Oral cancer: analysis of the clarity of publications in Instagram profiles of official health agencies in Brazil

Câncer bucal: análise da clareza das publicações realizadas em perfis do Instagram de órgãos oficiais de saúde do Brasil

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Abstract *This article aims to analyze the clarity and engagement measures of publications on oral cancer in the Instagram profiles of official health agencies in Brazil. An infodemiological study was conducted with 81 profiles. Data collected concerned content classification, account and media, manner of addressing the topic, number of posts, likes, comments, views and hashtags. The clarity of the educational publications was assessed with the Brazilian version of the Clear Communication Index (BR-CDC-CCI). Data analysis involved Spearman's correlation and the Mann-Whitney test ($\alpha = 5\%$). A total of 775 publications on oral cancer were found. The average BR-CDC-CCI score was 69.8 (SD = 15.5). The clarity of the information was adequate in 9.5% of the educational publications. Positive correlations were found between the number of likes and engagement (comments [r = 0.49], views [r = 0.96]), number of hashtags (r = 0.13) and year of publication (r = 0.21). Publications from the Health Ministry had a significantly higher BR-CDC-CCI score compared to the other profiles. Publications on oral cancer were correlated with engagement, year of publication and number of hashtags. Public agencies increased publications to reach the population, but the clarity of the content was low.*

Key words *Access to online information, Oral cancer, Health communication*

Resumo *O objetivo do artigo é analisar a clareza e as medidas de engajamento das publicações sobre câncer bucal nos perfis do Instagram dos órgãos oficiais de saúde no Brasil. Realizou-se um estudo infodemiológico com 81 perfis. Foram coletados dados sobre classificação do conteúdo, conta e mídia, abordagem do tema, número de postagens, curtidas, comentários, visualizações e hashtags. A clareza das publicações educativas foi avaliada pela versão brasileira do Clear Communication Index (BR-CDC-CCI). A análise dos dados envolveu a correlação de Spearman e o teste de Mann-Whitney ($\alpha = 5\%$). Foram encontradas 775 publicações sobre câncer bucal. O escore médio do BR-CDC-CCI foi 69,8 (DP = 15,5). A clareza das informações foi adequada em 9,5% das publicações educativas. Correlações positivas foram encontradas entre o número de curtidas e engajamento (comentários [r = 0,49], visualizações [r = 0,96]), número de hashtags (r = 0,13) e ano de publicação (r = 0,21). Publicações do Ministério da Saúde apresentaram escore do BR-CDC-CCI significativamente maior do que os demais perfis (p = 0,01). As publicações sobre câncer bucal foram correlacionadas com engajamento, ano de publicação e número de hashtags. Os órgãos públicos aumentaram as publicações para atingir a população, mas a clareza do conteúdo foi baixa.*

Palavras-chave *Acesso à informação online, Câncer bucal, Comunicação em saúde*

Introduction

Oral cancer is characterized by a set of malignant neoplasms that affect different anatomical sites in the head and neck region[1,2,3,4]. The incidence in Brazil is considered one of the highest in the world, ranking first in relation to the countries of South America[5]. In the Brazilian population, oral cancer is the fifth most common type of cancer among men and the seventh most common among women, posing a serious public health problem due to the high mortality rate and impact on the quality of life of affected individuals[6,7].

Among the risk factors associated with this pathology, smoking, genetic predisposition, alcohol, prolonged exposure to ultraviolet radiation and infection with some types of the HPV virus are described in the literature[8,9].

An early diagnosis is fundamental to a favorable prognosis and remains the most effective way to increase the survival rate as well as reduce the occurrence of morbidity, treatment time, disfiguration due to surgeries and hospital costs[10]. The lack of information and awareness on the part of individuals with regards to symptoms contributes to the late diagnosis of the disease[2,7]. Therefore, the continual development of educational actions directed at encouraging the population to perform a self-examination of the oral cavity, the sensitization of healthcare providers to screen groups at risk and the development of educational policies for the prevention and early diagnosis of cancer are of the utmost importance[11,12]. This is an effective, economical, sustainable strategy for controlling the increase in the incidence of this disease[7].

