

Artificial Intelligence Chatbots as Sources of Information on Oral Cancer: Assessment of Readability and Discursive Content

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Chatbots de Inteligência Artificial como Fontes de Informação sobre Câncer de Boca: Avaliação da Legibilidade e do Conteúdo Discursivo

Chatbots de Inteligencia Artificial como Fuentes de Información sobre Cáncer Oral: Evaluación de la Legibilidad y del Contenido Discursivo

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ABSTRACT

Introduction: The growing use of artificial intelligence (AI) chatbots as sources of health information requires a critical evaluation of the readability and communicative adequacy of their responses, particularly regarding sensitive topics such as oral cancer. **Objective:** To evaluate and compare the readability of responses provided by different AI chatbots to basic questions about oral cancer and to describe the discursive content generated by these platforms. **Method:** This observational and descriptive study evaluated ten AI chatbots that answered seven standardized questions. Textual readability was assessed using an automated tool by calculating a global mean score. Additionally, the Discourse of the Collective Subject technique was applied to synthesize the convergent content of the responses for each question. **Results:** The global mean readability score was 12.9, a borderline value classified as high readability, indicating a required educational level equivalent to completion of secondary education, with variations across platforms and question types. Convergence was observed around a technically adequate biomedical core, associated with recurrent expansion of content beyond the scope of the questions. **Conclusion:** Although AI chatbots show potential to expand access to information on oral cancer, persistent limitations related to readability, content organization, and communicative adequacy remain, indicating the need for human curation to ensure complementary and equitable use in health contexts.

Key words: Generative Artificial Intelligence; Comprehension; Health Communication; Mouth Neoplasms.

RESUMO

Introdução: A utilização crescente de *chatbots* de inteligência artificial (IA) como fontes de informação em saúde demanda avaliação crítica da legibilidade e da adequação comunicacional das respostas, especialmente em temas sensíveis como o câncer de boca. **Objetivo:** Avaliar e comparar a legibilidade das respostas fornecidas por diferentes *chatbots* de IA a perguntas básicas sobre o câncer de boca e descrever o conteúdo discursivo gerado pelas plataformas. **Método:** Estudo observacional e descritivo com dez *chatbots* que responderam a sete perguntas padronizadas. A legibilidade textual foi analisada por ferramenta automatizada, com cálculo de uma média global. Complementarmente, aplicou-se a técnica do Discurso do Sujeito Coletivo para sintetizar o conteúdo convergente das respostas por pergunta. **Resultados:** A média global de legibilidade foi de 12,9, valor limítrofe classificado como alta legibilidade, indicando exigência de escolaridade equivalente ao ensino médio completo, com variações entre plataformas e tipos de pergunta. Observou-se convergência de conteúdo em um núcleo biomédico tecnicamente adequado, associado à expansão recorrente do conteúdo para além do escopo das perguntas. **Conclusão:** Embora os *chatbots* apresentem potencial para ampliar o acesso à informação sobre câncer de boca, persistem limitações relacionadas à legibilidade, à organização do conteúdo e à adequação comunicacional, indicando a necessidade de curadoria humana para uso complementar e equitativo em saúde.

Palavras-chave: Inteligência Artificial Generativa; Compreensão; Comunicação em Saúde; Neoplasias Bucais.

RESUMEN

Introducción: El uso creciente de *chatbots* de inteligencia artificial (IA) como fuentes de información en salud exige una evaluación crítica de la legibilidad y de la adecuación comunicacional de sus respuestas, especialmente en temas sensibles como el cáncer oral. **Objetivo:** Evaluar y comparar la legibilidad de las respuestas proporcionadas por diferentes *chatbots* de IA a preguntas básicas sobre el cáncer oral y describir el contenido discursivo generado por las plataformas. **Método:** Estudio observacional y descriptivo con diez *chatbots* de IA que respondieron a siete preguntas estandarizadas. La legibilidad textual se analizó mediante una herramienta automatizada, con el cálculo de una media global. De forma complementaria, se aplicó la técnica del Discurso del Sujeto Colectivo para sintetizar el contenido convergente de las respuestas por pregunta. **Resultados:** La media global de legibilidad fue de 12,9, un valor límite clasificado como de alta legibilidad, que indica un nivel educativo equivalente a la finalización de la educación secundaria, con variaciones entre plataformas y tipos de pregunta. Se observó convergencia de contenido en un núcleo biomédico técnicamente adecuado, asociado a una expansión recorrente del contenido más allá del alcance de las preguntas. **Conclusión:** Aunque los *chatbots* de IA presentan potencial para ampliar el acceso a información sobre el cáncer oral, persisten limitaciones relacionadas con la legibilidad, la organización del contenido y la adecuación comunicacional, lo que señala la necesidad de curaduría humana para un uso complementario y equitativo en salud. **Palabras clave:** Inteligencia Artificial Generativa; Comprensión; Comunicación en Salud; Neoplasias de la Boca.

