Research Article

Quality analysis of the most viewed videos on YouTube about cervical cancer in Brazil

Abstract

Cervical cancer is a major cause of preventable death in women. Health education strategies on preventive and protective methods are decisive for health promotion. In view of the popularity of the YouTube platform, this study evaluated 169 most viewed videos, selected based on the keyword "cervical cancer" in Brazil. These were downloaded and transcribed and analyzed for technical information and content analysis compared to information from the World Health Organization. Most of the analyzed videos are short; posted by laypeople (37.9%) and widely viewed (1,400 to more than 62,000). Although the majority try to disseminate information content, more than 58.9% do not cover the definition of cervical cancer, its risk factors (80.47%), signs and symptoms (68.64%), primary prevention (68.5%) and tertiary prevention (74.56%). Secondary prevention was addressed in 49.70%, but only 1.2% with correct and complete information. In general, 57.4% of the videos were rated as bad or very bad, pointing to the low quality of information about cervical cancer prevention on YouTube in Brazil. In conclusion, YouTube has been used in Brazil to discuss important issues about cervical cancer, but the quality of the video content is quite limited.

Keywords: sexually transmitted disease, health promotion, cervical cancer

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Introduction

Cervical cancer represents one of the main causes of death for women worldwide.[1,2] Currently, it is the fourth most common cancer, with an estimated 604,000 new cases and 342,000 deaths.[1] In Brazil, the estimate for the triennium 2020-2022 is 16,590 new cases, with an estimated risk of 15.43 cases per 100,000 women,[3] which is still one of the main health problems in the country. It is caused by the persistent infection of the human papilloma virus (HPV),[4–7] but despite the involvement of HPV in up to 99.7% of cervical cancers, about 60% of the lesions regress within the first year and 90% can regress after two years,[8,9] influenced by the woman's immune status.

Faced with this public health problem, the World Health Organization (WHO) has encouraged the development of strategies to reduce the number of cases of cervical cancer, mainly through the implementation of vaccination, screening, and treatment.[1,2] Some studies predict that the implementation of these strategies can reduce more than 40% of new cases of the disease, as well as 5 million deaths related to this type of cancer by 2050.[10,11]

In addition to the traditional strategies adopted by public health agencies for the control of cervical cancer, the role of health education has been highlighted to make the population aware of the importance of preventing this type of cancer and its early diagnosis. In fact, there is evidence that women's lack of knowledge about the health-disease-care process is a preponderant factor for the little success of governmental actions to control cervical cancer.[12–14] This is strengthened as health education strategies aimed at women in socially vulnerable conditions can improve rates of early diagnosis of cervical cancer.[15–18]

This response can only be achieved at the expense of improving women's self-care in health, especially regarding the development and perpetuation of primary disease prevention actions.[19–21]

Thus, it is recognized that, for the effective implementation of the cervical cancer control actions, it is essential that there is a harmony between the government's structural actions and social participation, the latter being dependent on access to information.

However, in the web 2.0 scenario, in which anyone can produce and disseminate health-related information content on the internet, improving women's access to information alone is not enough. Much evidence on the effects of the propagation of fake news, in promoting actions and behaviors disconnected from what is proposed by health regulatory agencies[22,23] has drawn attention to the need to assess these impacts. In the case of the cervical cancer, conspiratorial movements against the HPV vaccine are quite common, especially through social media.[24–26] resulting in a negative impact on the decision to adhere to HPV vaccination.[27–29]

Among the different ways of quick and easy access to health information content on the internet, online videos stand out as the easiest way.[30–33] YouTube is one of the most popular and freely accessible online video streaming platforms, with popular sources of information and more than 2 billion users connected every month.[34] YouTube not only provides access to educational information, with a new trend of learning through videos, but also provides a platform for sharing interactive information, lectures, and other educational materials.[35–38]

However, the risk of the dissemination of misleading information cannot be ignored,[39–41] as videos are not peer-reviewed and/or generally not published by healthcare institutions.[42–44] Videos on different topics in the health area have been widely disseminated on YouTube, whether with the aim of informing the layperson about a specific topic,[43,45,46] professional and medical training or for the exchange of experience between patients.[44,47] The concern is with the quality of the content of these videos, putting in doubt the potential of their application as an effective strategy for health education. Thus, in the present study, the quality of the content of the most viewed videos on YouTube in Brazil about cervical cancer was evaluated.[48–62]

