

# SAY YES TO THE HUMAN PAPILOMAVIRUS VACCINE: PRODUCTION AND VALIDATION OF AN ILLUSTRATED GUIDE

## DIGA SIM À VACINA CONTRA O PAPILOMAVÍRUS HUMANO: PRODUÇÃO E VALIDAÇÃO DE UM GUIA ILUSTRADO

## DIGA SÍ A LA VACUNA CONTRA EL PAPILOMAVIRUS HUMANO: PRODUCCIÓN Y VALIDACIÓN DE UNA GUÍA ILUSTRADA

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**Objective:** to produce and validate an illustrated guide as a technological resource of information for boys and girls about the vaccine against the Human Papillomavirus. **Method:** methodological study, conducted in a virtual environment guided by the ADDIE (Analysis, Design, Development, Implementation and Evaluation) model and by the Contextualized Instructional Design. The participants in the validation of content and appearance were 35 experts in the health area and 35 from other areas. In the semantic evaluation, 20 boys and 22 girls participated. **Results:** the developed educational technology was an illustrated guide, consisting of 13 topics. Overall content validation was 0.91; appearance validation was 0.95. In the evaluation, the texts had 94.8% and the illustrations, 88.8% of total agreement. The final version consisted of 18 pages in print and digital versions. **Final considerations:** the guide proved to be valid and adequate to convey information with potential as a didactic resource to mediate educational practices with boys and girls about the vaccine against the Human Papillomavirus.

**Descriptors:** Human Papillomavirus Viruses. Papillomavirus Vaccines. Educational Technology. Public Health Nursing. Validation Study.

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*Objetivo: produzir e validar um guia ilustrado como recurso tecnológico de informação para meninos e meninas sobre a vacina contra o Papilomavírus Humano. Método: estudo metodológico, conduzido em ambiente virtual guiado pelo modelo ADDIE (Analysis, Design, Development, Implementation e Evaluation) e pelo Design Instrucional Contextualizado. Participaram da validação de conteúdo e aparência 35 experts da área da saúde e 35 de outras áreas. Na avaliação semântica, participaram 20 meninos e 22 meninas. Resultados: a tecnologia educacional desenvolvida foi um guia ilustrado, constituído de 13 tópicos. A validação de conteúdo global foi 0,91; a validação de aparência, 0,95. Na avaliação, os textos tiveram 94,8% e as ilustrações, 88,8% de acordo total. A versão final constituiu-se de 18 páginas nas versões impressa e digital. Considerações finais: o guia mostrou-se válido e adequado para veicular informações com potencial enquanto recurso didático, para mediar práticas educativas com meninos e meninas sobre a vacina contra o Papilomavírus Humano.*

*Descritores: Papilomavírus Humano. Vacinas contra Papilomavírus Humano. Tecnologia Educacional. Enfermagem em Saúde Pública. Estudo de Validação.*

*Objetivo: producir y validar una guía ilustrada como recurso tecnológico de información para niños y niñas sobre la vacuna contra el Virus del Papiloma Humano. Método: estudio metodológico, conducido en ambiente virtual guiado por el modelo ADDIE (Analysis, Design, Development, Implementation y Evaluation) y por el Design Instrucional Contextualizado. Participaron en la validación de contenido y apariencia 35 experts en salud y 35 de otras áreas. En la evaluación semántica, participaron 20 niños y 22 niñas. Resultados: la tecnología educativa desarrollada fue una guía ilustrada, constituida por 13 tópicos. La validación de contenido global fue 0,91; la validación de apariencia, 0,95. En la evaluación, los textos tuvieron 94,8% y las ilustraciones, 88,8% de acuerdo total. La versión final constaba de 18 páginas en las versiones impresa y digital. Consideraciones finales: la guía se mostró válida y adecuada para transmitir información con potencial como recurso didático, para mediar prácticas educativas con niños y niñas sobre la vacuna contra el Virus del Papiloma Humano.*

*Descriptorios: Virus del Papiloma Humano. Vacunas contra Papillomavirus. Tecnología Educacional. Enfermería en Salud Pública. Estudio de Validación.*

## Introduction

According to the National Cancer Institute (INCA), for the 2020/2022 biennium, the estimates, for Brazil, are 16,590 new cases of cervical cancer, a Gross Rate of 15.43 per 100,000 women. For Amazonas, about 700 new cases of cervical cancer are predicted, a Gross Rate of 33.08 per 100,000 women<sup>(1)</sup>.

