV Vaccine Knowledge and Concerns

Most survivors and caregivers considered the decision to HPV vaccinate in the context of their or their child's cancer history. Even among those who had gotten the vaccine or whose survivor had gotten the vaccine, there was a belief that they had not received adequate information about the HPV vaccine to decide if it was appropriate for their child or themselves after cancer treatment. One survivor stated: *“I mean, I had heard of it a lot, but I just didn't know what it was. I didn't know why I was supposed to get it or anything.”* Concerns about whether the HPV vaccine was appropriate were common among participants and included a lack information and worries about safety and side effects for cancer survivors. One caregiver shared, *“Any vaccine we get, we always want to look at side effects, and potential side effects, and interactions with his current health state post-chemo.”*

While rare, a few participants described general concerns about the HPV vaccine that did not have to do with their own cancer history or their child's cancer history. One caregiver stated that their child had not gotten the HPV vaccine because, *“The [HPV vaccine] was a newer vaccine and I was just not really informed well about it and didn't know a lot of people that*

had gotten it and so I just thought, ‘Well, maybe it’s not well known enough; maybe it hasn’t had enough research to get it yet.’ And so, I just kind of put it off to the side.”

HPV Vaccination Recommendation Preferences

All participants who reported being vaccinated had received a recommendation from a provider about the HPV vaccine. For many, receiving this recommendation from a trusted provider was the determining factor for HPV vaccine receipt. Most participants preferred to receive the recommendation from their cancer care team, typically their oncologist. One caregiver shared, *“But where she has a history of cancer, I would want, for sure, my oncologist to say to me, ‘With her specific history this is something that we recommend, we’re gonna’ recommend, because of where she’s been, because she’s not like every kid out there.’”* Another survivor mirrored this sentiment stating *“if like my oncologist was like, ‘You know, you should get this vaccine,’ I would feel more comfortable doing this than just from a family doctor.”*

Participants who were unvaccinated tended to have not received a recommendation from a provider. In particular, these participants thought a recommendation from their oncologist was key. Specifically, they felt that a recommendation that took into account their or their child’s complex cancer history would be crucial to prompt HPV vaccination. One caregiver stated, *“For [Childhood Cancer Survivor], it would be his oncologist, because they’ve got the most in-depth knowledge of his health and how things could affect him having had cancer and chemo and those things.”*

Some survivors and caregivers, regardless of HPV vaccination status, felt that a simple recommendation from an oncology provider would be enough for them to initiate the HPV vaccine series: *“If [my child’s oncologist] said, ‘Do it’ even though she’s been healthy for four years, we do it.”* However, other participants voiced that they preferred a more in-depth, discussion-based recommendation that addressed their lack of knowledge about the applicability and safety of the HPV vaccine for cancer survivors. One survivor stated that this discussion would help, *“So I’m aware of what [the HPV vaccine is] really for, what symptoms or side effects I should be looking out for and stuff like that.”* Other survivors and caregivers expressed that they would be motivated to receive the vaccine if they felt like their provider truly believed in the efficacy of the vaccine. For example, one caregiver said, *“I’d like to feel like they believe in it.”* However, survivors and caregivers did not express a preference about where they got the vaccine (i.e., oncology vs. PCP clinic) as long as an oncology provider recommended it.

HPV Vaccination Reminder Preferences

Most caregivers and survivors expressed that reminders would be helpful for HPV vaccine series completion regardless if they or their child had completed the series. One caregiver shared why reminders would be helpful: *“Life is busy and sometimes you just totally forget.”* Participants mostly preferred digital messaging reminders (i.e., email, text messages), though a few caregivers preferred phone calls or did not want to receive any kind of reminder. Survivors particularly viewed text message reminders as helpful post-treatment. One survivor shared *“Yeah, I actually think that [text message reminder] is helpful because*

I don't know about anybody else, but I tend to forget a lot of stuff after my treatments, so yeah, no, it's great."

Participants felt that reminder messages that contained actionable information would be the most helpful and should include details such as the clinic the reminder is coming from, which HPV dose number they needed next, and when to get the dose. One caregiver described this as *"She's due for this, this, this, and this. And it's very helpful for my records to see a list of what's coming up."* Additionally, most survivors and some caregivers expressed that multimedia text messages (e.g., memes or culturally based humorous images with overlaid text) could spark important conversations between caregivers and adolescent survivors more so than messages containing solely text. One caregiver stated *"Yeah, I mean it makes it more light... I would talk to [younger survivor] about it. "Hey, [younger survivor], come open this, or this is funny."* Some survivors and caregivers reported text message reminders from the oncology clinic after an oncology provider recommends the HPV vaccine as the ideal reminder modality. Other survivors and caregivers did not have preferences about who was the source of the reminder as long as it came from their clinic.

Discussion

Young cancer survivors are at a higher risk than the general population for developing HPV-related cancers later in life [3], and yet, many remain unvaccinated [6]. Our findings from semi-structured interviews with AYA cancer survivors and caregivers of pediatric cancer survivors illustrate that the decision to receive the HPV vaccine is closely intertwined with cancer history. Cancer survivors and caregivers in our sample repeatedly emphasized the critical role their oncology providers could play in their HPV vaccination decision-making process. Our findings echo commonly reported barriers regarding HPV vaccination in the general population including a need for provider recommendations and increased knowledge [22–24], but suggest that for survivors of cancer, providers should be sure to emphasize the safety of the vaccine for someone with a cancer history.