Methodology

This is a descriptive observational study with the objective of analyzing the content of videos on the "YouTube" platform about cervical cancer. The videos were downloaded in April 2021 from the search descriptors "cervical cancer" applying the "most viewed" filter. Of the first 200 videos listed, those with a duration longer than

20 minutes as well as those with a duration of less than 20 seconds were excluded. Videos in a language other than Portuguese were also excluded, as well as those that dealt with demonstration of surgical technique, that were videoconference or that did not refer to any gynecological topic. The remaining 169 videos were saved to a playlist and watched later. All videos were transcribed by two researchers and technical information was obtained from the description provided by YouTube for each video.

The analysis of the quality of the videos was carried out through accuracy's method. According to Eysenbach et al. (2002), accuracy as a criterion for evaluating the quality of information on the web is defined by the degree of agreement between the information offered and the best evidence generally accepted by medical practice.[63] The videos were watched by two independent evaluators (gynecology specialists), evaluating eight topics, comparing the content with that published by WHO and PAHO.[64] Thus, every video evaluated received a qualification regarding the accuracy of each topic, using the Likert scale (0-5). To assess the quality of the videos, based on the accuracy of the information, the correspondence between the grades obtained on the Likert scale and the quality denomination was used, in the following order: terrible (grade 01), bad (grade 02), regular (grade 03), good (grade 04), excellent (grade 05).

The data obtained in the present study are presented as arithmetic mean, standard deviation and median (numerical data) and as absolute and relative frequencies (categorical data). Analysis of the distribution of data normality was performed using the Shapiro-Wilk test and the Sturges method for the number of classes. The coherence between the video quality assessment data between the two evaluators was determined using Kappa analysis, with moderate Kappa values (p < 0.05). Thus, it was considered the data from the analysis of a single evaluator. The analyzes were performed using the IBM-SPSS V.27 statistical program.

Results

The data from the 169 videos analyzed showed that the average time of the videos was 7.05±4.75 minutes. The average viewing of videos was 21,950±74,757 (views per video). Most videos (74.6%) were posted by ordinary people or public institutions with no clear relationship with the health area (lay people, companies, media) (Table 1). The majority (73.9%) presented informative content about some aspect of the cervical cancer (either to inform the layperson or the health professional). Information from personal reports was also predominant (20.7%), through videos aimed at sharing experiences.

Table 1 Frequency distribution of data on the identity of the account and the characterization of the content of the videos

Account identity	Absolute frequency	Relative frequency
Lay people	64	37,90%
Health professionals	36	21,30%
Media	29	17,20%
Medical societies	7	4,10%
Companies	33	19,50%
Objective		
Information for lay people	104	61,50%
Professional training	21	12,40%
Personal experience	35	20,70%
Alternative therapies	5	3
Others	4	2,40%

Data on the analysis of the accuracy of the information contained in the videos on different topics related to the topic of cervical cancer are presented in Table 2. As for the lack of information on the topics, it is noted that 59.8% did not inform the definition of cervical cancer, 65 .7% did not report on epidemiology, 80.5% on risk factors, 68.6% on signs and symptoms, 60.4% on HPV, 68% on primary prevention, 49.7% on prevention secondary and 74.6% on tertiary prevention. As for the presence of correct information, only 5.3% spoke correctly about the definition of cervical cancer, 1.2% about epidemiology, 1.8% about risk factors, 3.6% about signs and symptoms, 8 .9% on HPV, 0.6% on primary prevention, 1.2% on secondary prevention and 2.4% on tertiary prevention.