A more substantial investment is needed in the promotion of health literacy to ensure the greater use of healthcare services, diminish the occurrence of risk behaviors and, consequently, lower health costs[13,14]. One way to promote health literacy is the development of health education materials, which should ensure understanding on the part of the target public[15]. When individuals understand the information that they receive, they become capable of executing preventive-therapeutic actions in an autonomous way that favors their own health. Official public health vehicles should be attentive to the quality of the messages contained in the material produced in both print form and through electronic media[16].

The use of the internet as a source of information on health has increased over the years. The social medium Instagram has surpassed more than 100 million users in Brazil and involves the publication of images and videos combined with texts, enabling interaction among users and the multiplication of knowledge[17,18]. Patients and healthcare providers have turned to this tool for knowledge, which demonstrates that online information can contribute to awareness and improvements in both prognoses and adherence to treatment and can facilitate communication between healthcare providers and patients[19]. However, certifying whether the information published on the internet is from valid, reliable sources is not an easy task. Thus, the creation and assessment of messages should ideally occur prior to being made available to the public and it is also necessary to be aware of the level of health literacy of the population[20,21].

An investigation of the quality and essential components in the preparation of educational and informative materials is necessary to enable careful construction, safe sharing and effective communication. Thus, considering the fact that oral cancer is a public health issue and that social media may play an important role in the dissemination of preventive measures, the aim of the present study was to assess the clarity of information and the engagement measures on the topic of oral cancer, published through Instagram by official health vehicles in Brazil.

Methods

Type of study

An infodemiological study with a quantitative approach was conducted to assess publications on oral cancer in Instagram profiles of official health agencies in Brazil in the period from 2011 to 2021. Infodemiology is the study of the determinants and distribution of health information and inaccurate information on the Internet, carried out through the collection of data from search engines in online tools, which characterize collective behavior in search of information. It is a passive method for automatically analyzing trends on the Internet, without actively involving users. Furthermore, it is a crude method because it is performed using a search term in a search engine, which gives the number of occurrences over time[22].

As Brazilian federal regulations do not apply to studies involving the use of publicly available data and that do not involve human subjects, no ethical approval was necessary for this study.

Object of study

The Brazilian health profiles with an active Instagram account selected were from the Health Ministry, state Secretaries of Health (in the absence of an active state account, that of the respective state government was used), Dental Councils and Dental Associations, totaling 81 profiles (Figure 1). The universe of this study was all publications in the feeds of Instagram profiles from their first publication to December 31, 2021 (end of data collection period), totaling 130,398 publications analyzed.

Initial exploratory study

A pilot study was undertaken with forty publications on oral cancer. These publications were randomly selected from one of the included Instagram profiles and were analyzed respecting temporal organization. This step of the study aimed to test the search, selection and the

data collection process. The study's previously planned variables were detected and confirmed, and the categorization of such variables was defined. The results of the pilot study revealed no need to alter the methods and the data from this step were included in the main study.

Eligibility criteria

The inclusion criteria were all publications on the topic of oral cancer destined for the general population written/recorded in Brazilian Portuguese. Publications not related to the topic of interest were excluded.