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INTRODUCTION

Oral cancer is a malignant neoplasm that affects the structures of the oral cavity such as the lips, tongue, gums and floor of the mouth. In 2022, approximately 389,000 new cases and 188,000 deaths from this cancer occurred worldwide, with a higher incidence observed in low-and middle-income countries¹. In Brazil, approximately 17,190 new cases were estimated annually for the triennium 2026-2028, placing the disease among the cancers with the highest incidence in the country².

The main risk factors associated with oral cancer are tobacco use and alcohol consumption which act synergistically. Other factors associated with the development of the disease are infections by the human papilloma virus (HPV), chronic sun exposure and persistent inflammatory oral conditions³.

Despite its epidemiological relevance, the literature shows that the knowledge of the population about oral cancer remains limited. Although a large part of the individuals are already aware about the disease, many are unaware of its initial signs and risk factors, in addition to underestimating the severity of the condition^{4,5}. This gap is more evident in individuals with low educational level and low income, exactly those more exposed to the main etiologic factors⁶. Therefore, the access to accessible and clear information on the theme, essential for the prevention and treatment, is still challenging.

It is known that the Internet is consolidated as one of the main health information sources for the overall population. When seeking health information, many individuals first use easily accessible digital tools because they offer anonymity and provide quick answers⁷. With the recent advance of artificial intelligence (AI), especially with the development of large scale models – LLM, a specific class of systems, the AI chatbots, have been consolidated. Because they are conversational, personalized and exhibit social presence to the users their adoption and use is increasing⁸.

Recent evidences indicate that these systems present high acceptability and engagement among users, acting as emerging sources of health-related information and offering continuous and accessible support further to being non-judgemental⁹. Therefore, it is understandable that AI chatbots are a new interface to access health information with high potential of growth in the upcoming years.

However, like other forms of health information, the usefulness depends on the veracity of the content and its readability. The actions of health communication may use textual language and structures beyond the average populational level, utilizing technical terms that are

difficult to be understood by low-educated individuals. This is critical in relation to oral cancer whose occurrence is higher in least educated groups^{10,11}. Difficulties of reading and interpreting texts can lead to misunderstanding of the recommendations, affecting the behavior in health. Simple and clear language are essential for the efficacy of health communication.

The concept of textual readability is defined as how easily the reader is able to understand a written text considering linguistic and structural characteristics such as the sentences length, number of syllables per word, the syntactic complexity and vocabulary adopted. Readability is a central element of communication in health because it determines how accessible a text is for different levels of literacy and directly influences the capacity of the reader to interpret and apply the information received¹². Therefore, adequate levels of readability are essential to promote equitable access to health information.

Regardless of a rising number of studies on AI chatbots, analyzes on oral cancer are still scarce, especially in Portuguese. This study attempts to fill in the gaps by comparing different platforms and examine simultaneously the readability and the discursive content produced about a relevant theme for the public policy in Brazil.

In light of this context, the present study aims to evaluate and compare the readability of the responses provided by different AI chatbots to basic questions on oral cancer. Additionally, the responses are synthesized by questions through the technique of Discourse of the Collective Subject (DCS) in order to describe the discourse content generated by the platforms. Thus, it is attempted to contribute to the discussion about the equitable access to health information and communicative effectiveness of AI-based novel technologies.

METHOD

Observational, descriptive study of ten AI chatbots in the standard configuration: ChatGPT (GPT-5); Claude (Sonnet 3.5); Consensus; Copilot (Insight 1.0); DeepSeek (V3); Gemini (3 Flash); Grok (4.20); Manus (1.6 lite); Meta AI (Muse Spark 1.2) and Perplexity AI (4.1).

