

# Evaluation of Pediatric Human Papillomavirus Vaccination Provider Counseling Written Materials: A Health Literacy Perspective

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** Despite recommendations supporting human papillomavirus (HPV) vaccination, pediatric vaccination rates remain suboptimal in the United States; lack of tools to support provider counseling is one barrier. We sought to evaluate HPV-related counseling materials for readability, suitability, and content, and assess parent perceptions of materials, using a health literacy perspective.

**METHODS:** A systematic search was conducted for written materials developed for HPV vaccination counseling by examining state Department of Health Web sites and associated links to local and national organizations. Materials were assessed for the following: 1) readability (Flesch Reading Ease, Flesch-Kincaid, Gunning Fog, Simple Measure of Gobbledygook, Fry), 2) suitability (understandability and actionability) (Suitability Assessment of Materials; Patient Education Materials Assessment Tool for Printable Materials), and 3) coverage of 8 key content areas (recommended by Centers for Disease Control and Prevention). Semistructured interviews were conducted with English-speaking parents or caregivers of children 9 to 17 years of age from 3 pediatric clinics (New York, Ohio, Illinois)

servicing predominantly low-income families to assess perceptions and usefulness of 4 handouts selected for review.

**RESULTS:** Thirty-eight documents were assessed. Mean  $\pm$  standard deviation (SD) reading grade level was  $9.4 \pm 2$ ; 10.5% ( $n = 4$ ) had a reading level of 6th grade or below; 68.4% ( $n = 26$ ) were considered not suitable. Mean understandability was 41.7% and mean actionability was 20.7%. Only 5.3% ( $n = 2$ ) addressed all 8 content areas mean  $\pm$  SD (number of areas =  $6.7 \pm 1.2$ ). Brochure comprehensiveness and inclusion of a personal story were cited as factors that would be helpful in influencing parents to vaccinate against HPV.

**CONCLUSIONS:** Few written materials for HPV vaccination counseling were optimal from a health literacy best practices perspective. Content comprehensiveness was important for informed decision making.

**KEYWORDS:** health communication; health literacy; human papillomavirus; vaccination

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## WHAT'S NEW

Few written materials for HPV vaccination counseling in the United States are optimal from a health literacy best practices perspective, and few contain all recommended key content for informed decision making, representing a barrier for effective provider–patient/parent communication on this topic.

important role that HPV vaccination can play in preventing HPV-related morbidity, the American Academy of Pediatrics (AAP) and the Advisory Committee on Immunization Practices strongly recommend HPV vaccination during preadolescence.<sup>3</sup> Even though these vaccines are considered safe and effective, implementation of HPV vaccine recommendations remains suboptimal. US data show that about 60% of adolescent girls and 50% of adolescent boys received 1 or more doses of the HPV vaccine<sup>4</sup>; only about one third of girls received all 3 recommended doses,<sup>5</sup> and the percentage of boys receiving the full series was even lower.<sup>5</sup> These rates are significantly lower than the Healthy People 2020 goal of having 80% of 13- to 15-year-old girls fully vaccinated against HPV.<sup>6</sup>

AN ESTIMATED 14 MILLION people are newly infected with human papillomavirus (HPV) every year in the United States. Approximately 360,000 develop genital warts and 27,000 new HPV-associated cancers.<sup>1,2</sup> Recognizing the

Approximately 1 in 3 US parents has limited health literacy, which can contribute to difficulty understanding and acting on HPV vaccination information.<sup>7</sup> Low health literacy has been linked to poor access to care, decreased use of preventive services, worse disease management, and poorer health outcomes.<sup>8</sup> Low health literacy affects provider–patient/parent communication<sup>9,10</sup> and impairs shared decision making.<sup>10,11</sup> Research also shows that available health education materials are often written at a grade level that is too high for the general population.<sup>12</sup>

Most parents report not having enough information about HPV vaccination and difficulty understanding the importance of the vaccine.<sup>11,13,14</sup> A health literacy–informed approach to improving communication about the benefits and risks of the HPV vaccine is needed, especially for minority families with low socioeconomic backgrounds, who have disproportionately higher rates of HPV-related morbidity.<sup>15</sup> A body of literature exists regarding common parent/patient concerns about HPV vaccines<sup>16</sup>; print materials can support a standardized approach to vaccination counseling and help ensure that barriers are addressed.

To date, no studies have systematically assessed the readability, suitability, and comprehensiveness of available provider counseling materials for HPV vaccination. To fill this gap, the Academic Pediatric Association (APA) Health Literacy Special Interest Group used a health literacy perspective<sup>17–20</sup> to design and conduct an environmental scan to identify written materials that incorporate health literacy best practice strategies and could be recommended for use as part of provider–parent communication. Additionally, parent feedback was solicited for selected materials to assess the degree to which materials supported parent decision making.

## METHODS

We conducted a 2-phase study to examine written materials used to support provider counseling regarding HPV vaccination. Phase 1 involved an environmental scan to identify materials used for HPV counseling in the United States, and to evaluate materials for reading grade level, suitability (eg, understandability, actionability), and content. Phase 2 involved one-on-one semistructured interviews with parents or caregivers to assess the acceptability or adequacy of selected HPV written materials identified in the scan. Parents were enrolled from 3 primary care clinics (Montefiore Children’s Hospital, Bronx, NY; Nationwide Children’s Hospital, Columbus, Ohio; and Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, Ill), which serve predominantly low-income, minority families. Inclusion criteria included having a child between the ages of 9 and 17 and having the ability to speak and read English. Institutional review board approval was obtained from each site.