Data collection

Data collection was carried out independently by four already calibrated researchers and followed the same methodology as in the initial exploratory phase (online, through an account created on Instagram [@pesquisahpvcb] for the
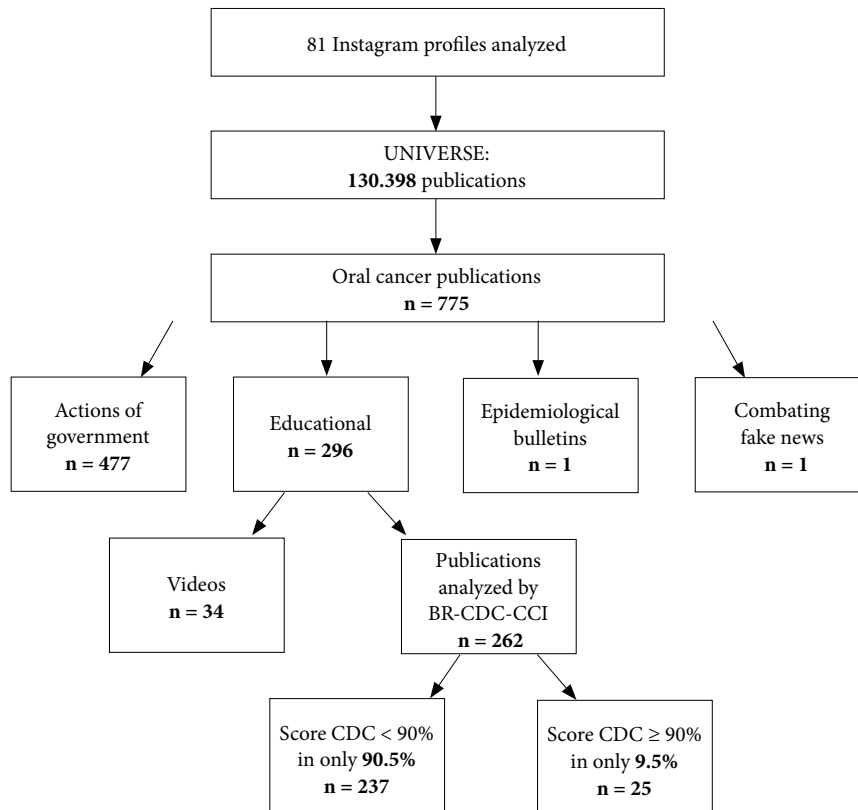
Figure 1. Process of selection of publications.

Source: Authors.

selection of profiles and publications). First, the data were saved as a print screen in specific folders of each health agency; then, the following data contained in the publication were extracted and tabulated in Excel files: name of the Instagram profile, access link, date, publication by the health ministry, type of publication, theme location, how the topic oral cancer was addressed, number of posts, likes, comments, views, hashtags and classification of publication. All files were stored in Drive.

The publications were registered, named, dated and categorized according to the classification of the content (actions of government, educational actions, epidemiological bulletins and combatting fake news). The parameters adopted to assess engagement achieved through the publications were the type of profile as well as the number of likes, comments and views. Other data of interest were the hashtags used, type of media, way of addressing the content, frequency, number of posts (Instagram's carousel tool allows up to 10 posts in a single post) and whether the publications were from the profile of the Health Ministry – considering its guiding role in the determination of health policies on the national level, the degree of visibility of the profile and the high number of followers on the platform (2.7 million), publications were categorized as belonging or not to this account. Publications classified as educational were analyzed with regards to the clarity of the information using the Brazilian version of the Clear Communication Index of the US Centers for Disease Control and Prevention (BR-CDC-CCI)[23]. Supplementary file 2 details all variables' categorizations, available at: https://data.scielo.org/dataset.xhtml?persistentId=doi:10.48331/scielodata.G6BYPJ.

Instrument and calibration process

The BR-CDC-CCI is available to assess the clarity of health information and was designed to be used for the development of new materials or the assessment of existing materials. The instrument is composed of a set of questions based on criteria widely used in the field of health literacy and communication research. The Brazilian version was validated in 2020 in complete and modified forms containing items distributed in four parts that assess the clarity of information and understanding of the public according to the scientific literature considering the main message, call for action (Part A – 6 items), behavior rec-

ommendations (Part B – 2 items), numbers (Part C – 2 items) and risks addressed in the material (Part D – 3 items)[23].

The modified index is recommended for the assessment of short messages, such as social media in only text format, and was therefore selected for the present study. This index has 13 scored items with three response options (yes, no or NA [not applicable]). The point value depends of the answer (0 or 1 per item). The score of the modified index is calculated by the sum of the item scores, divided by the total number of applicable items and multiplied by 100. The total ranges from 0 to 100 points, with 90 to 100 points considered the recommended range. The score corresponds to the extent to which the material follows the criteria of the index.