After creating a free profile exclusively for that purpose, in October 2025 the same seven basic questions in Brazilian Portuguese were asked to each chatbot only once in the standard mode without additional adjustments of configurations of the platforms or variations of context or repetition of prompts. It was attempted to reflect the common use by lay users. The first response answered by each tool was considered in order to standardize the comparison. The questions were: 1) “What is oral

cancer?"; 2) "What causes oral cancer?"; 3) "How to prevent oral cancer?"; 4) "How to identify oral cancer?"; 5) "How to diagnose oral cancer?"; 6) "Is oral cancer treatable?"; 7) "If I suspect I have oral cancer, where should I seek care?". The seven questions were defined for being basic doubts about oral cancer, addressing different stages of the informational journey of the user since the onset of the disease until the treatment.

The responses were fully copied from the interface of each chatbot without modifications of the textual content and stored in a spreadsheet for further analysis. The content was analyzed entirely, except in case of emojis that were deleted. Each response was treated as an independent textual unit of analysis, representing the output of a platform to a specific question.

The readability was evaluated in the platform "*ALT – Análise de Legibilidade Textual*", a software developed in Brazilian Portuguese able to calculate the global mean of readability. This result was classified according to the intervals recommended¹³: High readability (mean value lower than 13); Average readability (mean value equal or higher than 13 and lower than 17); Low readability (mean value equal to 17 or higher). The performance of different AI tools as well as the readability per question was analyzed. The readability was analyzed as indicator of the easiness to read the responses. The informational quality, understood as accuracy and completeness of the content, was not evaluated.

Additionally, to synthesize the content of the responses, the technique of DCS was applied, based on the Theory of Social Representations. The DCS consists in the construction of a synthesis discourse drafted in the first person of the singular from textual discourses with similar meanings. Its operationalization involves the identification of Key Expressions (KEs), Central Ideas (CIs) and Anchors (ACs), when present, understood, respectively, as relevant literal texts, syntheses of the general meaning of the narratives and formulations that express beliefs, values or assumptions encountered in the discourse. In the present study, the responses were fully read segmented in KEs and grouped in CIs semantically equivalent for the elaboration of DCS^{14,15}.

The responses to each question generated by the platforms were fully read and segmented in KEs supported by the software NVivo 14¹⁶. Next, KEs were grouped in semantically equivalent CIs drafted in the first person of the singular from the organization of the respective KEs with edition restricted to minimal adjustments of cohesiveness and removal of redundances without introduction of external content to the corpus¹⁷. For purposes of textual synthesis, the DCS associated with more recurrent CIs of each question was treated as

predominant, keeping the others as non-predominant. This process was performed upon consensus between two investigators.

In compliance with Directive number 510/16¹⁸ of the National Health Council, the review by the Ethics Committee was waived because human subjects were not involved.

RESULTS

The global mean among the platforms was 12.9, classified as high readability. This level indicates a level of textual complexity compatible to readers who completed high-school (around 13 years of education). Six platforms were classified as high readability and four as average readability. Gemini (10.9) was the platform with the lower mean global value indicating easiness of textual understanding. The platform Consensus presented the highest mean global value (16.0), with texts of increased reading complexity (Figure 1).

The performance analysis per question showed that Grok and Gemini presented the better readability in two questions. The platforms Copilot, Gemini, Claude, ChatGPT and Deepseek presented the best performance in one question. In contrast, the platform DeepSeek had the worst performance in three questions and Consensus, in two (Figure 2).

The responses to the question "How to prevent oral cancer?" presented the better mean of readability (11.3). On the other hand, the responses to the question "Is oral cancer treatable?" presented the highest mean global value (14.2), indicating high linguistic complexity. Three questions presented means within the average range of readability while four questions were classified as high readability (Figure 3).

The analysis of DCS constructed for each one of the seven questions on oral cancer shows high uniformity of the informational nucleus presented by the platforms. Additionally, it was noticed that the responses are seldom limited to the strict enunciation of the questions because the chatbots expand the content with complementary explanations on the theme, incorporating definitions, risk factors, warning signs, guidelines of conduct and referrals, even when these elements extrapolate the immediate scope of the question (Chart 1).