Table 2 Frequency distribution of data regarding the accuracy of the videos covered on different health-related topics

Topic	Totally wrong	Partially wrong	Did not address	Partially right	Totally right
Definition	01 (0,6%)	04 (2,4%)	101 (59,8%)	54 (32%)	09 (5,3%)
Epidemiology	01 (0,6%)	00 (0,0%)	111 (65,7%)	55 (32,5%)	02 (1,2%)
Risk factors	01 (0,6%)	00 (0,0%)	136 (80,5%)	29 (17,2%)	03 (1,8%)
Signals and symptons	03 (1,8%)	04 (2,4%)	116 (68,6%)	40 (23,7%)	06 (3,6%)
HPV	01 (0,6%)	00 (0,0%)	102 (60,4%)	51 (30,2%)	15 (8,9%)
Primary prevention	01 (0,6%)	00 (0,0%)	115 (68,0%)	52 (30,8%)	01 (0,6%)
Secondary prevention	01 (0,6%)	06 (3,6%)	84 (49,7%)	76 (45,0%)	02 (1,2%)
Tertiary prevention	05 (3,0%)	04 (2,4%)	126 (74,6%)	30 (17,8%)	04 (2,4%)

Frequency distribution of video quality based on the accuracy of information on topics related to the cervical cancer are presented in the Table 3. It is noted that most videos were considered with bad content (57.4%) and only 29% with good or excellent content.

Table 3 Frequency distribution of video quality based on the accuracy of information on topics related to the cervical cancer

Accuracy	Absolute frequency	Relative frequency
Terrible	48	28,4%
Bad	49	29,0%
Regular	23	13,6%
Good	37	21,9%
Excellent	12	7,1%
Total	169	100%

Discussion

Online video platforms, such as YouTube, have been suggested as important in the process of expanding access to health information in contemporary society.[31,32] However, recent evidence casts doubt on this potential in view of video content quality limitations.[42–44,46,52] In the present study, there was a significant audience for the videos about the cervical cancer on YouTube, with most of them having more than 180 thousand views. These data reinforce the idea of the platform's popularity among Brazilians, based on some characteristics such as the importance of the topic for the target audience, justified by the fact that women are the ones who most seek health information on the internet,[65] especially, aged between 30 and 49years,[66] age where the classic signs and symptoms of cervical cancer are commonly diagnosed.[3]

On the other hand, even in the face of such popularity, the social interaction actions allowed on the platform, such as likes and comments, were very little explored by the people who viewed the videos. This interactive indifference suggests an apathetic behavior on the part of Internet users who use the platform only as an easy and quick source of informative content, without taking advantage of its potential as a socialization network. This fact deserves attention, since it is precisely the interactivity potential of social media that makes them relevant to be applied in health education strategies,[67,68] in which the exchange of ideas, exposure of doubts and questions are fundamental for the success of the network learning process.[69]

In addition, the interaction through the sharing of experiences, social support and connection and identification with peers enables a fruitful environment for disinhibition and allows the emergence of doubts that amplify the discussions, favoring the network learning process, as well as the adoption of health self-care behaviors.[70,71] The low usability data of the platform's interaction tools suggest little use of this space for learning and for the realization of knowledge about the cervical cancer.

Regarding the origin of the posts, publications about the cervical cancer on YouTube have been made by accounts not linked to health agencies or institutions. Most of the videos were posted by lay people, not specialists in the health area, by companies, which may present commercial interests in the publications, and by the media that, among other factors, are especially aimed at the audience. This finding does not exhibit a behavior inherent only to the YouTube platform in Brazil, other studies have shown similar behavior for other realities.

In a study carried out by Adhikari et al.,[61] in Nepal, of the 172 videos on YouTube about cervical cancer analyzed, less than 25% of them were published by self-reported accounts as health institutions or doctors.[59] Likewise, in a study by Ward et al.,[45] conducted in the United States, more than 85% of the videos analyzed did not include health professionals in the account identity data,[43] and as presented by Yurdaisik et al.,[46] who analyzed videos in Turkey, only 14% of the videos were posted by doctors and 2% by other health professionals.[44] Taken together, these data suggest a trend towards the use of the YouTube video platform to post videos on health topics by people without technical qualifications for this, which may justify the limitations of quality of information frequently pointed out by the scientific literature.[43,44,59,61]

As for the main purpose of the videos, it was observed that most are intended to support information to clarify recurring doubts about the cervical cancer and the sharing of experiences on some aspect of the subject. This fact has also been observed in other studies,[43,59] suggesting a plot tendency to be used in the preparation of these videos.