Training and calibration for the use of this instrument were performed in three steps (theory, first practical application and second practical application [15 days after first practical exercise]). This process was conducted by the researcher in charge of the validation of the Brazilian version of the CDC-CCI (considered the "gold standard"). Four researchers examined 10 publications. The results were compared and achieved a good level of agreement (intra-examiner and inter-examiner Kappa > 0.70).

Statistical analysis

The variables were entered and organized on a spreadsheet of Microsoft Office Excel 2016 and subsequently exported to the Statistical Package for the Social Sciences (SPSS version 25.0) for analysis. The data were first submitted to descriptive statistics for the calculation of absolute and relative frequencies as well as central tendency, dispersion and position measures. Spearman's correlation test was used to determine correlations between the BR-CDC-CCI score and the number of likes, comments, views and hashtags. Significant differences in the BR-CDC-CCI score between the categories of the use of hashtags, addressing of the topic and publication by the Health Ministry were determined using the Mann-Whitney test. All analyses were conducted considering a 5% significant level ($p \leq 0.05$).

Results

Between 2011 and 2021, a total of 775 publications on oral cancer were identified in the official

health agency profiles analyzed. Table 1 displays the characterization of the sample. The compilation of all publications from Dental Councils accounted for 65% of the materials analyzed in this study. Most of the publications had images as the media format (94.2%); oral cancer was addressed as the main topic in 65.8% and was mentioned in the media (image/video) and legend in 58.7%; most used hashtags (63.6%) and the content was on actions of the government (61.5%).

The average number of posts per publication was 1.95 (SD: 1.96), with an average of 198.7 likes (SD: 625.7), 3.9 comments (SD: 20.5), 2469.4 video views (SD: 6278.2), 3.77 hashtags (SD: 4.26) and an average BR-CDC-CCI score of 69.8 (SD: 15.5) (Table 1). Among the publications classified as educational (n = 296), 34 were videos and were not submitted to analysis using the BR-CDC-CCI, as the instrument only applies to materials in text format. Based on the index, the quality and clarity of the information was considered adequate (score ≥ 90%) in only 9.5% (n = 25) of the educational publications. The proportion of publications with desirable BR-CDC-CCI scores (≥ 90%) in the items of parts A and B ranged from 64% to 100% and is detailed in Supplementary file 3, available at: https://data.scielo.org/dataset.xhtml?persistentId=doi:10.48331/scielodata.G6BYPJ.. Supplementary file 4 details the selection of publications, available at: https://data.scielo.org/dataset.xhtml?persistentId=doi:10.48331/scielodata.G6BYPJ.

The hashtags most used were #dentistry (179 mentions), #oralhealth (81), #SUS [public healthcare system] (70 mentions), #GreenJuly (65 mentions), #OralCancer (55 mentions) and #prevention (38 mentions), with an average of three descriptors per publication.

The number of publications on oral cancer increased annually. Two materials were found in 2013, which was the year of the first publications in the sample, whereas 235 publications were identified in 2021.

The BR-CDC-CCI score was not significantly correlated with any of the variables. The number of likes was positively correlated with the number of comments (r = 0.492), number of views (r = 0.867), number of hashtags (r = 0.139) and year of publication (r = 0.211). A positive correlation was also found between the quantity of hashtags and year of publication (r = 0.271) (Table 2). Publications from the Health Ministry had significantly higher BR-CDC-CCI scores (76.6) in comparison to the other profiles (p = 0.01) (Table 3).

Table 1. Characteristics of sample.

