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A content analysis of HPV vaccination messages available online

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ABSTRACT

Parents have varied HPV vaccine communication needs, which presents a challenge for healthcare providers. To improve communication resources for providers, we sought to characterize HPV vaccination messages available in existing educational materials. In fall 2016, we searched PubMed, educational material clearinghouses, and Google for English language HPV vaccination messages. We extracted messages that a provider might use when raising the topic of HPV vaccination, answering common questions, and motivating vaccination. Two reviewers independently coded each message. The search identified 267 unique messages about HPV vaccination. Messages generally were long (mean no. of words = 44, standard deviation [SD] = 33) and required a high level of education to read (mean reading grade level = 10, SD = 3). Only 32% of messages were shorter than 25 words, and 12% had a readability at or below grade 6. Most frequent were messages to address common parent questions or concerns (62%); the most common topics were diseases prevented by HPV vaccine (18%) and safety and side effects (16%). Many messages included information about cancer prevention (26%) and same-day vaccination (13%). Few messages (6%) used a presumptive style to recommend HPV vaccination. In conclusion, available messages about HPV vaccination were markedly varied. We identified few messages that were both brief (to facilitate providers memorizing them) and accessible (to facilitate parents understanding them). Future research should identify which messages lead to HPV vaccine uptake.

1. Introduction

Human papillomavirus (HPV) vaccine is highly effective at preventing persistent HPV infections that can cause six cancers [1] and genital warts [2]. The United States recommends 11- and 12-year olds routinely receive the vaccine [3]. However, only 66% of 13- to 17-year olds in the US had initiated HPV vaccination as of 2016, and only 49% had completed the multi-dose series [4]. This is far short of the national Healthy People 2020 goal of 80% [5] and coverage for two other vaccines recommended for adolescents [4]. As highlighted by the President's Cancer Panel [6], low HPV vaccination coverage leaves many of today's children at unnecessary risk of death caused by HPV-associated cancers.

Receiving a healthcare provider's recommendation is one of the strongest predictors of HPV vaccination [7]. For example, adolescents whose parents receive a high-quality recommendation have 9 times higher odds of initiating HPV vaccination than those without a recommendation [8]. However, about half (48%) of parents of age-eligible adolescents report having not received such a provider recommendation [8]. In identifying the reasons for not recommending HPV vaccine, providers report the time it takes to make a recommendation, avoiding potential uncomfortable discussions with parents, and lacking information on how to address parents' questions and concerns about HPV vaccination [9–11]. For this reason, supporting providers to communicate with parents about HPV vaccine is critical to improving coverage nationally.

Numerous public health and medical organizations, such as the Centers for Disease Control and Prevention (CDC), the American Cancer Society (ACS), and the American Academy of Pediatricians (AAP), have developed educational materials to aid providers by offering them messages to recommend HPV vaccine and answer parents' questions. The CDC, for example, has a dedicated website for providers on HPV vaccine resources displaying well-tested messages (e.g., a tip sheet for talking with parents). Various other online resources containing HPV vaccine messages are publicly available. Despite the availability of resources, many providers do not know where to go for messages and how to use them in conversations with parents [12]. In addition, little is known about

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the content of these messages, including their length, readability, and type of information covered. We sought to characterize messages through a content analysis of HPV vaccination messages available online to inform future communication training efforts.

2. Materials and methods

2.1. Identification of messages

We defined HPV vaccination messages as language that could inform what a provider might say to raise the topic of vaccination, address a parent's question or concern, or motivate vaccination. Messages could consist of one or more sentences or phrases. Given the many places HPV vaccination messages may appear, we searched a variety of online resources covering HPV vaccine-related educational materials, media campaigns, and continuing medical education (CME). In October and November 2016, we searched Google using these terms: (human papillomavirus OR HPV) AND (vaccine OR vaccination OR immunization) AND (message or communication). We examined the first 10 websites retrieved for each combination of terms, a common method employed in HPV information online searches [13]. We also used these terms to search for research articles in PubMed. We also conducted a targeted search of existing online clearinghouses of HPV vaccination resources: National Cancer Institute's Research Tested Intervention Programs, National HPV Vaccination Roundtable, AAP's HPV Resources, PATH Vaccine Resource Library, American Sexual Health Association, Cervical Cancer-Free Coalition, and CDC's HPV resources for providers. We excluded online resources that were listservs, book previews, directories devoted solely to listing other websites, non-English websites, websites focused exclusively on non-HPV vaccines, and broken links that led to no active websites. We included messages that (1) were in English, (2) were specific to HPV vaccination, and (3) could help providers communicate with parents. We excluded messages focused solely on cervical cancer, screening, Pap smear, or vaccine completion.