The primary barrier to HPV vaccination reported by survivors and caregivers within our study was a lack of knowledge to determine if the vaccine was necessary. Similarly, caregivers of vaccine eligible adolescents in primary care samples also commonly report a lack of knowledge as a barrier to HPV vaccination [24]. However, other common barriers reported in the literature such as caregivers perceptions of how the vaccine may affect their child's sexual behavior [24] were not raised by caregivers or survivors in this study. While this will need to be confirmed in other samples, it does suggest that the concerns of cancer survivors and caregivers may be fundamentally different from non-cancer populations. Future investigation should prioritize understanding how HPV vaccine concerns change throughout the cancer continuum, particularly comparing pre-diagnosis concerns with survivorship concerns.

One key avenue for improving knowledge and uptake of the vaccine may be finding strategies to promote oncology provider recommendations and discussions regarding the HPV vaccine, as earlier research shows that provider recommendations are associated with HPV vaccine initiation among childhood cancer survivors [12,13]. Participants

overwhelmingly reported that a provider recommendation should come from their oncology provider, because they trusted them to understand how the vaccine might affect them as a cancer survivor.

Unlike the rest of our findings, survivors and caregivers did not have a preference regarding the location of HPV vaccine receipt. This finding is encouraging as integrating HPV vaccination into busy oncology practices may not be feasible. Thus, having oncologists make an HPV vaccine recommendation and discuss any worries about safety due to cancer while then referring survivors to their PCPs for vaccination may be a necessary strategy to improve uptake. Participants also did not care whether a reminder for doses of the HPV vaccine came from their oncology clinic or their PCP. Participants in our interviews liked the idea of text message reminders that included memes that could spark conversation. As such, using suitable, age-appropriate messaging strategies when creating communication strategies, such as humor that memes can provide, may also appeal emotionally to survivors and caregivers, potentially combatting HPV vaccine misinformation or worries [25]. Future studies should assess the effectiveness of oncology and primary care-based HPV vaccine text messaging and other reminder tools tailored to AYA survivors and caregivers.

Limitations

Our study has few notable limitations. HPV experiences and preferences vary by geographic location and culture; our findings are limited by the homogeneous Utah specific sample, although do likely reflect the beliefs of survivors in many states with similarly low levels of HPV vaccination uptake. Furthermore, our sample was primarily white and female, limiting our understanding of more diverse populations such as people of color and men who are continuously under-represented in HPV research. Additionally, our entire sample was insured at the time of interview. Thus, our results may not apply to survivors and caregivers who may lack insurance access to the HPV vaccine. Although the HPV vaccine is provided to the uninsured and underinsured through the Vaccines for Children Program, this program may be difficult to access and participants are only eligible through age 18. Regardless of these limitations, the novelty and depth of this data provide a new and substantial understanding of the HPV vaccine experiences and preferences of young cancer survivors and caregivers and sets the stage for future research in this understudied area.

Conclusion

HPV vaccination is an important opportunity to prevent second cancers in childhood and AYA cancer survivors. Our results demonstrate that oncology providers should play an essential role in recommending the HPV vaccine and providing information to assist young cancer survivors and their families with HPV vaccine decision making. At the same time, age appropriate reminder systems are necessary to help survivors complete the multi-dose HPV vaccine series, though these reminders do not necessarily need to be from their oncology clinic. Our findings suggest that future research should explore ways that oncology and primary care can work together to increase HPV vaccination rates among this at-risk population.

Acknowledgements

This study would not have been completed without the contributions from the survivors and caregivers. The authors appreciate recruitment support from the Huntsman-Intermountain Adolescent and Young Adult (HIAYA) Program patient navigators as well as content feedback from the HIAYA Patient and Family Advisory Board.

Funding

The research reported in this publication was supported by the St. Baldrick's Foundation, Huntsman Cancer Foundation, and the National Cancer Institute of the National Institutes of Health under Award Numbers P30CA042014 and R03CA216174 (Kirchhoff and Kepka, PIs). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

Conflicts of interest/Competing interests

Deanna Kepka receives a portion of her salary from American Cancer Society, which receives funding from Merck, for the purpose of Mission: HPV Cancer Free Quality Improvement Initiative.

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Table 1:

Cancer Survivor and Caregiver Demographics

AYA Survivors* (N=10)		
	Mean	Range
Age at interview, years	21.1	18–23
	N	%
Female	6	60
Non-Hispanic White	9	90
Insured	10	100
Received HPV vaccine	5	50
Caregivers** (N=10)		
	N	%
Age at interview		
30–39 years old	2	20
40–49 years old	6	60
50–59 years old	2	20
Female	9	90
Non-Hispanic White	8	80
Child: Female	5	50
Child: Non-Hispanic White	6	60
Child: Insured at time of survey	10	100
Child: Received HPV vaccine	3	30
	Mean	Range
Child: Age at interview, years	13.8	10–17
Type of diagnosis*** (N=20)		
	N	%
Leukemia	5	25
Central nervous system tumor	3	15
Sarcoma	5	25
Lymphoma	7	35

* Participating survivors were limited to those ages 18–26 years at interview

** Caregivers consisted of parents who have a child ages 9–17 years old with a previous history of childhood cancer.

*** Diagnosis was reported by participating survivors (N=10) and by caregivers regarding their child with cancer (N=10)