Variable	Frequency	
	n	%
Number of publications	775	100.0
Instagram profile		
Health Ministry	44	5.7
State Secretary of Health	100	12.9
Dental Council	504	65.0
Dental Association	127	16.4
Type of publication		
Image	730	94.2
Video	45	5.8
Addressing of topic		
Main content	510	65.8
Mentioned	265	34.2
Classification of publications		
Educational	296	38.2
Actions of government	477	61.5
Epidemiological bulletins	1	0.1
Combating fake news	1	0.1
Use of hashtag		
Yes	493	63.6
No	282	36.4
Publications per year		
2011	0	0.0
2012	0	0.0
2013	2	0.3
2014	5	0.5
2015	10	1.3
2016	13	1.7
2017	40	5.2
2018	102	13.2
2019	200	25.8
2020	168	21.7
2021	235	30.3
	Mean (SD)	Median (Q_1-Q_3)
Number of posts	1.95 (1.96)	1 (1-2)
Number of views of videos	2469.4 (6278.2)	372 (154-767)
Number of likes	198.7 (625.7)	46 (24-98)
Number of comments	3.9 (20.5)	0 (0-1)
BR-CDC-CCI score	69.8 (15.5)	70 (58-80)
Number of hashtags	3.77 (4.26)	3 (0-6)

Source: Authors.

Discussion

The majority of the educational publications on oral cancer analyzed in the present study obtained a "clear communication" score below the desired level. Only 25 publications (9.5%) were considered clear and of adequate quality for communication with the general public. The BR-CDC-CCI instrument pointed out that most publications did not have the main message highlighted, did

Table 2. Correlations between variables analyzed.

	BR-CDC-CCI score	Number of likes	Number of comments	Number of views	Quantity of hashtags	Year of publication
BR-CDC-CCI score	1[a]					
Number of likes	0.087[a]	1[b]				
Number of comments	0.039[a]	0.492[**][b]	1[b]			
Number of views	-	0.867[**][c]	0.508[*][c]	1[c]		
Quantity of hashtags	-0.119[a]	0.139[**][b]	0.065[b]	0.204[c]	1[b]	
Year of publication	-0.119[a]	0.211[**][b]	0.000[b]	0.244[c]	0.271[**][b]	1[b]

*$p \leq 0.05$, **$p \leq 0.01$. [a] Sample size for this analysis was 262 publications. [b] Sample size for this analysis was 775 publications. [c] Sample size for this analysis was 34 publications.

Source: Authors.

Table 3. Associations between BR-CDC-CCI score and use of hashtags, addressing of topic and publication by Health Ministry (n = 262).

Variable	Median (Q_1-Q_3)	p-value
Use of hashtags		
Yes	70 (57.1-80)	0.20
No	75 (60-84.6)	
Addressing of topic		
Main content	70 (58.3-83.3)	0.36
Mentioned	70 (57.1-80)	
Publication by Health Ministry		
Yes	75 (63.6-89.5)	0.01
No	70 (57.6-80)	

Significant results at 5% level.

Source: Authors.

not use the active voice, contained specialized terms or unknown words without presenting definition or clarification, risks and benefits were not explored and recommendations did not include behavior to the public.

Studies analyzing different types of health content[7,24,25] also found that materials used for educational purposes are not achieving their goals. These results indicate communication weaknesses and the need to improve the material published. The establishment of effective communication through governmental public health media can enhance the public's trust and possibly increase the effectiveness of the healthcare system as well as patient satisfaction with the care offered[26,27]. This is the first study to assess the quality of national publications on oral cancer on Instagram.

A point that also deserves attention is the fact that approximately half of the included publications in the past ten years were recent (from the years 2020 and 2021). This trend is likely due to the COVID-19 pandemic, as social media has been increasingly used for the dissemination of health information[28]. Despite that, we could not observe an increase in the BR-CDC-CCI scores during this period (2020-2021), reinforcing that there is still need to increase the clarity of information from Instagram publications of the official health agencies.

The engagement provided in social networks is strategic to expand knowledge and campaigns on health, in addition to making citizens more aware of their health and the society in which they are inserted[17]. There is a variety of methods for evaluating engagement in the virtual environment, such as taking into account the number of followers on the profile, number of publications, shares of likes, comments and views. However, there is no consensus on how to evaluate this issue, which was carried out subjectively in the present investigation. Engagement with the posts was considered low and disproportional to the number of followers that each profile had, especially considering the increase in the popularity of the Instagram platform in recent years and the time users spend connected per day[29,30]. The increase in the number of publications each year is evident and the preparation of materials requires assessment using validated instruments[16].