2.2. Content analysis

Pairs of reviewers (WC, TM, MR, JY) independently searched online resources and coded messages using a codebook and a standardized coding form. We recorded the source where each message appeared: government websites (e.g., CDC), medical or professional association websites (e.g., AAP), Medscape, peer-reviewed articles, educational clearinghouses (e.g., National HPV Vaccination Roundtable), and others. We also assessed the word count of messages and calculated their readability score using an online readability test tool (www.webpagefx.com/tools/readable/). One measure of quality was message length, a proxy for usability by providers. Shorter messages facilitate recall and use by providers. The designation of a "short message" being 25-word or fewer follows the approach of Malo and colleagues [14]. Another measure of message quality was readability, a proxy for understandability of the text to patients. Longer sentences and words can be harder to read and understand [15]. To calculate the reading grade level of the message, we averaged scores generated by five widely used readability indicators: Flesch-Kincaid Grade Level and Reading Ease, Gunning Fog Score, Coleman Liau Index, Automated Readability Index, and the SMOG Index. Higher grade level indicated lower ease of reading (lower readability). We coded readability levels as very easy to read (grade 6 or lower), moderately easy to read (grades 7–8), and not easy to read (grade 9 or higher) [15]. Our coding scheme is consistent with recommendations that readability of written health information should not be higher than grade level sixth to eight [15].

We coded the messages for the presence (yes/no) of 44 topics organized in six major thematic areas: (1) communication quality, (2) HPV vaccination communication steps, (3) addressing common parent questions or concerns, (4) HPV topics, (5) HPV vaccination topics, and (6) narrative style. In addition to quantitative quality indicators (i.e., message length and readability), we assessed the quality of messages using a set of codes presented by Gilkey et al. [8]: strength of endorsement (saying the vaccine is important), timeliness (vaccination by ages 11–12), consistency (recommending it routinely), and urgency (same-day vaccination). We also coded messages for mentioning that HPV vaccine prevents cancer, saying that HPV vaccine should be given with other adolescent vaccines, and using presumptive announcements (saying that the child is due for vaccines and they will be given at the end of the visit) [16].

With regard to HPV vaccination steps, we followed the work of Brewer *et al.* [16] to code for opening statements (e.g., presumptive announcements, participatory conversations to engage parents in discussions), messages to address parent questions or concerns, motivational statements, and recommendations. We coded for seven common questions or concerns parents report about HPV vaccine [17]: diseases prevented by HPV vaccine, the age to start HPV vaccination, vaccination for boys, guideline recommendations for HPV vaccine, HPV vaccine safety and side effects, HPV vaccination for children who are not sexually active, and school requirements for HPV vaccination. We also adapted a set of codes developed by Kornides and colleagues [18] for characterizing messages with regard to HPV infection topics (e.g., epidemiology) and HPV vaccination (e.g., guidelines, administration). We coded for narrative style; whether the messages included stories (e.g., experience vaccinating own kids) and statistics (e.g., number of people with HPV infection, number of people with HPV-attributable disease). Messages could be categorized using multiple codes because they were not mutually exclusive. We resolved discrepancies in coding through review with the entire research team.

3. Results

3.1. Message source

Our search identified 267 unique messages about HPV vaccination. The most common source of the messages was government websites (34%). Other sources were medical or professional association websites (27%), Medscape (27%), peer-reviewed research articles (18%), and educational clearinghouses (15%).

3.2. Message quality

Messages were generally quite long (mean = 44 words, standard deviation [SD] = 33) and varied substantially in length (range: 5–227 words). Only 32% met our criterion for being short messages: having 25 or fewer words (Table 1). Messages also varied in readability (mean grade level = 10, SD = 3), and the majority scored grade 9 or higher (62%). Only 12% had a readability score of grade 6 or lower (easiest to read). In terms of other quality indicators, 26% of messages addressed cancer prevention and 13% urgency. Six percent of messages used a presumptive approach to raise the topic of and recommend HPV vaccination. Fewer messages addressed recommendation timeliness (5%) or consistency (1%).

3.3. Message content

The majority of messages (62%) had information providers could use to address parents' questions and concerns (Table 2). Twenty-nine percent of messages were motivational statements,

Table 1
Quality of HPV vaccination messages (n = 267).