DISCUSSION

The mean readability of the responses generated by AI chatbots on oral cancer is within the limit of high readability, requiring approximately 13 years of education for comprehensive understanding, which is equivalent



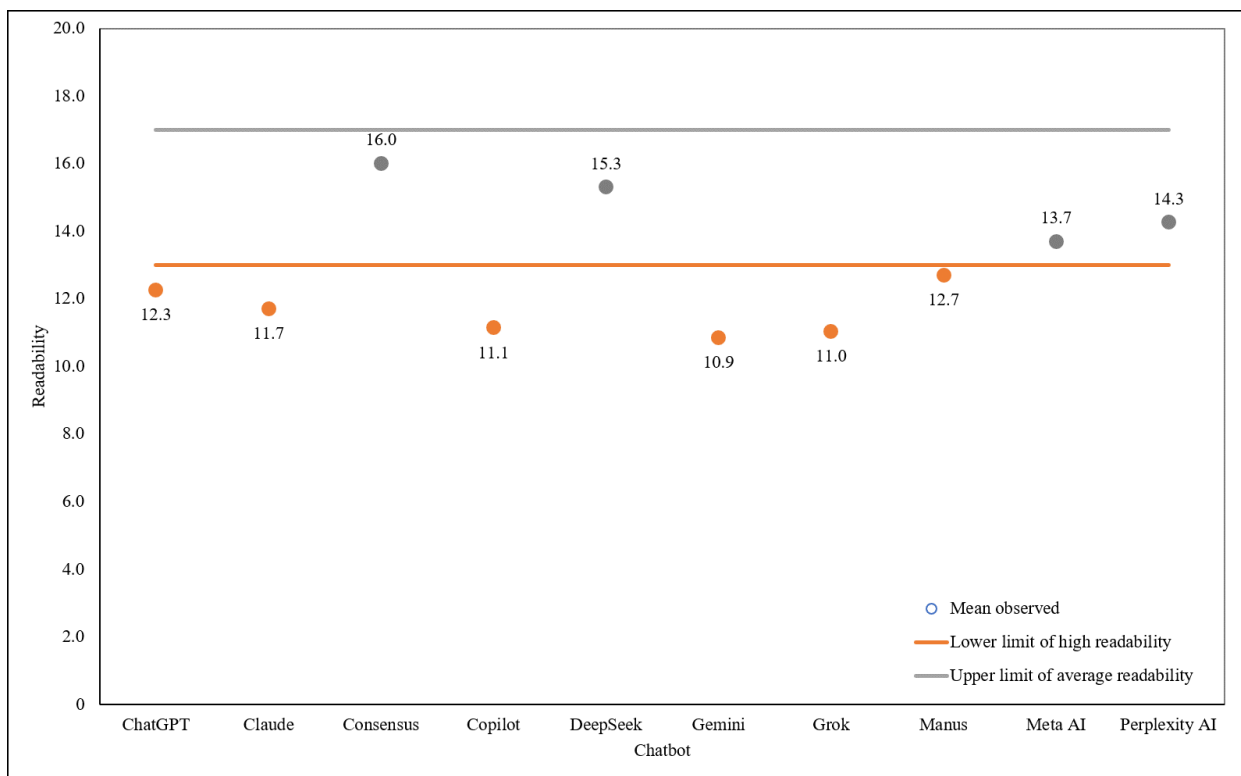


Figure 1. Global means of readability metrics per platform

Platform*	What is oral cancer?	What causes oral cancer?	How to prevent oral cancer?	How to identify oral cancer?	How to diagnose oral cancer?	Is oral cancer treatable?	If I suspect I have oral cancer, where do I seek care?
Gemini	10.7	11.8	7.6	9.1	11.9	13.3	11.7
Grok	9.3	10.4	8.2	10.8	12.9	14.2	11.6
Copilot	12.2	11.6	8.7	10.5	12.3	10.8	12.0
Claude	11.8	10.7	9.5	13.7	13.2	13.1	10.2
ChatGPT	15.2	12.7	9.3	15.0	10.8	12.0	10.9
Manus	14.7	13.8	10.8	11.1	13.6	13.3	11.6
Meta AI	10.8	17.1	13.3	11.9	15.0	14.4	13.6
Perplexity AI	12.9	13.1	13.9	13.3	15.0	16.8	15.0
DeepSeek	10.2	10.5	15.2	18.7	17.4	19.5	15.7
Consensus	14.9	15.9	17.0	17.7	16.2	14.6	15.8

Figure 2. Heatmap of readability per question and platform, ranging from high readability (green) to low readability (red)
 *Platforms sorted in ascending order of global mean of readability metrics.

to completion of high-school. Furthermore, DSC analysis revealed a recurring trend where responses went beyond what was actually asked, adding explanations and complementary recommendations. This pattern appears to be associated with an implicit logic of language models based on the assumption that a larger volume of information and expanded contextualization would result in better comprehension.