### IDENTIFICATION OF THE SAMPLE OF HPV WRITTEN MATERIALS

A systematic online search was conducted of Department of Health websites across each of the 50 states to identify local

and national HPV vaccine counseling tools. Search terms used within the websites’ internal search features included: [human papillomavirus, HPV] and [vaccine, vaccination, immunization]. These websites were further searched using hyperlinks that included the above terms in addition to the following: [adolescent health, school health] and [sexually transmitted diseases, STD]. Associated links were searched for supplemental, endorsed material, including materials from local and national organizations such as the US Centers for Disease Control and Prevention (CDC), the AAP, and the Immunization Action Coalition (IAC). This environmental scan was conducted between April and August 2015.

Counseling tools included in the final sample were based on the following inclusion criteria: 1) written material endorsed by a state Department of Health or associated links, 2) written in English, 3) focused on HPV vaccine counseling for parents, 4) targeted vaccination of preadolescents and adolescents, and 5) published in 2010 or later.

### ASSESSMENT OF HPV WRITTEN MATERIALS

Each identified written material underwent an in-depth assessment, including ascertainment of readability (reading grade level), suitability (understandability, actionability), and content analysis to determine if key content areas were addressed.

#### READABILITY

Five readability formulas were used: Flesch Reading Ease (FRE), Flesch-Kincaid (F-K), Gunning Fog (FOG), Simple Measure of Gobbledygook (SMOG), and Fry.<sup>21–26</sup> A composite reading grade level score was calculated for each document, using the average reading level across the 5 formulas; this was done to account for strengths and weaknesses of each formula as well as to enhance the reliability of our estimate. Because it is recommended that patient education materials be written at a 6th grade level or lower,<sup>27–30</sup> each document was also categorized on the basis of this criterion.

Readability Plus software (Micro Power & Light Co, Dallas, Tex) was used to generate grade levels using each of the 5 readability formulas. Before using the software, each document was converted to a text file and prepared systematically; section headers, labels, and table headings that did not form sentences were removed, as is standard practice for readability assessments.<sup>18,31</sup> The text that remained included only text that the parent was expected to read and comprehend to act on key information; organization, slogan, funding, and references were therefore removed.

#### SUITABILITY

Suitability was assessed using 2 approaches: the Suitability Assessment of Materials (SAM)<sup>27</sup> and the Agency for Healthcare Research and Quality Patient Education Materials Assessment Tool for Printable Materials (PEMAT-P).<sup>32</sup>

The SAM is a common tool that analyzes documents in the following 6 domains: content, literacy demand, graphics, layout and typography, cultural appropriateness, and learning simulation.<sup>18,33</sup> For this study, 5 SAM domains were assessed; one domain, cultural appropriateness, was not assessed

because the HPV documents are targeted for general audiences rather than a specific population. A scoring system of 2 = superior, 1 = adequate, 0 = not suitable was used to grade individual factors within each domain. Categorical and total SAM scores were calculated by dividing the sum of scores for each domain by the total number of applicable items. On the basis of the SAM score, handouts were divided into 3 categories: “superior” ( $\geq 70\%$ ), “adequate” ( $\geq 40\text{--}<70\%$ ) or “not suitable” ( $<40\%$ ).<sup>27,34</sup> Handouts were further dichotomized into “suitable” (“superior” and “adequate”) and “not suitable” categories.

The PEMAT-P consisted of 17 understandability and 7 actionability items. A rating system of 0 = disagree, 1 = agree was used to assess each item. A score of 1 was used when a characteristic was present at least 80% of the time. Two composite scores were calculated for each handout, one for understandability and one for actionability. Each score was calculated by dividing the sum for each item by the total possible points (excluding items scored as not applicable).

#### KEY CONTENT AREAS

Each pamphlet was assessed for 8 key content areas, or elements, on the basis of criteria from the CDC and the President’s Cancer Panel.<sup>16</sup> Key content areas were: 1) general disease information, 2) positioning of vaccine as cancer prevention, 3) emphasis of age 11–12 recommendation, 4) emphasis of importance of vaccination before sexual debut, 5) discussion of safety and efficacy, 6) reminder of 3-shot series (consistent with guidelines through September 2016), 7) addressing of system-level barriers (eg, cost), and 8) emphasis on male vaccination and benefit for boys and men. Each content area was scored as 1 = present or 0 = absent. For each handout, the percentage of the total content areas covered was also calculated.

#### DOCUMENT ASSESSMENT PROCESS

Readability was assessed using software, as described in the [Methods section](#). For suitability, 2 trained raters independently assessed each of the 38 documents after a 2-hour training session and calibration. Interrater reliability was high for scoring each document as “suitable” or “not suitable” using the SAM ( $\kappa = 0.89$ ); overall agreement was also high for the PEMAT-P for understandability ( $\kappa = 0.73$ ) and actionability ( $\kappa = 0.90$ ) items. A third rater served as a tie breaker in cases of disagreement. Similarly, for the content analysis, 2 reviewers independently rated each handout. Interrater reliability was high ( $\kappa = 0.84$ ) based on agreement or disagreement for scoring of each key content area. A third rater reviewed any instances of disagreement, with final results reflecting agreement of 2 of the 3 raters.