Professionals from various areas of activity need to have a more accurate look at the scenario in which chronic diseases are presented, considering the extent of their spread in complex populations and the difficulties of adherence to control programs and other services offered<sup>(2)</sup>. A study conducted in 55 low-income countries (between 2005 and 2018), which aimed to identify the prevalence levels of cervical cancer screening throughout life in low- and middle-income countries, showed great variation in self-reported prevalence, showing the need for increased screening rate<sup>(3)</sup>.

The Human Papillomavirus (HPV) vaccine, used in more than 140 countries, developed by

genetic engineering, safely and effectively well established and widely recognized, protects against four virus subtypes: 6, 11, 16 and 18. Two of them (6 and 11) are responsible for 90% of genital warts; the other two (16 and 18), for 70% of cervical cancer cases. The World Health Organization (WHO) recommends the inclusion of HPV vaccines in vaccination plans in all countries as a measure to prevent cervical cancer<sup>(4)</sup>.

The implementation of the HPV vaccine in Brazil took place in 2014 as a consequence of the policy to expand the industrial health complex in the production capacity of vaccines, resulting from an agreement between the Ministry of Health (MH) and the company Merck Sharp Dohme (MSD). This agreement was intermediated by the Butantan Institute, with gradual transfer to Brazil of the technology and formula of the active ingredient. In 2020, vaccination coverage for the first dose of the Quadrivalent HPV vaccine was 64.68% for girls

aged 9 to 14 years and 47.28% for boys aged 11 to 14 years. However, vaccination coverage for the second dose was 51.78% for girls and 33.17% for boys in the same age group<sup>(5)</sup>.

An integrative review on educational technologies for promotion and dissemination of information on the HPV vaccine, conducted in Brazil in 2014 and published in 2016, showed positive evidence in the application of different formats (printed materials, videos, messages from electronic devices, websites, computer programs and radiosoap). However, it showed that adolescents and their families did not have enough information about the importance of HPV vaccination and its benefits to health, and did not feel encouraged to vaccinate against HPV, due to the lack of effective awareness campaigns or strategies<sup>(6)</sup>.

Regarding the production of Educational Technologies (ET) as a resource for information dissemination, especially in the health area, it can improve the actions of nurse educator as well as can promote adherence and participation

of the subject, educating him/her, taking him/her to the exercise between theory and practice for sharing and exchanges of knowledge, making him/her reflect on the subject and develop critical thinking<sup>(7-9)</sup>. The objective of this study was to produce and validate an illustrated guide as a technological resource of information for boys and girls about the vaccine against Human Papillomavirus.

## Method

This is a methodological study<sup>(10)</sup>, developed in 2021. The study is a clipping of a macro project entitled Production and Validation of Educational Technologies – VALIDTE Project. The study took place in a virtual environment (WhatsApp application, Google Forms and E-mail) through questionnaires between the months of February and September. It was guided by the five phases of the ADDIE model (Chart 1): Analysis, Design, Development, Implementation and Evaluation<sup>(11)</sup>.

**Chart 1** – Steps and activities of the ADDIE model

Codes	Phases	Activities
A	Analysis	Definition of the target population: boys (11 to 14 years old) and girls (9 to 14 years old). Formulation of the objective: to convey information about the vaccine against the Human Papillomavirus. Identification of the starting point for development: indecision on “to vaccinate” or “not to vaccinate”, which has led to non-achievement of vaccine coverage targets. Definition of context: without delimitation.
D	Design	Conduction of three literature reviews. Identification of content-generating themes. Format definition: printed and digital illustrated guide, in Portuguese and Spanish.
D	Development	Elaboration of the illustrated guide Version I and II, based on the Contextualized Instructional Design (CID).
I	Implementation	Content and appearance validation of Version II according to Pasquali’s Assumptions. Organization of Version III.
E	Evaluation	Evaluation of Version III with the target population.

Source: created by the authors.

