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Development and initial feedback about a human papillomavirus (HPV) vaccine comic book for adolescents

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Abstract

Human papillomavirus (HPV) vaccination rates do not meet the Healthy People 2020 objective of 80% coverage among adolescent females. We describe the development and initial feedback about an HPV vaccine comic book for young adolescents. The comic book is one component of a multi-level intervention to improve HPV vaccination rates among adolescents. Parents suggested and provided input into the development of a HPV vaccine comic book. Following the development of the comic book, we conducted a pilot study to obtain initial feedback about the comic book among parents (n=20) and their adolescents ages 9 to 14 (n=17) recruited from a community-based organization. Parents completed a pre-post test including items addressing HPV knowledge, HPV vaccine attitudes, and about the content of the comic book. Adolescents completed a brief interview after reading the comic book. After reading the comic book, HPV knowledge improved (2.7 to 4.6 correct answers on a 0–5 scale; $p<0.01$) and more positive attitudes toward HPV vaccination ($p<0.05$) were reported among parents. Parents confirmed that the comic book's content was acceptable and adolescents liked the story, found it easy to read, and thought the comic book was a good way to learn about being healthy. Parents provided valuable information in the development of a theoretically-based comic book and the comic book appears to be an acceptable format for providing HPV vaccine information to adolescents. Future research will include the comic book in an intervention study to improve HPV vaccination rates.

Introduction

Human papillomavirus (HPV) is a common sexually transmitted infection (STI) with an estimated 20 million individuals living in the United States (U.S.) infected with HPV [1, 2]. Furthermore, most sexually active individuals will acquire HPV at some time during their

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lives. In the U.S., HPV prevalence has been shown to vary by age, race, education, poverty level, and sexual history [3]. Even though most HPV infections are asymptomatic, persistent infection with an oncogenic HPV type (mostly types 16 and 18) may cause cervical, vaginal, vulvar, anal, penile, and oropharyngeal cancers and non-oncogenic HPV types 6 and 11 cause over 90% of the cases of genital warts [4–7].

The U.S. Food and Drug Administration (FDA) approved a quadrivalent HPV vaccine for the prevention of cervical, vaginal, and vulvar cancer among females and for the prevention of genital warts and anal cancer among females and males [8, 9]. Additionally, a bivalent HPV vaccine has been approved for the prevention of cervical cancer among females [10]. The Advisory Committee on Immunization Practices (ACIP) recommends HPV vaccination (3-dose series) for adolescents age 11–12 years, but it may be administered as early as age 9, with catch-up vaccinations for age 13–26 [9].

In the U.S., HPV vaccination rates among female adolescents are much lower than the Healthy People 2020 objective of 80% coverage, and initiation rates lag behind other recommended adolescent vaccines [11]. HPV vaccination rates (2012) among females (13–17 years old) are 53.8% and 66.7%, for initiation and 3-dose series completion (among individuals who had at least one HPV vaccine dose), respectively [12]. HPV vaccination rates among males are 20.8% for initiation and 45.1% for 3-dose series completion among the same age group [12].

Parental barriers to HPV vaccination for adolescents have been documented in numerous studies which suggest that parents may not be aware of the HPV vaccine, lack understanding of the benefits of HPV vaccination for their children, are misinformed about the vaccine's safety, are concerned that their child may become promiscuous if vaccinated, or other logistical issues (e.g. cost, time needed for medical visits for the 2nd and 3rd dose, etc.) [13–15]. Since numerous factors may be influencing decision making about the HPV vaccine, new strategies are needed to improve HPV vaccination rates. During parental group sessions to inform the development of a multi-level intervention to improve adolescent HPV vaccination rates, parents suggested that a comic book for young adolescents be developed to explain the importance of receiving the HPV vaccine.