Regardless of the focus given to the videos, the biggest problem lies in the thematic direction of the information. Most of the videos analyzed did not cover many of the topics considered relevant for the prevention of cervical cancer, not presenting, therefore, great value for the realization of the necessary knowledge to stimulate self-care in health. As an example, it was observed that more than 60% of the videos did not even bother to define what cervical cancer is or cited information about the epidemiology of the disease. Considering the contribution of knowledge about the health-disease-care process to the control of cervical cancer, the absence of a clear definition of the disease and its epidemiological implications may limit the subsequent understanding of other more specific topics in this process.[72]

Nowadays, clarifications about signs and symptoms, as well as risk factors, fundamental for understanding the cervical cancer prevention process,[64,72,73] were practically ignored in the videos and, when approached, the information was mostly dubious, difficult to understand and misleading. In terms of public health, women's understanding of the main signs and symptoms of cervical cancer is essential for the success of screening and early diagnosis of this malignancy, the main objective of prevention programs, as it represents the first step to motivate women to seek the health service.[64,74] Likewise, understanding the risk factors for cervical cancer is of great importance in the context of preventing this type of cancer, and can be decisive for the development and propagation of protective behaviors, with a focus on individual and collective self-care.[74,75]

Ensuring the success of health education strategies, focused on the prevention of cervical cancer, is essential for population control of this type of cancer,[7,64] especially in Brazil, where regional epidemiological inequality is exacerbated, with the highest incidence rates and mortality from the disease recorded in the poorest regions of the country.[3] Still, in this aspect, it is worth mentioning that the mention of the HPV virus, as a necessary factor for the existence of cervical cancer, also did not receive due attention in the analyzed videos, not being mentioned in more than 60% of them. The absence of this information can negatively impact the understanding of primary and secondary prevention that constitute the pillars of cervical cancer prevention programs.[64,76,77]

Thus, informative videos could not fail to cover these topics that should be considered the focus for information vehicles, but this is not the scenario we show. Primary prevention was addressed in less than 32% of the videos and mostly incompletely, while secondary prevention was addressed in just over half of the videos and, in almost its entirety, in a partial way with a lot of wrong information.

The tertiary prevention approach showed little expression in the videos analyzed, which implies the absence of substantial information for patients affected by the disease in more advanced stages. In addition, when addressed, the content addressed the effectiveness of alternative therapies (not scientifically proven) in the treatment of cervical cancer. This fact is worrying, as this type of information can lead to the abandonment of conventional therapy and, as evidenced by Johnson et al. (2018), lead to a higher unnecessary risk of death.[78] Even though many of the therapies referred to as alternatives or adjuncts in the treatment of cervical cancer have value for some aspects of women's health, obviously, when applied, they should not disregard traditional therapies, as their efficacy and applicability are not yet established.[46,79,80] Therefore, propagations of healing affirmations by this method can be dangerous.

The focus on tertiary prevention videos is valuable, as they can support essential health self-care behaviors to guarantee an improvement in the quality of life of patients living with the disease. Patients naturally already very fragile by the physical and social conditions generated by the pathology itself, which makes them more likely to opt for alternative therapies, as they are highly attractive to them in these circumstances. For this reason, videos that disregard important aspects of tertiary prevention and tend to focus on alternative therapies are important, as they offer the opportunity to discuss important issues about the health-disease process, such as cultural and spiritual issues and that cross-cut other types of medicine, as the oriental medicine for example.

Videos aimed at empowering the individual, through proper guidance and training in this prevention phase, can alleviate insecurities and would be of great value, since, depending on the stage of the disease, cancer can lead to significant changes in vital functions and social interaction, negatively impacting women's quality of life.[81] In addition, patients who are better oriented, screened and monitored have a lower risk of developing a new neoplasm,[82] reinforcing the need to produce quality videos on tertiary prevention.