After meeting the requirements of the analysis phase, the design stage began. To guide the

collection of information, a literature review was carried out with the following guiding

questions: What educational technologies were developed to convey information about the Human Papillomavirus for adolescents? What is the evidence on Human Papillomavirus, considering epidemiology, health costs, incidence, prevention, symptoms, diagnosis, treatment, vaccine, knowledge and information of boys and girls about it? The search terms selected were: vaccine, educational technology, adolescent, epidemiology, health costs, incidence, prevention, symptoms, diagnosis, treatment, vaccine, knowledge, information for boys and girls. The databases used were BDNF, LILACS and MEDLINE.

In the development phase, the construction was based on Contextualized Instructional Design<sup>(11)</sup>. Version I (developed before the project qualification) and version II (developed after the suggestions of the project qualification board) were built in the Canva application, a free editor that allows the creation of arts without complications and that can be used for different productions. The images and/or drawings were captured from the internet, prioritizing those free of copyright. The choice was guided by the topics that emerged from the literature review. Regional aspects were considered both in the choice of characters (population diversity) and in illustration (animals and geographic contexts).

In the implementation phase, the content and appearance of version II were validated according to Pasquali's assumptions<sup>(12)</sup>. Regarding the participants, the experts were divided into two groups: judges-specialists in the health area (JSH): doctor(s) and nurse(s) with professional experience in HPV, educational technologies and/or validation of instruments (content); judges-specialists from other areas (JSOA): professionals and designers with professional experience in their areas, educational technologies and/or validation of instruments (communication)<sup>(13)</sup>.

Contacts with JSH and JSOA, at first, were established by WhatsApp. The telephone number of the participants in the professional contacts agenda of one of the authors, who has been working in an institution of reference in oncology for 31 years and is responsible

for the state coordination of oncological care in the state of Amazonas, was obtained. The Snowball Sampling technique was adopted, and participants indicated other specialists and forwarded the telephone numbers. After acceptance, the nominees received by e-mail the invitation letter, the Informed Consent Form (ICF), the link to access the educational technology (printed and digital version) and the instrument. The JSH were asked to comment and make suggestions for improving the ET. Judges who did not comply with the guidelines or that ceased to communicate were excluded<sup>(14)</sup>.

The first instrument, aimed at the JSH, contained the following guiding question: Is the content of the Illustrated Guide able to convey adequate information for boys and girls about the Human Papillomavirus? It presented instructions and 3 blocks of questions with a score of 4 points on the Likert scale: Totally Adequate (1); Adequate (2); Partially Adequate (3); Inadequate (4). The blocks were thus identified: objectives, structure and presentation, relevance, general comments and suggestions. The 2<sup>nd</sup> instrument, aimed at JSOA, contained two guiding questions: Does the Illustrated Guide have an adequate appearance to inform boys and girls about the Human Papillomavirus? Is the technological designer suitable to inform boys and girls about the Human Papillomavirus? The instrument, called Suitability Assessment of Materials (SAM), had the following topics: content, text comprehension, illustration, presentation and motivation<sup>(15)</sup>.

For analysis, descriptive statistics were adopted, observing the absolute and relative frequencies. In relation to the JSH instrument, the Content Validity Index (CVI) was applied. A valid CVI was the one in which the score of items was equal or superior to 0.70, with agreement level greater than or equal to 70% in the totally adequate and adequate options. In the JSOA instrument, the SAM score was applied, calculated based on the sum of points obtained, when the technology should have a score equal to or greater than 10 points. The score was thus interpreted: "Superior" if 100%, "Adequate"

if between 80 and 99.9%, “Inadequate or Not Acceptable” if  $<80\%$ <sup>(16)</sup>.

In the evaluation phase, contacts with the target population, boys from 11 to 14 years and girls from 9 to 14 years, was also established by WhatsApp. The telephone number of the participants was obtained through groups of parents and teachers contained in the address book of one of the authors. The Snowball Sampling technique was adopted, and the participants indicated other boys and girls and forwarded the telephone numbers. After acceptance, there were other Inbox messages with details of the evaluation process and access links to the ICF (for those responsible), the Informed Assent Form (for boys and girls), and a copy of the technology and the instrument. For analysis, the descriptive statistics of the answers Totally Agreed (TA), Partially Agreed (PA) and Disagree (D), for two questions: “Are the texts clear and understandable?” and “Are the illustrations self-explanatory and sufficient?” was adopted.