Although the inclusion of additional explanations and contextualization reflects the intention to provide complete and accountable responses, this discursive expansion tends to increase the textual density and cognitive burden imposed to the lay reader, hindering the identification of what is essential for decision-making. Evidences indicate that in health contexts, the excess of information can compromise the practical understanding,

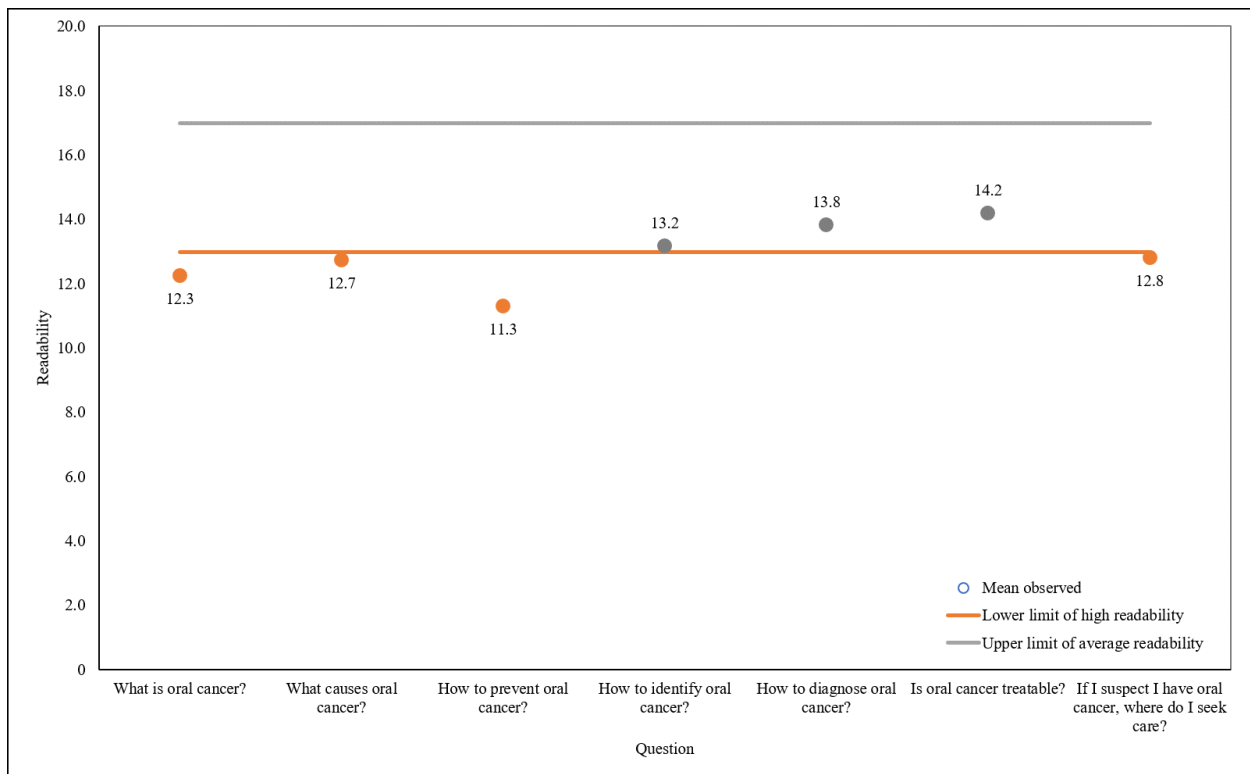


Figure 3. Global means of readability metrics per question

create confusion and reduce the ability to act, especially for low health literacy groups^{11,19}. Thus, the informational expansion may fail to achieve didactic function and be an obstacle to the understanding instead, especially among most vulnerable groups because more information does not necessarily imply in better communication.

Even though the readability level found is an improvement compared to previous assessments of health digital materials, it remains above the recommended level for health communication, presenting relevant linguistic barriers to effective access to information for populations with lower educational attainment. There are evidences that these limitations are not episodic or restricted to the theme of oral cancer but reflect a recurring challenge of AI chatbots applied to health^{11,12,19-21}.

In that sense, the informational gain of these platforms^{22,23} not always translates into accessible information, preserving the readability as critical dimension for its use in health literacy and information. Therefore, the democratization of AI-mediated health-related information depends on better textual clarity because advances of semantic sophistication and technical correction have not ensured, on their own, an effective communication^{1,24-27}.

In Brazil, the emphasis on communication clarity and intelligibility have recently gained legislation support through Law number 15,263 of 2025²⁸ and Law number

14,129 of 2021²⁹ that determined the use of clear and understandable language by the individual. Although both laws are applicable to the public administration and not directly to AI platforms, they are in line with the results of the present study when they reinforce the relevance of the clarity, accessibility and communicational adequacy while offering information, including those related to health.