Despite constituting a not very significant percentage, videos with greater content coverage and higher quality of information were posted by organizations and health professionals, reinforcing the statement by Sing et al., who point to these entities as a reliable source of health information, and Madathil's[34] statement about the importance of their active participation in the production of educational videos on YouTube.[32]

Another important point that should also be raised in the health education strategies adopted for the control of cervical cancer is the discussion of the importance of the periodicity of carrying out preventive exams and administration of the HPV vaccine, especially nowadays, with a population immunocompromised. In general, the quality of the information and the thematic approaches used in the construction of the videos about the cervical cancer were presented in a limited way and did not match the recommended by the WHO. Most of the videos were rated as poor in terms of content quality, which points to the immediate need for further discussions on the role of social media in the context of public health, especially the video platform YouTube. This idea is common among the scientific community,[42–44] pointing to the need for studies that assess the impact of using YouTube in the context of public health.

Regarding the topic investigated herein, the propagation of incorrect information about the cervical cancer is an important detriment for women, since not encouraging self-care in health can be decisive for guaranteeing quality of life. Considering that limitations of access to quality information is presented as one of the social determinants associated with cancer-related disparities,[83] the data referring to the low quality of the content of YouTube videos, about cervical cancer in Brazil, reinforce the need a closer look by public health institutions on this issue. The importance of information on the resources of traditional Chinese medicine cannot be disregarded either, aspects that are little explored in the videos, and which have been demonstrated in another study[84] on the importance of energy balance in maintaining the immune system and its implications for cervical cancer prevention.

Conclusion

The content quality of the most popular videos on YouTube about cervical cancer in Brazil is quite limited. This data suggests the immediate need for more effective public policies to favor the publication of safer information content on online social media, as well as a greater debate on the popularization of science and training of people through the internet.

Conflicts of interest

Author declares there is no conflict of interest exists.

References

1. Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2021;caac.21660.

2. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem and its associated goals and targets for the period 2020 – 2030. United Nations General Assembly; 2020:1–3.

3. INCA. 2020 estimate: cancer incidence in Brazil/José Alencar Gomes da Silva National Cancer Institute. 2019.

4. Waggoner SE. Cervical cancer. *Lancet*. 2003;361(9376):2217–2225.

5. Ferlay J, Soerjomataram I, Dikshit R, et al. Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*. 2015;136(5):E359–E386.

6. Bhatla N, Aoki D, Sharma DN, et al. Cancer of the cervix uteri. *Int J Gynecol Obstet*. 2018;143:22–36.

7. Burd EM. Human papillomavirus laboratory testing: The changing paradigm. *Clin Microbiol Rev*. 2016;29(2):291–319.

8. Cubie HA. Diseases associated with human papillomavirus infection. *Virology*. 2013;445(1–2):21–34.

9. Derchain SF, Costa LB, Jales RM RL. Cervical cancer. Journal of Chemical Information and Modeling. São Paulo: Federação Brasileira das Associações de Ginecologia e Obstetrícia (FEBRASGO); 2018:1689–1699.

10. Hu Z, Ma D. The precision prevention and therapy of HPV-related cervical cancer: new concepts and clinical implications. *Cancer Med*. 2018;7(10):5217–5236.

11. Wang X, Huang X, Zhang Y. Involvement of human papillomaviruses in cervical cancer. *Front Microbiol*. 2018;9(NOV):1–14.

12. Brisson M, Kim JJ, Canfell K, et al. Impact of HPV vaccination and cervical screening on cervical cancer elimination: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *Lancet*. 2020;395(10224):575–590.

13. Canfell K, Kim JJ, Brisson M, et al. Mortality impact of achieving WHO cervical cancer elimination targets: a comparative modelling analysis in 78 low-income and lower-middle-income countries. *Lancet*. 2020;395(10224):591–603.

14. Dsouza JP, Van den Broucke S, Pattanshetty S, et al. Exploring the barriers to cervical cancer screening through the lens of implementers and beneficiaries of the national screening program: a multi-contextual study. *Asian Pacific J Cancer Prev*. 2020;21(8):2209–2215.

15. Perehudoff K, Vermandere H, Williams A, et al. Universal cervical cancer control through a right to health lens: refocusing national policy and programmes on underserved women. *BMC Int Health Hum Rights*. 2020;20(1):21.

16. Vale DB, Teixeira JC, Bragança JF, et al. Elimination of cervical cancer in low- and middle-income countries: Inequality of access and fragile healthcare systems. *Int J Gynecol Obstet*. 2021;152(1):7–11.