#### DOCUMENTS SELECTED TO PRESENT TO PARENTS

Findings from the comprehensive assessment and content analysis were presented to a team that included pediatricians and health literacy experts (consisting of

**Table 1.** Readability Characteristics of 38 Human Papillomavirus Vaccination Handouts

Characteristic	Value
Individual Readability Formulas	
Flesch reading ease score*	
Mean $\pm$ SD	61.7 $\pm$ 8.6
Range	46–89
Flesch reading ease category, n (%)	
5th grade	0
6th grade	2 (5.3)
7th grade	3 (7.9)
8th–9th grade	18 (47.4)
10th–12th grade	13 (34.2)
Higher than 12th grade	2 (5.3)
Flesch-Kincaid grade level	
Mean $\pm$ SD	8.3 $\pm$ 1.7
Range	2.7–11.1
FOG grade level	
Mean $\pm$ SD	10.2 $\pm$ 1.9
Range	3.7–12.9
SMOG grade level	
Mean $\pm$ SD	10.4 $\pm$ 1.4
Range	5.7–12.7
Fry grade level	
Mean $\pm$ SD	9.7 $\pm$ 2.6
Range	2.0–15.0
Composite Readability†	
Average grade level	
Mean $\pm$ SD	9.4 $\pm$ 2.0
Range	4.0–13.1
Overall grade category, n (%)	
4th grade	1 (2.6)
5th grade	1 (2.6)
6th grade	2 (5.3)
7th grade	5 (13.2)
8th grade	4 (10.5)
9th grade	10 (26.3)
10th grade	6 (15.8)
11th grade	7 (18.4)
12th grade	1 (2.6)
13th grade	1 (2.6)
Grade level 6th grade or below, n (%)‡	4 (10.5)

SD indicates standard deviation; FOG, Gunning Fog; and SMOG, Simple Measure of Gobbledygook.

\*Flesch reading scores were categorized into grade categories as follows: college graduate (0–29), college (30–49), 10th–12th grade (50–59), 8th–9th grade (60–69), 7th grade (70–79), 6th grade (80–89), 5th grade (90–100).

†Averaged across the 5 readability formulas.

‡Patient education materials for the general population should be written at a 6th grade level or below<sup>17,23</sup>; current state level standards for patient materials exist (eg, Medicaid forms, in which the majority of states recommend a 6th grade level or below for health-related information<sup>33,34</sup>).

the 11 authors) for deliberation, with a total of 4 documents ultimately selected for parent review. Three of the documents were chosen because they scored well in at least one of the domains (readability, suitability, or comprehensiveness); no single document scored well in all areas. A fourth document was selected because it took a unique approach by sharing an anecdote from a parent’s perspective: it told the story of father whose young adult daughter had died from an HPV-related cancer, and the research team wanted to assess whether

**Table 2.** Suitability Assessment of 38 Human Papillomavirus Vaccination Handouts: Suitability Assessment of Materials (SAM) Criteria

Recommended Criteria	Not Suitable	Adequate	Superior
	n (%)	n (%)	n (%)
Content			
Purpose explicitly stated	14 (36.8)	18 (47.4)	6 (15.8)
Content aimed at desirable behaviors and actions	28 (73.7)	8 (21.1)	2 (5.3)
Scope limited to essential information	9 (23.7)	22 (57.9)	7 (18.4)
Summary	36 (94.7)	2 (5.3)	0
Content—composite	32 (84.2)	5 (13.2)	1 (2.6)
Literacy demand			
Reading level	25 (65.8)	11 (28.9)	2 (5.3)
Writing style conversational, uses active voice, simple sentences	28 (73.7)	9 (23.7)	1 (2.6)
Vocabulary uses common words	21 (55.3)	16 (42.1)	1 (2.6)
Context given first before new information	0	13 (34.2)	25 (65.8)
Learning aided by “road signs” or advanced organizers	1 (2.6)	10 (26.3)	27 (71.1)
Literacy demand—composite	8 (21.1)	25 (65.8)	5 (13.2)
Graphics			
Cover*	2 (14.3)	12 (85.7)	0
Graphics simple, uses line drawings or sketches; likely to be familiar to reader†	2 (8.3)	17 (70.8)	5 (20.8)
Illustrations relevant; key messages presented visually in an effective manner	31 (81.6)	5 (13.2)	2 (5.3)
Purpose and use of lists, tables, graphics explained‡	1 (20.0)	4 (80.0)	0
Explanatory captions used for graphics†	21 (87.5)	1 (4.2)	2 (8.3)
Graphics—composite	32 (84.2)	5 (13.2)	1 (2.6)
Layout and typography			
Layout factors optimized§	13 (34.2)	23 (60.5)	2 (5.3)
Typography optimized	3 (7.9)	31 (81.6)	4 (10.5)
Subheadings or “chunking” used to group ideas	7 (18.4)	20 (52.6)	11 (28.9)
Layout and typography—composite	14 (36.8)	21 (55.3)	3 (7.9)
Learning stimulation and motivation			
Interactiveness promoted by presenting problems or questions for reader response	6 (15.8)	31 (81.6)	1 (2.6)
Behaviors are modeled and specific	26 (68.4)	10 (26.3)	2 (5.3)
Motivation and self-efficacy encouraged by subdividing topics into small, learnable parts	5 (13.2)	28 (73.7)	5 (13.2)
Learning stimulation and motivation—composite	27 (71.1)	10 (26.3)	1 (2.6)
Overall suitability category¶	26 (68.4)	11 (28.9)	1 (2.6)