Additionally, differences among free and paid versions of these platforms have been identified, the free versions tended to present low readability with direct implications on the equitable access to health information³⁰. This characteristic can be critical in scenarios of low education attainment, as is often the case among groups at high risk of oral cancer^{10,31} because they can reinforce the already existing disparities. In this perspective, the readability and organization of the content are no longer just style or technical attributes of communication, but instead, they start to function as communicational determinants potentially expanding the symbolic barriers of healthcare, impacting the understanding, adherence and adequate use of the services²⁵.

It has also been observed that readability varies according to the type of question, with worse performance in more clinical questions, especially related to the treatment. This difference is plausibly explained by increased terminology density inherent to the clinical field. However, from the perspective of healthcare, it is a sensitive finding because the phase of the treatment coincides with high stress, fatigue

Chart 1. Discourses of the Collective Subject and non-predominant ideas per question and adherence to AI chatbots

Question	Discourse of the Collective Subject	Non-predominant ideas
What is oral cancer?	<p>I believe that oral cancer is a malignant tumor that develops in the oral cavity and can affect lips, tongue, gingiva, cheeks, palate and floor of the mouth and oropharynx. It results from the uncontrolled growth of abnormal cells and is known as squamous cell carcinoma. It can start discreetly with sores or ulcers that do not heal, white and red spots, nodules or swelling in the mouth or neck, as well as persistent pain. Difficulty to swallow, chew or talk, numbness, bleeding or problems of prosthetics adjustment may occur. The main risk factors are smoking and alcohol abuse, especially if combined, in addition to human papilloma virus infection, solar exposure on lips, poor oral hygiene and chronic trauma as ill-adjusted prosthetics. Diet and family history and genetic factors are risk factors as well. Early diagnosis is a determinant. Persistent alterations for more than two weeks should be motives to seek a professional.</p>	<ul style="list-style-type: none"> • Affirmation that there are no screening tests • Brazil's epidemiologic data • Description of the treatment • Classification as "head and neck cancer" and inclusion of throat, tonsils and salivary glands as related areas • Mechanistic explanation of carcinogenesis • Other preventive measures (HPV vaccination, dental dam for oral sex) • Other risk factors (chewing betel nut, obesity, immunosuppression) • Other signs and symptoms (hoarseness, bad breath, weight loss, sensation of something "stuck in the throat", limitation of the motion of the tongue and mandible, ear pain and wobbly teeth) • Laryngoscopy, pharyngoscopy and panendoscopy to complement the diagnosis
What causes oral cancer?	<p>I understand that oral cancer does not have a single cause but is linked to exposure to risk factors that can damage the cells of the mucosa, cause DNA changes, generate mutations and lead to uncontrolled growth, forming a malignant tumor. The main risk factors are smoking, alcohol use (especially if associated with tobacco), solar exposure (for lip cancer), human papilloma virus infection, poor oral hygiene, chronic irritations (including ill-adjusted prosthetics) and low fruits and vegetables diet. Reducing the exposure to these factors is a form of prevention and risk reduction</p>	<ul style="list-style-type: none"> • Better response to the treatment of human papilloma virus related tumors • Other risk factors (very hot drinks, occupational or environmental exposure, family history and genetic factors, age, low immunity, obesity and other viruses in addition to HPV)
How to prevent oral cancer?	<p>I understand that oral cancer prevention depends on the reduction of modifiable risk factors and surveillance of oral health. I should not smoke, avoid or reduce alcohol use and avoid the combination of these products. I must apply sun blockers to protect the lips, eat healthy diet with fruits, legumes and vegetables, perform oral hygiene, go regularly to the dentist and submit to tests and exams and watch my mouth regularly. If I notice wounds, spots or lumps persisting for more than 15 days, I should seek professional care. I must adopt preventive measures against the human papilloma virus as vaccination and safe sexual activities. Early detection is decisive for the diagnosis</p>	<ul style="list-style-type: none"> • Description of the target-audience of vaccination against human papilloma virus in the National Health System (SUS) • Mention to tobacco cessation programs in SUS • Other preventive measures (weight control, regular tooth cleaning by a dentist and well-adjusted prosthetics, treatment of chronic inflammations, periodontal diseases and oral infections, avoid ultra-processed food, sugary foods, processed meat, very hot food and drinks, avoid unprotected sun exposure) • Quantification of probability of cure with early detection
How to identify oral cancer?	<p>I understand that I may suspect of having oral cancer when signs and symptoms persist for at least 15 days. This includes wounds, lesions and ulcers that don't heal, red or white spots, persistent pain and bleeding without apparent cause. I also consider bumps, nodules or swelling in the mouth and neck, numbness in areas of the mouth, voice changes, unjustified weight loss and difficulty to chew, swallow, talk or move the tongue as warning signs. I can do an auto-examination to detect changes and in face of persistent signs, I must seek a doctor or a dentist with confirmation by biopsy. Early detection improves the prognosis and increases the chances of cure.</p>	<ul style="list-style-type: none"> • Only professionals can confirm the diagnosis • Risk factors can raise suspicion • Mild onset of lesions and possibility of benign symptoms • Mention to SUS and care pathway • Complementary methods (clinical examination, toluidine blue, self-fluorescence, special lights, exfoliative cytology, artificial intelligence and imaging exams) • Other signs and symptoms (lump in the neck, dental mobility, ill-adjusted prosthetics, bad breath, lip cracks, trismus and ear pain) • Percentage of cure by staging