17. Eghbal SB, Karimy M, Kasmaei P, et al. Evaluating the effect of an educational program on increasing cervical cancer screening behavior among rural women in Guilan, Iran. *BMC Womens Health*. 2020;20(1):149.

18. Heidari Sarvestani M, Khani Jeihooni A, Moradi Z, et al. Evaluating the effect of an educational program on increasing cervical cancer screening behavior among women in Fasa, Iran. *BMC Womens Health*. 2021;21(1):41.

19. Romli R, Shahabudin S, Saddki N, et al. Effectiveness of a health education program to improve knowledge and attitude towards cervical cancer and Pap smear: a controlled community trial in Malaysia. *Asian Pacific J Cancer Prev*. 2020;21(3):853–859.

20. Souto R, Falhari JPB, Cruz AD da. The Human Papillomavirus: a factor related to the formation of neoplasms. *Rev Bras Cancerol*. 2005;51(2):155–160.

21. Abu SH, Woldehanna BT, Nida ET, et al. The role of health education on cervical cancer screening uptake at selected health centers in Addis Ababa. *PLoS One*. 2020;15(10):e0239580.

22. Calderón-Mora J, Byrd TL, Alomari A, et al. Group versus individual culturally tailored and theory-based education to promote cervical cancer screening among the underserved hispanics: a cluster randomized trial. *Am J Heal Promot*. 2020;34(1):15–24.

23. Ford ME, Cannady K, Nahhas GJ, et al. Assessing an intervention to increase knowledge related to cervical cancer and the HPV vaccine. *Adv Cancer Res*. 2020;146:115–137.

24. Thomas J, Peterson GM, Walker E, et al. Fake News: Medicines Misinformation by the Media. *Clin Pharmacol Ther*. 2018;104(6):1059–1061.

25. Wang Y, McKee M, Torbica A, et al. Systematic literature review on the spread of health-related misinformation on social media. *Soc Sci Med*. 2019;240:112552.

26. Calo WA, Gilkey MB, Shah PD, et al. Misinformation and other elements in HPV vaccine tweets: an experimental comparison. *J Behav Med*. 2021;44(3):310–319.

27. Massey PM, Kearney MD, Hauer MK, et al. Dimensions of misinformation about the HPV vaccine on instagram: content and network analysis of social media characteristics. *J Med Internet Res*. 2020;22(12):e21451.

28. Teoh D. The power of social media for HPV vaccination–not fake news! *Am Soc Clin Oncol Educ B*. 2019;(39):75–78.

29. Pan S, Zhang D, Zhang J. Caught in the crossfire: how contradictory information and norms on social media influence young women's intentions to receive HPV vaccination in the United States and China. *Front Psychol*. 2020.

30. Spanos KE, Kraschnewski JL, Moss JL, et al. Parent support for social media standards combatting vaccine misinformation. *Vaccine*. 2021;39(9):1364–1369.

31. Walker KK, Owens H, Zimet G. We fear the unknown: Emergence, route and transfer of hesitancy and misinformation among HPV vaccine accepting mothers. *Prev Med Reports*. 2020;20:101240.

32. Andika R, Kao CT, Williams C, et al. YouTube as a source of information on the COVID-19 pandemic. *J Community Hosp Intern Med Perspect*. 2021;11(1):39–41.

33. Campbell IH, Rudan I. A systematic analysis of online public engagement with 10 videos on major global health topics involving 229 459 global online viewers. *J Glob Health*. 2020;10(1):1–7.

34. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, et al. Healthcare information on YouTube: A systematic review. *Health Informatics J*. 2015;21(3):173–194.

35. Warren CJ, Sawhney R, Shah T, et al. YouTube and men's health: a review of the current literature. *Sex Med Rev*. 2021;9(2):280–288.

36. YouTube. 2019.

37. Dutta A, Beriwal N, Van Breugel LM, et al. YouTube as a source of medical and epidemiological information during COVID-19 pandemic: a cross-sectional study of content across six languages around the globe. *Cureus*. 2020;12(6):e8622.

38. Hyatt A, Morkunas B, Davey D, et al. Co-design and development of online video resources about immunotherapy with patients and their family. *Patient Educ Couns*. 2021;104(2):290–297.