Suitability Assessment of Materials Criteria is from Doak et al.<sup>27</sup>

\*Not applicable for 24.

†Not applicable for 14.

‡Not applicable for 33.

§Optimized layout factors include the following: illustrations adjacent to related text; layout and sequence of information consistent, allowing for reader to predict flow of information; visual cuing devices (eg, shading, boxes, arrows, bold, italic) used to direct attention to key information; adequate white space; use of color supports and does not distract from message; line length 30 to 50 characters and spaces; high contrast between type and paper.

||Optimized typography features include the following: serif or sans-serif font; 12-point font size; typographic cues (bold, size, color) used to emphasize key points; no all caps for long headers or running text.

¶Based on combination of all criteria; mean suitability score = 32.2%.

personal stories about cervical cancer would be useful for parents for decision making.

### SEMISTRUCTURED QUALITATIVE PARENT INTERVIEWS

A semistructured qualitative interview was conducted with parents to assess their perceptions about the 4 documents identified in phase 1. Convenience sampling was used to identify English-speaking parents at each site using posted flyers on the walls and clinic-based recruitment. For clinic-based recruitment, parents were identified by on-site research staff at the time of check-in or in the waiting room and were handed a flyer. Interested parents provided written informed consent.

### MEASURES

In-person semistructured qualitative interviews were conducted on the day of enrollment. Before responding

to interview questions regarding the 4 documents, parents answered demographic and HPV-related questions administered by trained research staff. Upon completion of the survey, participants were given a \$25 gift card.

### HPV-RELATED EXPERIENCE

HPV-related experience was assessed with the following questions: “Before taking this survey, had you ever heard of HPV (human papillomavirus)?” and “Before taking this survey, had you ever heard of HPV vaccine?” Answer choices were “yes,” “no,” and “not sure.” Participants were asked about their attitude toward HPV vaccine with the question, “What is your general attitude toward HPV vaccine?” Answer choices were “positive,” “neutral,” and “negative.” They were also asked, “Has your child or any of your children been vaccinated for HPV?” Answer choices were “yes” or “no.”

**Table 3.** Suitability Assessment of 38 Human Papillomavirus Vaccination Handouts: Use of the Patient Education Materials Assessment Tool for Printable Materials (PEMAT-P)

Assessment Domain and Criteria	Disagree	Agree
	n (%)	n (%)
Understandability*		
Content		
Purpose completely evident	32 (84.2)	6 (15.8)
No information that distracts from purpose	28 (73.7)	10 (26.3)
Word choice and style		
Common, everyday language	35 (92.1)	3 (7.9)
Medical terms used only to familiarize audience with terms, and when used, defined	36 (94.7)	2 (5.3)
Active voice	36 (94.7)	2 (5.3)
Use of numbers		
Numbers clear and easy to understand	30 (78.9)	8 (21.1)
Does not expect user to do calculations	0	38 (100)
Organization		
“Chunks” information into short sections	1 (2.6)	37 (97.4)
Sections with informative headers	5 (13.2)	33 (86.8)
Logical sequence	5 (13.2)	33 (86.8)
Summary provided	36 (94.7)	2 (5.3)
Layout and design		
Visual cues (eg, arrows, boxes, bullets, bold, larger font, highlighting) to draw attention to key points	6 (15.8)	32 (84.2)
Use of visual aids		
Used whenever possible	37 (97.4)	1 (2.6)
Reinforce rather than distract†	17 (70.8)	7 (29.2)
Clear titles and captions‡	23 (95.8)	1 (4.2)
Illustrations and photographs are clear and uncluttered‡	3 (12.5)	21 (87.5)
Simple tables with short, clear row and column headings‡	1 (25.0)	3 (75.0)
Actionability§		
Clearly identifies at least one action user can take	11 (28.9)	27 (71.1)
Addresses user directly in describing actions	26 (68.4)	12 (31.6)
Actions broken down into manageable, explicit steps	30 (78.9)	8 (21.1)
Tangible tool (eg, menu planner, checklist) provided whenever it could help	35 (92.1)	3 (7.9)
Simple instructions and examples of calculations	...	...
Explains how to use charts, graphs, tables, diagrams to take action¶	3 (60.0)	2 (40.0)
Uses visual aids whenever it would make it easier to act on instructions	35 (92.1)	3 (7.9)

PEMAT-P indicates Patient Education Materials Assessment Tool for Printable Materials (developed by the Agency for Healthcare Research and Quality).