	No. of messages	%
Length		
≤25 words	85	32
26–49 words	95	35
≥50 words	87	33
Reading grade level (readability)		
≤ Grade 6 (very easy to read)	33	12
Grade 7–8 (moderately easy to read)	69	26
≥ Grade 9 (not easy to read)	165	62
Other quality indicators		
Cancer prevention	70	26
Urgency (same-day vaccination)	35	13
Bundled (HPV vaccine with other vaccines)	30	11
Presumptive style (assume ready to vaccinate)	17	6
Endorsement (vaccine is important, not optional)	16	6
Timeliness (vaccination by ages 11–12)	14	5
Consistency (recommend to all adolescents)	3	1

Percentages for *Other quality indicators* may not sum up to 100% because messages could address more than one of the indicators.

Table 2
Content of HPV vaccination messages (n = 267).

	No. of messages	%
Communication step		
Opening statement	29	11
Address parent concerns or questions	165	62
Motivational statement	77	29
Recommendation	19	7
Common parent concerns or questions[1]		
Diseases prevented by HPV vaccine	49	18
Safety & side effects (vaccine is well tested and very safe; side effects are minor)	42	16
Sex (vaccination for children not sexually active)	30	11
Child is too young (vaccine works best at ages 11–12 years)	22	8
Vaccinating boys (HPV vaccine has benefits for males)	13	5
Guideline recommendations for vaccination	8	3
Not a school requirement	1	<1
Other HPV topics		
HPV causes cancer	30	11
HPV is very common	16	6
HPV infection is asymptomatic	10	4
HPV causes genital warts or other diseases	8	3
Description of HPV-attributable cancer burden	7	3
Partner can expose virgin to HPV	8	3
Exposure can occur without sex	6	2
Infection most often occurs in early ages	2	<1
There is no treatment or cure for HPV	2	<1
Other HPV vaccination topics		
Scientific evidence supports vaccination	31	12
Vaccine is effective	25	9
Safe	23	9
Administration or side effects are as other vaccines	21	8
Common or minor side effects	15	6
Antibody response is better at early ages	13	5
No serious side effects	14	5
Ongoing monitoring	10	4
HPV vaccine is recommended with no mention of guidelines	9	3
Organizations endorse HPV vaccine	9	3
No waning immunity	5	2
HPV vaccine dose schedule	3	1
Protect future partner	4	1
Safety testing before approving the vaccine	3	1

Percentages may not sum up to 100% because messages could address multiple topics. [1]Topics assessed only for the 165 messages that addressed parent questions or concerns.

11% were opening statements, and 7% were recommendations. Regarding messages to address parent questions or concerns, messages most commonly included information related to diseases prevented by HPV vaccine (18%) and vaccine safety and side effects (16%). Messages least commonly included information about vaccinating boys (5%), guideline recommendations (3%), and school requirements (<1%).

Regarding HPV information, the most frequently included topic was HPV causes cancer (11%), followed by HPV is common (6%) and HPV is asymptomatic (4%). Few messages mentioned that there is no treatment or cure for HPV (<1%) or that infection most often occurs in early ages (<1%). As for messages on HPV vaccination, the most commonly included topics were: scientific evidence supports vaccination (12%), vaccine safety (9%), and vaccine effectiveness (9%). The least frequently included topics were safety testing before the vaccine was approved for the U.S. market (1%) and dose schedule (1%). In terms of narrative style, 9% of messages used statistics or numbers and 8% mentioned providers' personal experiences with vaccinating their own kids or that they would vaccinate their kids when they become age eligible. Few messages (4%) mentioned stories that can elicit anticipated regret among parents.

4. Discussion

Little is known about messages available for providers to use when communicating with parents about HPV vaccination. Our content analysis of HPV vaccination messages identified hundreds of messages in English that varied markedly in quality and content. One the one hand, few messages had the quality markers of being both brief and understandable to individuals with lower levels of education. On the other hand, many messages focused on communicating the vaccine's cancer prevention benefits and had information to address specific parent questions and concerns about HPV vaccination.

With respect to quality, over two-thirds of messages were fairly long (over 25 words), which may make them challenging for providers to remember and use during vaccine discussions with families. Messages need not be so lengthy to communicate effectively with parents about HPV vaccine. In a recent study with a national sample of parents of adolescents ages 11–17 [14], parents read 9 long messages developed by the CDC (mean = 52 words) and 6 brief messages developed by the study team (mean = 17 words). At least half of parents reported that 3 brief and 8 longer messages would persuade them to agree to HPV vaccination [14]. Thus, certain brief messages can be as effective as longer ones, even though many short messages may be less effective. However, some parents may prefer longer messages depending the complexity of the information solicited and their personal characteristics (e.g., educational attainment) [19]. When communicating with parents, and following communication best practices, providers should recommend HPV vaccination using a brief presumptive announcement, which usually leads to vaccination [16]. For parents who express questions or concerns about HPV vaccine, the provider should elicit the main issue and address it. Short messages have the benefit of being memorable for providers and may serve as a starting point on which to elaborate depending the needs of parents.