39. Itamura K, Wu A, Illing E, et al. YouTube videos demonstrating the nasopharyngeal swab technique for SARS-CoV-2 specimen collection: content analysis. *JMIR Public Heal Surveill*. 2021;7(1):e24220.

40. Lacey K, Wall JG. Video-based learning to enhance teaching of practical microbiology. *FEMS Microbiol Lett*. 2021;368(2).

41. Dias da Silva MA, Walmsley AD. Fake news and dental education. *Br Dent J*. 2019;226(6):397–399.

42. Loeb S. Fake news about benign prostatic hyperplasia on YouTube. BJU Int. 2020;125(4):477–478.

43. Loeb S, Taylor J, Borin JF, et al. Fake news: spread of misinformation about urological conditions on social media. *Eur Urol Focus*. 2020;6(3):437–439.

44. Pereira Neto A de F, Paolucci R, Daumas RP, et al. Participatory assessment of the quality of health information on the internet: The case of dengue websites. *Cienc e Saude Coletiva*. 2017;22(6):1955–1968.

45. Ward M, Ward B, Warren C, et al. The quality of YouTube videos as an educational resource for attention-deficit/hyperactivity disorder. *Pediatr Neurol*. 2020;103:84–85.

46. Yurdaisik I. Analysis of the most viewed first 50 videos on YouTube about breast cancer. *Biomed Res Int*. 2020.

47. Knight E, Intzandt B, MacDougall A, et al. Information seeking in social media: a review of YouTube for sedentary behavior content. *Interact J Med Res*. 2015;4(1):e3.

48. Li M, Yan S, Yang D, et al. YouTube™ as a source of information on food poisoning. *BMC Public Health*. 2019;19(1):952.

49. Woloshyn V, Savage MJ. Features of YouTube™ videos produced by individuals who self-identify with borderline personality disorder. *Digit Heal*. 2020;6:205520762093233.

50. Braczynski AK, Ganse B, Ridwan S, et al. YouTube videos on parkinson's disease are a relevant source of patient information. *J Parkinsons Dis*. 2021;1–10.

51. Aydin MA, Akyol H. Quality of information available on YouTube videos pertaining to thyroid cancer. *J Cancer Educ*. 2020;35(3):599–605.

52. Bahat G, Yilmaz O, Kiliç C, et al. Performance of SARC-F in regard to sarcopenia definitions, muscle mass and functional measures. *J Nutr Health Aging*. 2018;22(8):898–903.

53. Huang MM, Winoker JS, Allaf ME, et al. Evidence-based quality and accuracy of YouTube videos about nephrolithiasis. *BJU Int*. 2021;127(2):247–253.

54. Loeb S, Reines K, Abu-Salha Y, et al. Quality of bladder cancer information on YouTube. *Eur Urol*. 2021;79(1):56–59.

55. Oztermeli A, Karahan N. Evaluation of YouTube video content about developmental dysplasia of the hip. *Cureus*. 2020;12(8):e9557.

56. Ache KA, Wallace LS. Human papillomavirus vaccination coverage on YouTube. *Am J Prev Med*. 2008;35(4):389–392.

57. Basch CH, Hillyer GC, Berdnik A, et al. YouTube™ videos related to human papillomavirus: the need for professional communication. *Int J Adolesc Med Health*. 2018;30(1).

58. Ekram S, Debiec KE, Pumper MA, et al. Content and commentary: HPV vaccine and YouTube. *J Pediatr Adolesc Gynecol*. 2019;32(2):153–157.

59. Tuells J, Martínez-Martínez PJ, Duro-Torrijos JL, et al. Characteristics of the videos in Spanish published on YouTube about the human papillomavirus vaccine. *Rev Esp Salud Publica*. 2015;89(1):107–115.

60. Gursoy A, Peker H. Does YouTube provide reliable and high-quality information? Assessment of pap smear test videos. *Acta Cytol*. 2020;64(5):425–432.

61. Adhikari J, Sharma P, Arjyal L, et al. Youtube as a source of information on cervical cancer. *N Am J Med Sci*. 2016;8(4):183.