To be continued

Chart 1. Continuation

Question	Discourse of the Collective Subject	Non-predominant ideas
How to diagnose oral cancer?	I understand that the diagnosis of oral cancer is performed by healthcare professionals and begins with a thorough clinical exam with inspection of the oral cavity to identify suspicious lesions. Whether a suspicious lesion exists, a biopsy is conducted to confirm. After the confirmation, imaging tests to evaluate the disease extension are requested and define the staging, that guide the treatment plan. I emphasize that early diagnosis is associated with better outcomes	<ul style="list-style-type: none"> • Self-examination as support to early detection • Temporal persistence triggers the investigation • Description of lack of screening for the overall population • Multidisciplinary team for the treatment • Where to seek care in SUS • Other complementary exams (anamnesis, palpation, evaluation of the neck, endoscopy, laryngoscopy, panendoscopy, dyes, special lights and autofluorescence, blood tests for the overall condition and human papilloma virus tests) • Percent of cure in initial stages • 30-day law for diagnostic confirmation
Is oral cancer treatable?	I understand that oral cancer is treatable and the chance of cure is high if diagnosis occurs earlier. Management is individualized and varies according to the stage, location of the tumor and clinical conditions. The most cited modalities include surgery, radiotherapy and chemotherapy frequently combined according to the necessity. Immunotherapy and target-therapy are options in specific situations. Care is multidisciplinary and multiprofessional, standing out speech therapy and functional rehabilitation focused to my speech, mastication and deglutition	<ul style="list-style-type: none"> • Access to and care pathway in SUS • Post-treatment follow-up to monitor relapse • Treatment side effects • Mention to "60-day law" • Other treatments (more extensive surgeries in advanced cases, palliative care, cervical emptying and lymphadenectomy, reconstruction and rehabilitation of esthetic function, intensity modulated radiation therapy, brachytherapy, robotic surgery and photodynamic therapy)
If I suspect I have oral cancer, where do I seek care?	If I suspect I have oral cancer, I will seek a dentist or a primary health care of SUS for initial evaluation and referral. Overall, the care pathway consists in referral to a Dental Specialized Service, stomatology service or evaluation by specialized physicians as otorhinolaryngologist, head and neck surgeon and oncologist. If necessary, I should attend accredited hospitals and oncology reference centers	<ul style="list-style-type: none"> • 15-day suspicion criteria • Mention to "60-day law" • Explicit mention to local family health strategy in SUS • Specific mention to High Complexity Oncology Center, High Complexity Oncology Unit or the National Cancer Institute • In urgencies, seek prompt care unit or hospital emergency • Guidelines on administrative flow in SUS • Guideline to seek a private dentist when possible • List of warning signs

and emotional vulnerability requiring decision-driven simple and straight communication^{32,33}. It is possible that there is a mismatch between the linguistic complexity of the responses and the ability of the user to process and understand exactly when he/she needs the clearest information as possible to adhere to the care.

The findings show still that there are differences among the platforms in regard to the use of health technical terminology which can be associated with how the models of AI have been trained. Those that rely more on scientific evidences, as, for instance, Consensus, tend to prioritize technical terms while the models exposed to daily language as Grok use to produce more fluent texts in simple language. The literature suggests that, when well calibrated and utilized

in adequate situations, the different chatbots can reach understanding levels close to those of human interactions. Therefore, it is possible to improve the communicational performance if an appropriately trained tool is chosen^{34,35}.