Comic books can be categorized as an example of entertainment-education, which is a strategy to promote educational messages within an entertainment context. Entertainment-education is an innovative format used to convey information, change attitudes, and promote behavioral change [16]. The effectiveness of entertainment-education has been explained primarily through two theories focusing on its narrative structure [17]. Dual-Processing Models conceive two methods of processing mediated by personal involvement in the narrative: central (systematic) processing whereby the receiver actively processes persuasive messages and peripheral (heuristic) processing where the receiver processes messages based on superficial cues and heuristics [18, 19]. These theories would suggest that using a narrative would facilitate central processing by enhancing engagement in the topic; however results validating this claim have been mixed in health behavior domains [17]. The second theory, the Transportation-Imagery Model, has been successful in explaining narratives and posits that narratives evoke vivid imagery which transports the reader into the world of the

story, decreasing their likelihood of counter-arguing, increasing their ability to relate to the situation, and drawing strong emotions for the characters, thereby increasing the influence of their perspectives [20]. In this model, more realistic or engaging stories would enable more efficient transformation of attitudes relating to the targeted health behavior.

The comic book, as an educational format, has been previously used to address public health issues in the U.S. and other countries. Comic books have been reported to improve knowledge and behaviors about sun safety, safe drinking water practices, back pain, pesticide safety, burn safety, and tobacco use [21–26]. The complementary nature of the visual story with text improves understanding, retention, and possibly the reader's interest making comic books a useful format for communicating health information to young adolescents and adults [27–29].

The use of a narrative in the format of a comic book about the HPV vaccine seemed like a viable channel to provide information to adolescents as suggested by parents assisting in the design of a multi-level HPV vaccine intervention. The purpose of this study is to describe the development of a theoretically-based HPV vaccine comic book that will be used as a component of an intervention to increase adolescent HPV vaccination rates and to describe the initial feedback about the comic book among parents and their adolescents.

Methods

Comic Book Development

During intervention development for a multi-level HPV vaccine intervention, parents participating in an intervention development work group suggested a need for educational material about the vaccine for young adolescents to understand the importance of HPV vaccination. These parents (n=6) had previously participated in focus groups about the HPV vaccine and were willing to meet for three working sessions that lasted 2–3 hours each to assist with the development of the parent component of a multi-level intervention to improve HPV vaccination rates among adolescents.

Parents discussed various options for the adolescent educational materials during the intervention development sessions and decided that a comic book with superhero characters would be an engaging format to provide age-appropriate information to young adolescents about the HPV vaccine. The draft of the comic book storyline was developed by members of the research team, presented to parents in the intervention development group for initial feedback, and artistic revisions were completed by a comic book illustrator. Parents verbally expressed positive feedback about the developed comic book during a work group session reporting that it was easily relatable for young adolescents, easy to understand, and encouraged positive preventative health behaviors.

The comic book text was developed based on constructs from the Theory of Planned Behavior and the Health Belief Model [30, 31]. A recent study about the HPV vaccine found that constructs from these theories predicted vaccine uptake [32]. Theoretical constructs incorporated into the comic book text included perceived susceptibility, perceived severity, perceived benefits and barriers, self-efficacy, cues to action, attitudes, subjective norms,

perceived behavioral control and intention (Table 1). For example, the comic book story included text to increase perceived susceptibility to an HPV-associated disease, address HPV vaccine barriers, suggest a cue to action, and indicated intention to receive the HPV vaccine by the story character. In addition, the comic book storyline addressed numerous concerns raised by parents in previously conducted focus groups about the acceptability of the HPV vaccine [33].

The comic book story follows an adolescent female and her younger brother who are resistant to getting the HPV vaccine in accordance with their mother's wishes. Among adolescents, the most frequently reported barrier to HPV vaccination is the perceived pain associated with the 3-shot vaccine series. When the young female falls asleep, two superheroes appear in her dreams to explain that she and her brother should be vaccinated to help fight HPV and become superheroes in the real world by not transmitting HPV to others in the future. In addition, the superheroes remind the young female that it's really important to get all three shots to prevent possible diseases in the future. After waking up, the young female feels empowered and she tells her mother that she and her brother are ready to be vaccinated to prevent possible HPV-related diseases in the future.