This study complied with the ethical precepts established by Resolution n. 466/2020 of the National Health Council and was approved by the Research Ethics Committee (Certificate of Presentation of Ethical Assessment: 88932418.3.0000.5014). It followed guidelines of the Executive Bureau of the National Health Council and National Ethics Commission, related to procedures in research with any stage in a virtual environment.

## Results

The searches that subsidized the design phase gathered 37 articles. After reading the selected material, the content of educational technology (main theme and complementary themes) was unveiled.

In the development phase, the themes “HPV and vaccine” were worked in a playful way with illustrations that had regional characteristics; an iconographic research was necessary in order to meet copyright issues to include references of images and illustrations; the color palette

was multiple, with relaxed typography and easy to read. For the layout of the guide, the indigenous graphics in the frame of the 18 pages were adopted. The layout size was A4 (21x29.7 cm) in both versions (printed and electronic); the vertical mode was chosen, which is easily adapted in electronic media; a grid of a column, ideal for running texts, consisting of only one block of text was used; the typographic fonts were Sigmar One (titles) and League Spartan (body texts).

To make reading accessible and interactive, the electronic version of the ET was animated by the Qr Code technology, two-dimensional barcode, easily scanned by most camera-equipped mobile phones. Soon after the definition of the characters and their respective positions, the animation began. Version II of the guide was developed in the CorelDraw program, software for vectorization and construction of illustrated images. The characters were dismembered and exported to the Adobe After Effects program. In the Keyframe (motion tool of the animation program), they gained movement and, in the end, were exported to the Canva App. The Storyboard technique was used, with sequential sketches of the illustrations and markings in the position of the texts, in order to preview the Guide in the printed and animated versions.

In the implementation phase, in which content and appearance validation occurred, 35 JSH participated, of which 34 were women, 24 nurses and 11 doctor, with the following titles: 25 specialists, 7 MSc and 3 PhD. Another 35 JSOA participated with the following representation: 8 men and 27 women, 22 educators and 13 communicators, 17 specialists, 13 MSc and 5 PhD.

In content validation, the Total Possible Markings (TPM) in the 3 blocks was 595 and the judges scored 544 [sum of TA (390) and A (154)], making the overall CVI 0.91, higher than 0.70. This result enabled the validation of the content of the Guide Illustrated by the JSH.

In the validation of appearance, the overall score was found with the total points obtained (866) divided by the Maximum Total (MT) of scores (910), multiplied by 100. The results by

category were: Content 98%; Language 94%; Graphic Illustrations 94%; Motivation 96%; Cultural Adequacy 93%. The overall result of SAM was 95%. Therefore, educational technology was considered adequate.

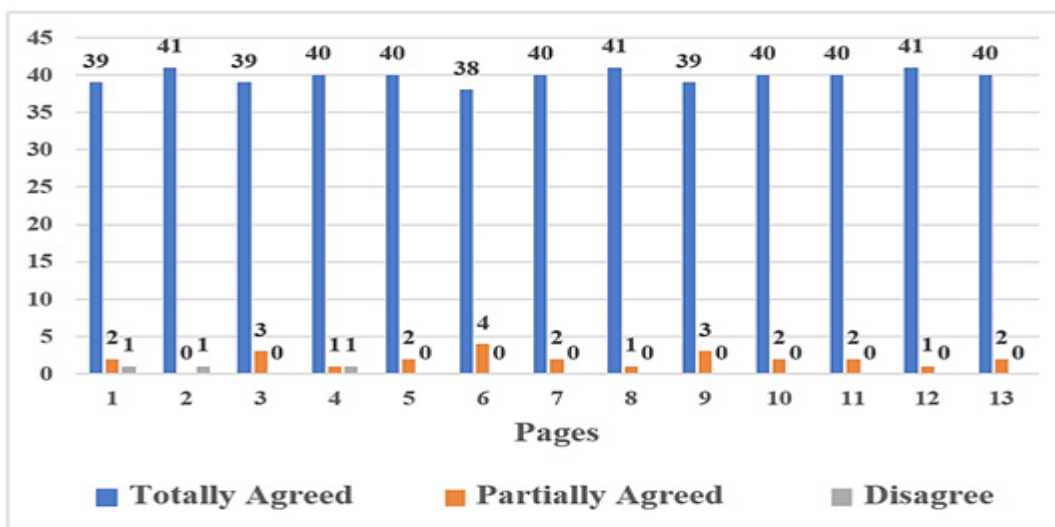
Of the total of 35 JSH, 24 commented and gave suggestions on educational technology. The suggestions were listed according to the JSH, pages and verbs: modify, add and organize. At the end of this phase, version III was obtained, when considering most of the opinions issued.