In light of this scenario, the results advocate that the effectiveness of the chatbots for the democratization of the access to the information depends on human curation, linguistic contextualization and attention to the educational level of the target-audience. In addition, from the ethical perspective, AI should be treated as supplement and not as a substitute of professional guideline^{36,37}. The improvement of the readability should be pursued in order to translate scientific accuracy into understandable language for different profiles of users^{9,27,34}.



Beyond readability, the synthesis of the responses through DCS indicated convergence around a biomedical core that, although technically adequate, tends to be ill-adjusted to the daily language utilized in the enunciation of the questions. This asymmetry between the simplicity of the questions and the specificity of the responses can limit the practical appropriation by the lay public. Furthermore, the underrepresentation of structural dimensions of illness and care reinforces discourses of individual responsibility, drawing less attention to the importance of social inequalities, access barriers and institutional determinants regarding illness and healthcare utilization. This is a particularly critical point in oral cancer where there is strong association between socioeconomic level and risk of the disease^{10,38}, so that the omission of these dimensions can make the guideline provided insufficient exactly for the most vulnerable groups, increasing the distance between specialized knowledge and actual healthcare demands.

On the other hand, the analysis of the non-predominant ideas indicates that the expansion of the content may assume the format of practical disinformation, although the analysis of factual errors has not been done. The incorporation of more specific, rare or strongly context-dependent information as the consumption of areca and auxiliary methods as autofluorescence or toluidine blue, occurs without clear mechanisms of selection, hierarchization or distinction between what is central or exceptional. This, while hindering the identification of what is effectively relevant, compromises the practical understanding of the information, most of all among low literacy users. In that sense, the attempt of not omitting information can produce a reverse effect than the expected, since the overburden of peripheral or non-consensual contents competes with essential guidelines, damaging the ability of the user to recognize priority and usable healthcare information³⁹.

Within SUS, the results should not be interpreted as indicative of immediate adoption of the platforms by the services, considering the lack of institutional governance about the contents created and the variability of the responses. The main contribution of the study is to reveal contemporary challenges of the communication in health and provide material for the development of educational and informational strategies accessible and responsive to meet the public demands.

The study limitations should be acknowledged. It is a cross-sectional analysis conditioned to specific versions of models subject to frequent updates. In addition, the focus was the readability, other equally relevant communicational dimensions as empathy and factual accuracy were not evaluated. Also, only one response per question in each platform was evaluated which does not

allow to capture the potential variability of the outputs generated by the models. Even though, while converging the results with international findings, they reinforce that the readability should be treated as a core component for ethical, inclusive and safe use of AI in health, most of all in contexts of great vulnerability as oral cancer.

CONCLUSION

This study evaluated the readability of responses to basic questions about oral cancer produced by different AI chatbots. The generated texts require a reading level equivalent to a high-school education, which is above the level recommended for public health communications. Although these tools present potential to expand the access to information, the results indicate that textual clarity is still a relevant barrier to the comprehension among the lay public, especially those with low educational attainment.

The analysis of the DCS revealed high convergence in the biomedical core of the responses associated with a recurring trend of expansion of the content beyond the strict scope of the questions. If not followed by filtering and hierarchical mechanisms, the expansion of the content can compromise the readability and identification of prioritized guidelines, limiting the practical applicability of the information.

In that sense, the adoption of these technologies should be supported by human curation, attention to socio-cultural context and linguistic adequacy to the target-audience in order to ensure that scientific accuracy is effectively translated into accessible communication to individuals seeking information on oral cancer. AI chatbots should be understood as complementary tools to professional care. The improvement of the readability and informational organization is a required condition for these technologies to contribute ethically and responsibly to the democratization of the access to health information, particularly in more vulnerable contexts as oral cancer.

CONTRIBUTIONS

All the authors contributed substantially to the conception and design of the study, acquisition, analysis and interpretation of the data, drafting and critical review. They approved the final version to be published.

DECLARATION OF USE OF ARTIFICIAL INTELLIGENCE

The authors utilized AI tools exclusively to support the drafting of the manuscript and refinement of the language and were not utilized in other phases of the study.

DECLARATION OF CONFLICT OF INTEREST

There is no conflict of interests to declare.

DATA AVAILABILITY STATEMENT

All content underlying the text of the article is contained in the manuscript.

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