\*Mean understandability score = 41.7%.

†Not applicable for 14.

‡Not applicable for 34.

§Mean actionability score = 20.7%.

||Not applicable for 38; no materials required user to perform calculations.

¶Not applicable for 33.

### PERCEPTION OF COUNSELING TOOLS

Trained staff presented parents with the first 3 documents selected from the environmental scan in random order. Parents were asked, “Would this handout convince you to get an HPV vaccine for your child?” Answer choices were “yes,” “no,” and “not sure/don’t know.” Parents were also asked a series of open-ended questions to assess adequacy of content (“If this were the only handout on the HPV vaccine your child’s doctor gave you, what questions would you have after looking at it?” and “Some parents are worried about giving the HPV vaccine to their child. What do you think we can add to this handout to make it easier for parents to decide whether or not to give the HPV vaccine to their child?”). Parents were also asked about the adequacy of specific topic areas: “Pretend you are a parent who is about to decide whether or not to give the HPV vaccine. Does this handout give you enough information about: 1) How

safe the vaccine is? 2) Why a child should get the HPV vaccine? 3) The types of cancers it can prevent? 4) How well the vaccine works? 5) The age a child should get the HPV vaccine? 6) Vaccine working for both boys and girls? and 7) The number of shots your child will receive?” Answer choices were “yes,” “no,” and “not sure.” For the fourth document, which included the personal story, parents were asked, “This handout includes a story about what happened to a child who did not get the HPV vaccine. How helpful do you think it would be to have a story included in a handout about the HPV vaccine?”

### ANALYSES

Descriptive statistics were used to describe document readability, suitability, and content comprehensiveness, as well as to characterize study population demographics, experience with HPV and/or HPV vaccination, and perceptions regarding selected informational brochures.

**Table 4.** Content Analysis (n = 38)

Barrier Addressed	Description	Not Included	Included
		n (%)	n (%)
Parents need more information	General disease information	2 (5.3)	36 (94.7)
	Positioning of vaccine as cancer prevention	3 (7.9)	35 (92.1)
Not sexually active or children don't need vaccine so young	Emphasis on age 11–12 recommendation	4 (10.5)	34 (89.5)
	Explanation of importance of vaccination before sexual debut	14 (36.8)	24 (63.2)
Safety and efficacy concerns	Discussion of safety and efficacy	14 (36.8)	24 (63.2)
Poor completion rates and 3-shot series	Reminder of 3-shot series	4 (10.5)	34 (89.5)
	Addressing of system-level barriers (eg, cost)	21 (55.3)	17 (44.7)
Lack of perceived benefit for boys	Emphasis of male vaccination and benefit for men	26 (68.4)	12 (31.6)

Based on US Centers for Disease Control and Prevention and President's Cancer Panel report.<sup>16</sup>

## RESULTS

### ASSESSMENT OF HPV WRITTEN MATERIALS

A total of 47 documents were identified in the environmental scan, of which 38 met the inclusion criteria. Nine documents were excluded for the following reasons: did not focus on the HPV vaccine (n = 6), not designed for parents (n = 1), not pediatric focused (n = 1), were dated before 2010 (n = 1).

#### READABILITY

The average reading grade level for documents was 9th grade (mean ± standard deviation = 9.4 ± 2.0 grade; range = 4th to 13th grade). Four documents (10.5%) had a 6th grade reading level or below, while 15 documents (39.5%) had a 10th grade or higher reading level (Table 1).

#### SUITABILITY

Mean SAM score was 32.2%. Twenty-six documents (68.4%) were categorized as “unsuitable,” 11 (28.9%) “adequate,” and 1 (2.6%) “superior” (Table 2). Mean PEMAT-P understandability score was 41.7%. Mean PEMAT-P actionability score was 20.7% (Table 3).

#### KEY CONTENT

Nearly all documents addressed disease information and positioned the vaccine as cancer prevention (Table 4). The average number of areas addressed was nearly 7 of 8 areas. Two documents (5.3%) addressed all key content areas (Table 5).

### DOCUMENTS SELECTED FOR PARENT REVIEW

The following were selected to be evaluated as part of parent interviews.

#### *BROCHURE 1: HPV VACCINE GARDASIL: WHAT YOU NEED TO KNOW (SOURCE: CDC)*

This was chosen because it was one of the better-scoring documents for comprehensiveness of content (covering 6 of 8 key areas) and for actionability (PEMAT-P) (although, like the majority of documents, it scored <60% for actionability). However, it scored average on understandability (~40%), was in the bottom half of documents for suitability (“not suitable” category [SAM]), and was written

at a 9th grade reading level (the CDC has retired the version of the document reviewed in this article. The following link is for the current, similar version being used: <https://www.cdc.gov/vaccines/hcp/vis/vis-statements/hpv.html>).

#### *BROCHURE 2: WHY YOUR DOCTOR SAYS YOU SHOULD GET ALL 3 HPV VACCINE SHOTS (SOURCE: APA)*

This document was selected because it met the criteria of being at a 6th grade reading level or below (4th grade), was the only document to receive a suitability designation of “superior” (SAM), and also received the highest score for both understandability and actionability (>90% of both; PEMAT-P). The document did not score highly for comprehensiveness (4 of 8 key areas) ([http://www.academicpeds.org/NIPA/assets/PDF/HPV\\_VaccineHandout\\_Appearance.pdf](http://www.academicpeds.org/NIPA/assets/PDF/HPV_VaccineHandout_Appearance.pdf)).