In the evaluation phase of version III, 20 boys (between 11 and 14 years) and 22 girls (between 9 and 14 years) participated. Of these, 29 studied in public schools and 13, in private schools; 34 attended elementary school and 8,

high school; 1 lived in Atibaia (SP), 16 in Borba (AM), 3 in Curitiba (PR), 21 in Manaus (AM) and 1 in Orlando (Florida, USA); 1 lived with both grandparents, 9 with the mother, 3 with the father and 28 with both parents; 33 were immunized with the vaccine against the Human Papillomavirus and 9 were not.

In the evaluation of the “texts” that made up the 13 pages of the ET (The Guide: say yes to the vaccine against Human Papillomavirus (HPV) – for boys and girls), there were possibilities of 546 answers ( $42 \times 13 = 546$ ). The results were: Totally Agreed – 518 (94.8%); Partially Agreed – 25 (4.6%); Disagree – 3 (0.6%). Chart 1 shows the ratings of the 13 pages of the texts:

**Graph 1** – Evaluation of the texts of the 13 pages of the Educational Technology version III



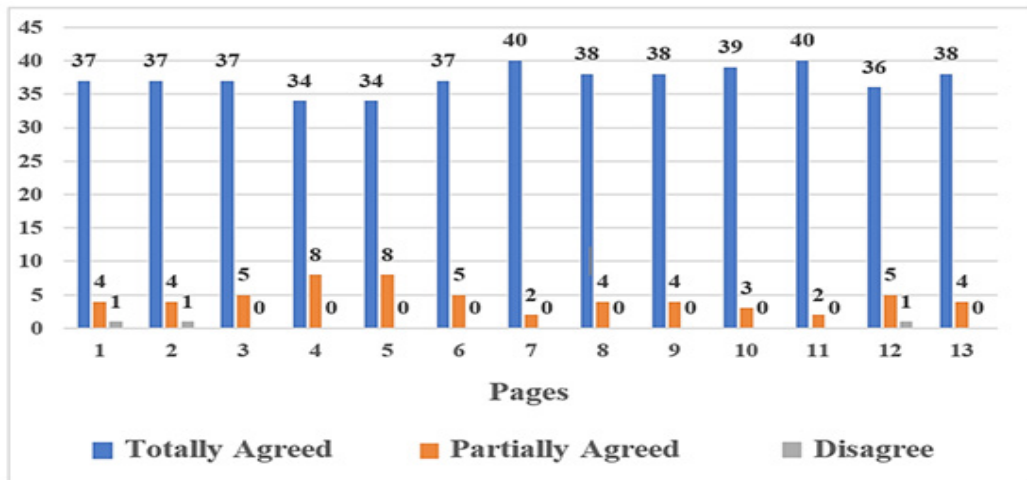
Source: created by the authors.

In the evaluation of the “illustrations” of the 13 pages containing texts, there were also possibilities of 546 answers ( $42 \times 13 = 546$ ). The results were: Totally Agreed – 485 (88.8%);

Partially Agreed – 58 (10.6%); Disagree – 3 (0.6%). Chart 2 shows the evaluation of the illustrations on each of the 13 pages:



**Graph 2** – Evaluations of the illustrations of the 13 pages of the Educational Technology version III



Source: created by the authors.

The two versions of the Guide “Say yes to the HPV vaccine” (printed and digital), in Portuguese (Figure 1) and Spanish, were registered at the Publisher of the State University of Amazonas

(UEA) to obtain the International Standard Book Number (ISBN), with the National Library Foundation.

**Figure 1** – The Guide “say yes to the HPV vaccine” in Portuguese



Source: created by the authors.