Pilot Testing of the Comic Book's Acceptability

The resulting comic book was pilot tested for acceptability among parents and adolescents recruited from a local community-based organization (YMCA) on the west side of CITY, STATE. The median household income in this well-established neighborhood was \$38,463 in 2011 [34]. The pilot study was conducted from December 2012 to February 2013. Adults with adolescents were approached to participate in the study. Eligibility criteria for parents included: 1) being a parent or legal guardian of a child ages 9–14 years; 2) being able to read and write in English; 3) having the child present at the time of the interview; and 4) providing consent. The study was restricted to parents with young adolescents because the comic book was developed to be targeted to this age group. Informed consent procedures and study protocol were approved by the [BLINDED] University Institutional Review Board.

Twenty-six adults were approached to participate in the study in the lobby of a community organization. Four parents were ineligible (two adults did not speak English, one was not with their ageeligible child, and one could not read the small print) for the study. Twenty of the 22 (91%) eligible adults approached agreed to participate in the study and provided written consent. Two adults refused study participation because of the lack of time.

Participating parents completed a pre-test survey, read the comic book, and filled out a post-test survey. On average, parents were able to complete the study in 10–15 minutes. Parents also provided permission for their adolescent to read the comic book and complete a short in-person interview to assess acceptability of the comic book. The adolescent interviews were audio recorded and lasted about 5–10 minutes.

Measures

The baseline survey included demographic characteristics (gender, race, ethnicity, marital status, education, household income), HPV vaccine history of their adolescent (receipt of the

HPV vaccine, provider recommendation of the HPV vaccine), HPV knowledge (5 true or false questions; “do not know” responses were scored as incorrect), and HPV and HPV vaccine attitudes (5 items on a 5-point Likert scale: strongly agree to strongly disagree). The true-false knowledge questions were: 1) HPV is a cause of cancer; 2) HPV can cause genital warts; 3) HPV infection is rare; 4) Males can get HPV; and 5) Females may be infected with HPV and not know it. The HPV vaccine attitude questions are listed in Table 3.

The post comic book survey measured HPV and HPV vaccine knowledge and attitudes, and also included questions regarding the comic book format, content, and acceptability for children (5-point Likert scale: strongly agree to strongly disagree).

Data Analysis

Pre-post knowledge scores were summed and mean scores compared using a paired t-test. Pre-post attitude responses were compared using a paired t-test. Audio recordings of the interviews were transcribed verbatim and reviewed for accuracy. Open-ended responses were coded, sorted in a matrix to assess the children’s pros and cons about the comic book, and reviewed by two members of the research team.

Results

Participant Characteristics

Demographic characteristics of the participants are presented in Table 2. Most parents had heard of HPV (90%) and the HPV vaccine (85%) prior to participation in the study. Thirteen parents (65%) reported that their adolescent had not received the HPV vaccine and 7 (35%) parents reported not knowing if their child had received the HPV vaccine. Ten parents did not know if their child’s physician had recommended the HPV vaccine, six parents reported that they had not received a provider’s recommendation for the HPV vaccine for their child, and four parents reported receiving a physician’s recommendation for the HPV vaccine.

Knowledge and Attitudes

Mean parental HPV knowledge significantly increased from 2.7 to 4.6 correct answers out of 5 ($p<0.01$) following the reading of the comic book. Attitudes about the HPV vaccine among parents are presented in Table 3. Parents reported more positive attitudes toward HPV vaccination after reading the comic book ($p<0.05$), however, the comic book did not significantly change their perception of how easy it would be to talk to their child’s doctor about the HPV vaccine.

Parental Evaluation of the Comic Book

Parents generally expressed a high level of acceptability of the comic book. Most parents ($n=19$; 95%) reported that the comic book was appropriate for children ages 9–14, with the remaining parent skipping this question. Additionally, 19 parents gave permission for their child to read the comic book. The one parent who refused their child’s participation indicated that the comic book did not discuss how HPV was transmitted and therefore was not appropriate stating: “...missing full data as to how HPV [is] specifically

contracted...which may not make a comic book appropriate. [I] would not take a comic book approach to explain [HPV] to my kids.”