#### *BROCHURE 3: HPV IS A SERIOUS DISEASE...MAKE SURE YOUR CHILD IS PROTECTED (SOURCE: IAC)*

This handout was chosen because it was one of the better-scoring documents for suitability (just above the cut-point for the “acceptable” category) and understandability (>50%; one of the top 5). However, it scored at a 9th grade reading level, scored low on actionability (<30%), and did not score highly in terms of comprehensiveness (4 of 8 areas) (<http://www.immunize.org/catg.d/p4310.pdf>).

#### *BROCHURE 4: HOW IMPORTANT IS HPV VACCINE FOR PRETEENS AND TEENS? ASK KRISTEN'S DAD (SOURCE: CALIFORNIA DEPARTMENT OF PUBLIC HEALTH)*

This was chosen because of its unique inclusion of a patient story. It was one of the better-scoring documents for

**Table 5.** Number of Content Areas Addressed (n = 38)

No. of Content Areas Addressed	n (%)
1	0
2	0
3	1 (2.6)
4	7 (18.4)
5	6 (15.8)
6	15 (39.5)
7	7 (18.4)
8	2 (5.3)

Mean ± SD number of content areas addressed = 6.7 ± 1.2; range = 3–8.

**Table 6.** Demographic Characteristics of Parent Sample (n = 75)

Characteristic	Value
Age, y, mean $\pm$ SD	41.8 $\pm$ 8.3
Gender*	
Female	65 (87.8)
Male	9 (12.2)
Race/ethnicity*	
White, non-Hispanic	27 (36.5)
Hispanic	21 (28.4)
Black, non-Hispanic	18 (24.3)
Other	8 (10.8)
Marital status*	
Single	11 (14.9)
Married	35 (47.3)
Divorced/separated	15 (20.3)
Living with a partner	12 (16.2)
Other	1 (1.4)
Education*	
High school or less	20 (27.1)
Some college/associate's degree	24 (32.4)
College graduate and over	30 (40.5)
Have you ever...*	
Heard about HPV before?	69 (93.2)
Heard about the HPV vaccine before?	66 (89.2)
Child or children with prior HPV vaccination*	38 (51.5)

HPV indicates human papillomavirus.

\*Total sample size was 75; for these items it was 74 due to missing data.

suitability (just above the cutpoint for “acceptable” on SAM). It was also one of the better-scoring documents for understandability and actionability ( $\sim 50\%$  for both; in the top 10 using PEMAT-P). The document scored at a 7th grade reading level and was average in terms of its comprehensiveness of content (6 of 8 areas) (<http://eziz.org/assets/docs/IMM-1124.pdf>).

### STRUCTURED PARENT INTERVIEWS

Twenty-five parents of preteens and teens were recruited from each of 3 sites (total n = 75). Mean  $\pm$  standard deviation age was 41.8  $\pm$  8.3 years; 87.8% were female. Demographic characteristics for the total sample are shown in Table 6. Nearly 90% of parents had heard about the HPV vaccine before. Over half had children who had been given the HPV vaccine in the past. Close to two-thirds (63.5%) reported a positive general attitude toward the HPV vaccine (32.4% were neutral and 4.1% were negative).

### PERCEPTION OF HPV HANDOUTS

Of the 4 documents, the document that the most parents reported would convince them to vaccinate their child (76.7%) was brochure 1 (“HPV Vaccine Gardasil”) (12.2% no, 10.9% not sure/don’t know). This document was considered comprehensive in terms of information about the safety and need for the vaccine, types of cancers it prevents and how well it works, at which ages to give the vaccine, and the importance of getting the vaccine for both boys and girls.

Over half of parents (56.8%) indicated that brochure 2 (“Why Your Doctor Says...”) was a brochure that would convince them to get the vaccine for their child (25.3% no, 17.6% not sure/don’t know). Parents

commented about how colorful, simple, and clear the document was.

Over half of parents (52.7%) reported that brochure 3 (“HPV Is a Serious Disease...”) would convince them to make a positive decision regarding getting the HPV vaccine for their child (17.6 no, 21.6% not sure/don’t know).

After looking at brochure 4 (“How Important Is HPV Vaccine...”), 92.0% reported that reading a personal story by a parent was an effective strategy (“It makes it personal”; “Not abstract anymore”). Parents noted that imagining your own child going through something similar made the connection between cervical cancer and HPV vaccine seem more real and served as a prompt to act (“Very helpful! It was this brochure that made me feel comfortable about vaccinating my child; Made me really think as a parent—why haven’t my children been vaccinated yet?”).

## DISCUSSION

To our knowledge, this is the first study to comprehensively assess existing written materials for provider counseling regarding HPV vaccination in terms of readability, suitability, and comprehensiveness of content. Overall, we found that few available educational handouts on HPV vaccination are optimal from a health literacy best practices perspective, and few contain all recommended content. Comprehensiveness of content, as well as inclusion of a personal story, were identified by parents as 2 aspects of written materials that are especially helpful for decision making regarding whether to vaccinate their child for HPV. Overall, more than half said they would vaccinate their child on the basis of the information included in the documents they were presented with.