Considering the tendency toward an increase in new cases and deaths due to oral cancer in Brazil[11], all measures directed at the public to reduce the incidence of this disease are necessary. Smoking is the main risk factor for the development of this pathology. It is estimated that the risk of becoming ill among smokers is almost five times greater than among non-smokers. Preventing initiation and encouraging smoking cessation are fundamental primary prevention strategies for disease control[2,5].

The health profiles that most published about oral cancer were the Dental Councils. In contrast, the profile of the Health Ministry had only 44 publications on the topic. However, the publications of the Health Ministry had significantly greater clarity in comparison to those of the other profiles analyzed. Considering the number of followers and the scope of information furnished by the Health Ministry, a greater frequency of dedication to content on this topic is fundamental.

With the increasing dissemination of online health information, it is important to consider some aspects. The content provided needs to be understandable and clear so that the target public can make the proper decisions in an autonomous manner[31]. Public authorities should have interest in publishing reliable content based on scientific evidence due to the impact on adherence to disease prevention and control programs[32]. The increasing engagement of the population indicates the reach of actions implemented by government entities[33,34]. Thus, the assessment of the quality of the information and the content addressed and the quantification of engagement on the part of the public in publications by public agencies is necessary and helps understand the role of the social media of these agencies. The fulfillment of the National Curricular Guidelines is important and necessary, as health professionals need to be trained and capable for the production of these materials.

A greater number of likes of publications on oral cancer was positively correlated with other engagement measures, such as the number of comments, views and hashtags. Year of publication was also positively correlated with the quantity of hashtags used. Hashtags are keywords preceded by the "#" symbol that delimit shared content and facilitate search by users on a subject of interest. The use of this communication and search tool contributes to greater engagement and visualization of publications[35]. This is corroborated by the positive correlation found between quantity of hashtags and number of likes. In allusion to the prevention of head and neck cancer, the Green July campaign was referenced through #GreenJuly, standing out as one of the hashtags most frequently found in the publications analyzed. In fact, July was the second month with the highest number of publications in this study (17.9%). Altogether, it seems that post creators are becoming increasingly aware of the importance of the topic oral cancer and are using social media to disseminate health information on this matter and employing strategies to enhance engagement.

Official platforms of health agencies are important sources of information and educational material for the public. Recommendations for the production of print and online material include objectivity, rigor in the development and design of information with attention to vocabulary, organization and clarity, exploring the tools of social media in such a way as to make the best use of these media[36].

The present study has limitations that should be considered. Publications from only one online platform (Instagram) were analyzed. The study was restricted to the analysis of the clarity of educational publications in media with text. It was not possible to measure the clarity of publications in video format due to the choice of the assessment tool (BR-CDC-CCI), which limits the results. The use of only one instrument for evaluation is also a limitation of the study. It is routine in the health literacy field the concomitant use of more than one assessment instrument, especially those evaluating numeracy[37]. However, as this in an emergent field of study in Brazil, there are no complementary instruments to the BR-CDC-CCI for materials on social networks. An important issue of the instrument refers to its response options, as the option "not applicable" can be misinterpreted. We emphasize that users would benefit if the instrument could be more objective. Despite such an issue, the BR-CDC-CCI is a good indicator. However, the observation that strategies are needed to improve content addressing oral cancer confirms the contribution of the present study.

Government agencies have used the social medium Instagram to provide information on their actions, guide decision making on the part of individuals and interact with the population. However, the material available on oral cancer warrants greater attention regarding the quality of the content. The focus should be on improving the quality of the information and facilitating understanding on the part of the population to contribute to greater autonomy in the adoption of behaviors compatible with individual and collective health, consequently diminishing the occurrence of adverse conditions in the public health realm.

Collaborations

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