Messages also varied in readability. Few messages were accessible (i.e., had low readability) to facilitate parents' comprehension. This finding concurs with several studies showing that online HPV vaccine information is often well above the reading level of the general population. One study, for example, examined the readability of HPV vaccine information posted on Canadian provincial health department websites [20]. The authors found that content on 6 of the 7 provinces' websites had information that would require postsecondary education to understand. Others have reported that the majority of pro-HPV-vaccination messages are considerably harder to read than anti-vaccine messages [21]. Considering that a provider's recommendation is one of the

strongest predictors of HPV vaccination in the US [7], it is critical that providers deliver messages that are understandable to the general public. Developing messages suitable for people with low literacy is important for communicating about HPV vaccination as over one-third of U.S. adults has inadequate health literacy [22].

With respect to themes and topics, many messages focused on communicating the vaccine's cancer prevention benefits. This finding aligns with communication best practices endorsed by the CDC [23], the ACS [24], and other professional organizations [25] that are urging providers to talk with parents about HPV vaccine as a cancer prevention opportunity. Recent content assessments of web-based CME activities [18] and public awareness campaigns [26] related to HPV vaccination also reported that these activities emphasized cancer prevention. Such message framing is key for counseling parents as getting a cancer prevention message is the most compelling reason to get their children vaccinated [19,27]. We also found that a limited number of messages included content aligned with high-quality HPV vaccine communication, including giving a strong endorsement, recommending HPV vaccine routinely for all adolescents, and recommending same-day vaccination for ages 11–12. Given that high-quality HPV vaccine communication is strongly associated with vaccination behavior [8,28], providers may increase HPV vaccine acceptance by incorporating quality communication elements in their recommendations.

Messages containing information to address parent questions and concerns, especially about diseases prevented by HPV vaccination and safety and side effects, were common. Interestingly, a recent national survey of 1196 U.S. parents of children 9–17, who have not completed the HPV vaccine series, reported that most parents put a priority on learning about these same two subjects [19]. Some of the messages we identified may help providers to address specific questions or concerns after recommending HPV vaccine and assessing parents' reasons for not vaccinating their children. However, it is important to note that asking parents which question or concern they have is different from determining which message would motivate vaccine uptake. Krakow et al. [29], for example, reported that parents who had discussed HPV vaccination with their children's providers still had a safety concern or lacked knowledge about the vaccine as a reason for not getting the vaccine. Although the importance of a provider's recommendation is well established [7,8], more work is needed to establish which messages effectively address questions or concerns that may come afterward. Ongoing research, including our own [19], is testing a set of brief messages providers could employ in their discussions with parents and developing general principles for increasing message effectiveness. Once it is clear which messages work better than others, they can be incorporated into existing professional education materials distributed by CDC and provider organizations as well as through provider communication trainings (e.g., The Announcement Approach on hpviq.org).

Strengths of our study include searching for messages in a range of educational resources, using objective quality metrics, and conducting a novel analysis of message content. A limitation was our focus on online content; printed or televised educational materials available in clinics may differ in content. With the exception of the messages developed by the CDC, we do not know about the formative work conducted to develop messages. Thus, it remains to be established which messages parents would find to be most informative and persuasive. We also acknowledge that readability is an imperfect measure given the ultimate goal of providers using the messages in discussions with parents.

4.1. Conclusions

Through a content analysis of HPV vaccination messages available online, we identified messages that providers can use to communicate with families about vaccination, from raising the topic of HPV vaccination, to responding to common parental questions and concerns, and to motivating vaccination. Messages were markedly varied but the majority were generally long and would not be easy for most people to read. It was encouraging to find that, following communication best practices, a good proportion of messages focused on cancer prevention. Important next steps include evaluating which messages lead to increased HPV vaccine uptake and which approaches best disseminate effective messages to providers (e.g., communication training).

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Conflict of interest

Dr. Brewer has received commercial research grants from Merck and Pfizer and served as a paid advisory board member for Merck. He is chair of the National HPV Vaccination Roundtable which is funded by CDC and hosted by the American Cancer Society. The other authors have no financial disclosures or potential conflicts of interest to report.

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