On average, assessed documents were written at the 9th grade level—too high for the average US adult to understand. Only 4 documents were written at the recommended 6th grade level or lower. These findings are similar to those of prior studies conducted with patient education materials in the United States.<sup>18,33</sup> Improving the readability of HPV vaccination counseling materials represents an important initial step toward enhancing the effectiveness of provider counseling around HPV vaccines.

Beyond addressing readability, a focus on optimizing the suitability of HPV vaccination handouts, including tackling understandability and actionability, is important. Nearly half of existing materials were categorized as not suitable, indicating that there were major flaws in the design of these documents. Areas in need of improvement included presentation of content, specifically focusing content on behaviors and actions over statement of facts, and inclusion of summary or key takeaway points to highlight main messages. The purpose of the document was often not completely clear; the recommendation to give HPV vaccination was often implied rather than explicit. Medical terms were often used but not defined, which increases cognitive burden.<sup>35</sup> Many materials did not use an active, conversational style, which is recognized to be helpful in engaging patients and families. Although images,

including photographs and illustrations, can help convey information in a more effective manner, few documents optimized the use of visual aids to help reinforce key concepts.

Notably, there were some domains in which documents scored well. Handouts were generally divided (or chunked) into short sections, allowing for easier information processing.<sup>27</sup> Visual cues like bold type, large font size, bullets, and boxes were utilized on many documents to draw attention to key points, although these strategies were often not fully used (eg, only one of these strategies used). In addition, there was generally no expectation that parents perform calculations. A strategy that was especially helpful in some handouts was provision of the exact wording of a script that could be used by providers in talking about HPV vaccination.

The majority of documents addressed most recommended key content areas, although few addressed all content areas. Documents that scored highest for suitability, including understandability and actionability, were not as comprehensive in covering content areas, and no single document that scored high in readability, suitability, and content was identified through our environmental scan. Because parents prefer brochures that convey comprehensive information (about the HPV virus and vaccine, cancer prevention, and safety and efficacy), as well as personal stories that make the situation feel real (both were reported to be important factors involved in decision making), a potential next step would be to approach the groups that designed documents that scored well in readability and suitability to see if additional key content identified by this evaluation could be added. Organizations that developed the most comprehensive documents could also be advised about how to better integrate readability and suitability considerations into their existing documents.

Notably, over half the parents thought that the documents they saw would convince them to vaccinate their child; the document judged to be most comprehensive convinced over 75% of parents. These findings suggest that some existing documents may be effective, and that a targeted approach to the design and content of documents could help increase vaccination rates.

There are limitations to this study. We conducted our environmental scan within a limited time period, and additional counseling materials may have become available since that time. We assessed only English-language written materials from the United States. Given limited resources and time constraints, it was only possible to include a limited number of English-speaking parents of preteens in our study. In addition, because we recruited a convenience sample using flyers and waiting rooms, there may have been selection bias. Finally, we assessed parent perceptions of the brochures but not actual understanding, and we did not track the actual decisions that parents made.

## CONCLUSION

Despite the importance providers and parents place on informative handouts for HPV vaccine decision making,

few HPV vaccine educational handouts were found to be optimal from a health literacy perspective, and few contained all recommended key content. Promoting the use of materials that incorporate health literacy best practices, particularly for at-risk, low-literacy populations, is a modifiable aspect of the health care system that can lead to improved child health outcomes, with the potential to reduce health disparities. Additional research is needed to better understand barriers to provider–parent communication regarding HPV vaccination and facilitators to best support these interactions, particularly for high-risk groups.

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## REFERENCES

1. Satterwhite CL, Tortrone E, Meites E, et al. Sexually transmitted infections among US women and men: prevalence and incidence estimates. *Sex Transm Dis*. 2008;2013:187–193.
2. Smulian EA, Mitchell KR, Stokley S. Interventions to increase HPV vaccination coverage: a systematic review. *Hum Vaccin Immunother*. 2016;12:1566–1588.
3. Petrosky E, Bocchini JA, Hariri S, et al. Use of 9-valent human papillomavirus (HPV) vaccine: updated HPV vaccination recommendations of the Advisory Committee on Immunization Practices. *MMWR Morb Mortal Wkly Rep*. 2015;64:300–304.
4. Reagan-Steiner S, Yankey D, Jeyarajah J, et al. National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years—United States. *MMWR Morb Mortal Wkly Rep*. 2015;2016:850–858.
5. Stokley S, Jeyarajah J, Yankey D, et al. Human papillomavirus vaccination coverage among adolescents, 2007–2013, and postlicensure vaccine safety monitoring, 2006–2014—United States. *MMWR Morb Mortal Wkly Rep*. 2014;63:620–624.
6. US Department of Health and Human Services. *Healthy People 2010: Understanding and Improving Health*. 2nd ed. Bethesda, Md: US Department of Health and Human Services; 2000.
7. Yin HS, Johnson M, Mendelsohn AL, et al. The health literacy of parents in the United States: a nationally representative study. *Pediatrics*. 2009;124(suppl 3):S289–S298.
8. Agency for Health Care Research and Quality; Institute of Medicine. *Health Literacy: A Prescription to End Confusion*. Washington, DC: National Academies Press; 2004.
9. Downs LS, Scarinci I, Einstein MH, et al. Overcoming the barriers to HPV vaccination in high-risk populations in the US. *Gynecol Oncol*. 2010;117:486–490.
10. Schillinger D, Piette J, Grumbach K, et al. Closing the loop: physician communication with diabetic patients who have low health literacy. *Arch Intern Med*. 2003;163:83–90.
11. Anhang R, Goodman A, Goldie SJ. HPV communication: review of existing research and recommendations for patient education. *CA Cancer J Clin*. 2004;54:248–259.
12. Helitzer D, Hollis C, Cotner J, et al. Health literacy demands of written health information materials: an assessment of cervical cancer prevention materials. *Cancer Control*. 2009;16:70–78.
13. Read DS, Joseph MA, Polishchuk V, et al. Attitudes and perceptions of the HPV vaccine in Caribbean and African-American adolescent girls and their parents. *J Pediatr Adolesc Gynecol*. 2010;23:242–245.