Parents reported agreement that the message of the comic book was easy to understand (100%) and easy to follow (100%). Parents also agreed that the comic book content was important (95%) and the story was convincing (85%). In addition, parents reported that the comic book was easy to read (95%), the reading level was appropriate for young adolescents (95%), the characters were relevant (85%), and the pictures were attractive (70%). Most parents reported that the comic book had a simple message that was geared toward young adolescents and that giving them a comic book would be better than providing them with a conventional brochure. Four parents stated that the comic book should be more thorough in explaining how HPV is transmitted and provide more details about genital warts.

Adolescent Evaluation of the Comic Book

Nineteen adolescents were given permission to participate in the study. Two adolescents did not participate, one because of the lack of time and one adolescent had a reading disability. Among the 17 participating adolescents, everyone liked the comic book, 16 liked the pictures, 15 liked the superheroes, and 13 adolescents reported that the comic book was easy to read. Thirteen adolescents believed that the comic book was a good way to learn about being healthy, and nine thought that their friends would like to read the comic book. When asked what they liked about the comic book, five adolescents indicated that they liked learning about the vaccine and its importance, three liked the message encouraging the girl to get over her fear of shots, two liked that it explained how to protect yourself from getting sick, and two indicated liking the superheroes.

Adolescents were also asked to comment on what they liked about the superheroes in the story. Six adolescents indicated that they liked that the superheroes helped people, two liked that they protect you from getting sick in the future, and two adolescents liked that the superheroes fought against the virus. Three adolescents indicated liking the superheroes' costumes; however, one child who disliked the comic book reported that the superheroes “had weird suits.”

Discussion

Our study found that a theoretically-based HPV vaccine comic book targeted to adolescents was acceptable among parents and adolescents. After reading the comic book, there was improved knowledge about HPV and more positive attitudes about the HPV vaccine reported by parents. In addition, the adolescents reported liking the comic book story and finding it easy to read. These results suggest that a comic book as a form of entertainment-education should appeal to young adolescents by engaging them in a relatable story. The HPV vaccine comic book was developed based on a request by parents reporting difficulty explaining to young adolescents the importance of HPV vaccination. Although there are developed HPV vaccine educational materials available, the HPV vaccine comic book was designed specifically to provide young adolescents with information to assist parents with HPV vaccine discussions. The main components of the multi-level HPV vaccine intervention were designed for parents (tailored interactive computer program and

brochure), providers (educational session including an automated PowerPoint presentation), and health centers (poster, 2nd and 3rd dose reminders). With parental permission the comic book will be provided to the adolescent to read while the parent is engaged with their component of the intervention.

The finding of improved knowledge and changed attitudes after reading the HPV vaccine comic book is similar to other studies using comic books as a channel to deliver health information [21–23, 25, 26]. The value of using entertainment-education to improve HPV vaccine knowledge has been previously reported using the format of a radionovela and has demonstrated improved knowledge and favorable attitudes toward HPV vaccination among Hispanic parents of vaccine-eligible female adolescents [35, 36].

In a previous study, adolescents reported that they did not understand what the HPV vaccine was for or voiced concern about potential pain associated with the 3-dose HPV vaccine series [37]. In addition, parents report wanting to engage their older adolescents in medical decision making processes, however they often do not know when and how to include adolescents in the process [38]. Therefore, by introducing information regarding HPV vaccination in a developmentally appropriate and acceptable format, HPV vaccination rates may improve by providing information in an understandable format that is acceptable to parents and may be useful in initiating parent-adolescent discussions about the HPV vaccine. The developed HPV vaccine comic book is a new component of a multi-level intervention to improve HPV vaccination rates among young adolescents. Although previous HPV vaccine educational materials have not specifically targeted adolescents, parents participating in our study suggested that adolescents often play a role in the HPV vaccine decision making process. The value of the HPV vaccine comic book may be in providing important information in an engaging format so that they are more willing to accept a provider's HPV vaccine recommendation. This is important because the HPV vaccine has the potential to reduce the incidence of HPV-associated cancers and has already shown to reduce the incidence of genital warts [39–41].