## Discussion

Regarding the production of ETs as a resource for conveying information, they can both improve the actions of the nurse educator as favor the adherence and participation of the subject learning, taking him/her to the exercise between theory and practice for sharing and exchanges of knowledge, making him/her reflect on an issue and develop his/her critical thinking<sup>(7-9)</sup>.

Scientific studies show that “vaccine hesitation” is associated with the lack of knowledge of the population<sup>(12,17-18)</sup> and incorrect information shared by social networks on the internet<sup>(8,19-21)</sup>.

The challenge was to create an intelligent visual art that could be used as a tool to facilitate the adherence of boys and girls to HPV vaccination. The steps of the methodological study were guided by one of the most widespread models of Instructional Design (ID) and currently used in the world, the ADDIE, which proved its effectiveness. Contextualized Instructional Design (CID) was applied in the development phase and enabled the production of this cooperative, autonomous and informal learning device<sup>(11)</sup>.

In order to meet the principle that validation processes should be based on assumptions, the model adopted was appropriate, since the technology construct (content and communication) was emphasized<sup>(17)</sup>. The established in the “Pasquali Model” was also adopted regarding the number of JSH and JSOA, which indicates 6 to 20 experts. The validation was performed by the careful contribution of judges specialists on the pedagogical qualities of ET, given the objectives of the study and adequacy to the teaching-learning proposal, with an informative and sequential approach<sup>(13)</sup>.

Concerning content validation, health professionals who met specific criteria of expertise and clinical and/or care experience in HPV were chosen. The option for experts selected according to criteria is one of the premises to guarantee the quality of the process<sup>(14,22)</sup>.

In relation to the validation of appearance, the professionals from other areas used the instrument Suitability Assessment of Materials (SAM), considered the one that takes into account the understanding of the text, the illustration, the presentation and the motivation to evaluate relevant aspects in an educational technology, beyond the content<sup>(15)</sup>.

The Snowball sampling technique enabled the experts to indicate other experts to participate in the validation processes, which extends the reach of participants with experience in methodological studies<sup>(14,23)</sup>. The evaluation of educational technologies should be stimulated by both judges specialists and the target population<sup>(24)</sup>.

This study proved that the illustrated guide can be an instrument to facilitate adherence to treatment and clarify doubts, because it is a printed material that stays with the subject and collaborates in the process of health education.

The Covid-19 pandemic limited the study, because the beginning of the contagion of the virus coincided with the development process of the research, forcing the implementation of adjustments to the web format in relation to the methods and stages previously in-person.

This research can contribute to nursing practice, causing nurse to change attitudes of the individual that directly interfere with his/her health and family, such as the decision to “vaccinate or not against the Human Papillomavirus”<sup>(8,12,25)</sup>.

## Final Considerations

The objective of producing and validating an illustrated guide as a technological resource of information for boys and girls about the vaccine against Human Papillomavirus was satisfactorily achieved throughout the research. After the validation and evaluation processes, as well as the respective adaptations of the versions resulting from the suggestions received, an illustrated guide produced based on evidence was possible to be created, which, moreover, provides a technological resource considered



appropriate, by both specialists and the target population. Thus, there is a valid educational technology to convey information to boys and girls about the vaccine against the Human Papillomavirus.

The development of this study revealed the importance of the search for scientific evidence for the construction of educational devices aimed at the adolescent population, aiming to stimulate behaviors more appropriate to the current life scenario. Educational technologies are tools that enable to promote health and prevent health problems.

### Collaborations:

1 – conception and planning of the project: Marília Muniz Cavalcante de Oliveira and Elizabeth Teixeira;

2 – analysis and interpretation of data: Marília Muniz Cavalcante de Oliveira and Elizabeth Teixeira;

3 – writing and/or critical review: Marília Muniz Cavalcante de Oliveira, Elizabeth Teixeira, Maria de Nazaré de Souza Ribeiro, Ione Rodrigues Brum, Kátia Luz Torres Silva and Darlisom Sousa Ferreira;

4 – approval of the final version: Marília Muniz Cavalcante de Oliveira, Elizabeth Teixeira, Maria de Nazaré de Souza Ribeiro, Ione Rodrigues Brum, Kátia Luz Torres Silva and Darlisom Sousa Ferreira.

### Conflicts of interest

There are no conflicts of interest.

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