14. Pitts MJ, Adams Tufts K. Implications of the Virginia human papillomavirus vaccine mandate for parental vaccine acceptance. *Qual Health Res.* 2013;23:605–617.
15. Benard VB, Johnson CJ, Thompson TD, et al. Examining the association between socioeconomic status and potential human papillomavirus-associated cancers. *Cancer.* 2008;113(10 suppl):2910–2918.
16. Rimer B, Harper H, Witte O. *President's Cancer Panel: Update for the National Cancer Advisory Board.* Bethesda, Md: President's Cancer Panel; 2015.
17. Yin HS, Parker RM, Wolf MS, et al. Health literacy assessment of labeling of pediatric nonprescription medications: examination of characteristics that may impair parent understanding. *Acad Pediatr.* 2012;12:288–296.
18. Yin HS, Gupta RS, Tomopoulos S, et al. Readability, suitability, and characteristics of asthma action plans: examination of factors that may impair understanding. *Pediatrics.* 2013;131:e116–e126.
19. Sanders LM, Perrin EM, Yin HS, et al. “Greenlight study”: a controlled trial of low-literacy, early childhood obesity prevention. *Pediatrics.* 2014;133:e1724–e1737.
20. Yin HS, Dreyer BP, van Schaick L, et al. Randomized controlled trial of a pictogram-based intervention to reduce liquid medication dosing errors and improve adherence among caregivers of young children. *Arch Pediatr Adolesc Med.* 2008;162:814–822.
21. Forbis SG, Aligne CA. Poor readability of written asthma management plans found in national guidelines. *Pediatrics.* 2002;109:e52.
22. Flesch R. A new readability yardstick. *J Appl Psychol.* 1948;32:221–233.
23. Kincaid JP, Fishburne RP, Rogers RL, et al. *Derivation of New Readability Formulas (Automated Readability Index, FOG Count and Flesch Reading Ease Formula) for Navy Enlisted Personnel.* Memphis, Tenn: Naval Air Station; 1975.
24. Gunning R. *The Technique of Clear Writing.* New York, NY: McGraw-Hill; 1952.
25. McLaughlin GH. SMOG grading—a new readability formula. *J Read.* 1969;12:639–646.
26. Caylor JS, Stitch TG, Fox LC, et al. *Methodologies for Determining Reading Requirements of Military Occupational Specialties.* Alexandria, Va: Human Resources Research Organization; 1973.
27. Doak CC, Doak LG, Root JH. *Teaching Patients With Low Literacy Skills.* Philadelphia, Pa: J. B. Lippincott Co; 1996.
28. Weiss BD. *Health Literacy and Patient Safety: Help Patients Understand.* Chicago, Ill: American Medical Association Foundation; 2007.
29. Health Literacy Innovation. *National Survey of Medicaid Guidelines for Health Literacy.* Bethesda, Md: Health Literacy Innovation; 2007.
30. Wallace LS, DeVoe JE, Hansen JS. Assessment of children's public health insurance program enrollment applications: a health literacy perspective. *J Pediatr Health Care.* 2011;25:133–137.
31. Micro Power & Light Co. *Readability Formulas: Windows User Guide Version 7.4.* Dallas, Tex: Micro Power & Light Co; 2008.
32. Shoemaker SJ, Wolf MS, Brach C. Development of the Patient Education Materials Assessment Tool (PEMAT): a new measure of understandability and actionability for print and audiovisual patient information. *Patient Educ Couns.* 2014;96:395–403.
33. Wolf MS, Davis TC, Shrank WH, et al. A critical review of FDA-approved Medication Guides. *Patient Educ Couns.* 2006;62:316–322.
34. Doak LG, Doak CC, Meade CD. Strategies to improve cancer education materials. *Oncol Nurs Forum.* 1996;23:1305–1312.
35. Pusic MV, Ching K, Yin HS, et al. Seven practical principles for improving patient education: evidence-based ideas from cognition science. *Paediatr Child Health.* 2014;19:119–122.