The current study has several limitations. First, the comic was developed with the assistance of parents whose children receive care at one urban federally qualified health center. Therefore their experiences may differ from those of other parents. However, many of the concerns about the HPV vaccine addressed by participating parents have been raised by other parents participating in previous focus groups [33]. Second, the generalizability of the results from the pilot study is limited by conducting the study among a small convenience sample of parents and children from one community location. It is possible that the parents and children from this one location could differ than parents and children from other geographic locations. Furthermore, our interview among the adolescents did not measure HPV vaccine knowledge or attitudes or compare the comic book to other print materials. The goal of our small pilot study was to evaluate if adolescents would read the comic book and obtain initial feedback about the comic book format and story. Finally, we have not yet evaluated the comic's impact on vaccination behavior, an important step to determining the effectiveness of using this format to provide information to adolescents.

Conclusion

The development and initial feedback about a HPV vaccine comic book suggests that parents were willing to have their young adolescents read the comic book and that the HPV comic book was well received by parents and adolescents. Results of this study provide valuable information to researchers targeting strategies to improve adolescent vaccination rates. Future research should incorporate an educational component for adolescents when developing interventions to improve HPV vaccination rates.

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Table 1

Examples of theoretical constructs addressed within the comic book text

Health Belief Model	
Construct	Text
Perceived Susceptibility	"...and it can be passed from person to person without anyone knowing it."
Perceived Severity	"...cause disease and trouble like cancer and genital warts."
Perceived Benefits	"The vaccine will protect you from cancer in the future."
Perceived Barriers	"I've always hated shots because they hurt"
Cue to Action	"Talk to your parents, nurses, and doctors about the HPV vaccine."
Self-Efficacy	"...but I am confident that we can do it."
Theory of Planned Behavior	
Construct	Application
Attitude	"...so we will not get sick in the future from something we could have prevented. "
Subjective Norm	"...you even told me that many of your friends have had the HPV vaccine shots."
Perceived Behavioral Control	"It's an easy step the both of you can take now to prevent cancer and genital warts in the future."
Intention	"...and we plan to get the HPV vaccine now."

Table 2

Demographic characteristics of parents and adolescents

	n (%)
Parents (N=20)	
Gender	
Female	14 (70)
Race	
White	16 (80)
Black or African American	4 (20)
Ethnicity	
Non-Hispanic	20 (100)
Marital Status	
Single	1 (5)
Married	12 (60)
Divorced or Separated	7 (35)
Education	
High School Graduate	7 (35)
College Graduate	10 (50)
Graduate/Professional School	3 (15)
Household Income	
<\$20,000	2 (10)
\$20,000–\$49,999	4 (20)
\$50,000–\$69,999	4 (20)
\$70,000+	10 (50)
Adolescents (N=17)	
Gender	
Female	6 (35)
Age range (years)	9–14

Table 3Human papillomavirus (HPV) and HPV vaccine attitudes among parents ($N=20$)[†]

Statement	Pre-test (Mean)	Post-test (Mean)
1. Males and females are at risk for getting an HPV infection. [perceived susceptibility]	3.95	4.55*
2. If my child were to get HPV it would be harmful to his/her health. [perceived severity]	3.55	4.20*
3. It would be easy for me to talk to my child's doctor about the HPV vaccine. [self-efficacy]	4.40	4.65
4. Most people I know would want me to talk to my doctor about the HPV vaccine. [social norms]	3.35	3.85*
5. The HPV vaccine would protect my child from certain types of HPV diseases. [response-efficacy]	3.89	4.74**

[†] Likert Scale: 1: Strongly Disagree, 2: Disagree, 3: Not Sure, 4: Agree, 5: Strongly Agree*
p<0.05;**
p<0.01