62. Moraes A de. Gynecological cancer preventive clinic – editorial. Anais Brasileiros de Ginecologia; 1948:207–210.

63. Esen E, Aslan M, Sonbahar BÇ, et al. YouTube English videos as a source of information on breast self-examination. *Breast Cancer Res Treat*. 2019;173(3):629–635.

64. Guo J, Yan X, Li S, et al. Quantitative and qualitative analyses of orthodontic-related videos on YouTube. *Angle Orthod*. 2020;90(3):411–418.

65. Selvi O, Tulgar S, Senturk O, et al. YouTube as an informational source for brachial plexus blocks: evaluation of content and educational value. *Brazilian J Anesthesiol*. 2019;69(2):168–176.

66. Eysenbach G, Powell J, Kuss O, et al. Empirical studies assessing the quality of health information for consumers on the World Wide Web. *JAMA*. 2002;287(20):2691.

67. OPAS. Comprehensive cervical cancer management - Essential Practice Guide. 2016. 415 p.

68. Kontos E, Blake KD, Chou W-YS, et al. Predictors of ehealth usage: insights on the digital divide from the health information National trends survey 2012. *J Med Internet Res*. 2014;16(7):e172.

69. Elisa Shearer B, Mitchell A, Research Elisa Shearer J, et al. News use across social media platforms in 2020: Facebook stands out as a regular source of news for about a third of Americans. 2021;12:2021.

70. Hwang KO, Etchegaray JM, Sciamanna CN, et al. Structural social support predicts functional social support in an online weight loss programme. *Heal Expect*. 2014;17(3):345–352.

71. Krukowski RA, Harvey-Berino J, Ashikaga T, et al. Internet-based weight control: the relationship between web features and weight loss. *Telemed e-Health*. 2008;14(8):775–782.

72. Gaio AVA, Rocha C, Sousa FM de. Open access as a tool for patient empowerment. *Cad BAD*. 2018;1:350–360.

73. Valente TW. Social networks and health: models, methods, and applications. *Soc Networks Heal Model Methods, Appl*. 2010;18(4):1–296.

74. Wicks P, Massagli M, Frost J, et al. Sharing health data for better outcomes on patientslikeme. *J Med Internet Res*. 2010;12(2):1–12.

75. Ferreira IG, Piazza M, Souza D. Health and sexuality workshop: Health residents promoting sex education among public school adolescents. *Rev Bras Med Família e Comunidade*. 2019;14(41):1788.

76. Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA). Brazilian guidelines for cervical cancer screening. Ministério Da Saúde; 2016:31–34.

77. Ramirez A, Westcombe A, Burgess C, et al. Factors predicting delayed presentation of symptomatic breast cancer: a systematic review. *Lancet*. 1999;353(9159):1127–1131.

78. Migowski A, Azevedo E Silva G, et al. Guidelines for early detection of breast cancer in Brazil. II – New national recommendations, main evidence, and controversies. *Cad Saude Publica*. 2018;34(6):1–16.

79. Denny L, Prendiville W. Cancer of the cervix: Early detection and cost-effective solutions. *Int J Gynecol Obstet*. 2015;131:S28–S32.

80. Fields MM. New cervical cancer screening guidelines: was the annual pap too much of a good thing? *J Adv Pract Oncol*. 2013;4(1):59–64.

81. Johnson SB, Park HS, Gross CP, et al. Complementary medicine, refusal of conventional cancer therapy, and survival among patients with curable cancers. *JAMA Oncol*. 2018;4(10):1375.

82. Manosroi A, Akazawa H, Pattamapun K, et al. Potent anti-proliferative effects against oral and cervical cancers of Thai medicinal plants selected from the Thai/Lanna medicinal plant recipe database "MANOSROI III." *Pharm Biol*. 2015;53(7):1075–1081.

83. Zivarpour P, Nikkhah E, Maleki Dana P, et al. Molecular and biological functions of gingerol as a natural effective therapeutic drug for cervical cancer. *J Ovarian Res*. 2021;14(1):1–13.

84. Ling H. The importance of treating energy imbalances and chakras replenishment for prevention and treatment of cancer. *Advances in Cancer Research & Clinical Imaging*. 2020.