The International Agency for Research on Cancer Handbook of Oral Cancer Prevention as a Framework for Future Screening Programs in Brazil

https://doi.org/10.32635/2176-9745.RBC.2026v72n3.5624EN

O Manual da Agência Internacional para Pesquisa em Câncer sobre Prevenção do Câncer Oral como Referência para Futuros Programas de Rastreamento no Brasil

El Manual de la Agencia Internacional de Investigación sobre el Cáncer sobre la Prevención del Cáncer Oral como Referencia para Futuros Programas de Detección en el Brasil

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INTRODUCTION

The Handbooks of Cancer Prevention series, developed by the International Agency for Research on Cancer (IARC), was launched in 1995 to complement the IARC Monographs series. It comprises a collection of authoritative publications that critically analyze and synthesize the scientific evidence on cancer prevention[1]. Collectively, these Handbooks provide evidence-based recommendations to assist governments and public health stakeholders in formulating policies and interventions aimed at reducing the global cancer burden[2]. To date, 20 volumes have been published and are freely available through the IARC Handbooks website[1].

In 2020, a multidisciplinary Working Group of 25 international experts convened to review and synthesize the latest scientific evidence on primary and secondary prevention of oral cancer, culminating in the publication of the IARC Handbooks Volume 19: Oral Cancer Prevention in 2023. This is the first volume of the IARC Handbook series to focus exclusively on oral cancer prevention[2,3]. The evidence complied in this publication provides a unique and comprehensive foundation for developing and implementing evidence-based strategies to strengthen oral cancer prevention and early detection, with a focus on low- and middle-income countries with high oral cancer incidence.

The present opinion article aims to contextualize the key findings and recommendations of this IARC Handbook within the Brazilian public health landscape. By bridging global evidence with national priorities, it seeks to guide future oral cancer screening initiatives and stimulate dialogue among researchers, clinicians, and policymakers. Ultimately, the goal is to promote integrated, equitable, and sustainable strategies for oral cancer prevention and control in Brazil and other Latin American and Caribbean (LAC) countries.

DEVELOPMENT

The global burden of oral cancer is a known public health challenge, with high incidence and mortality rates exacerbated by social, economic, and healthcare inequalities. According to the Global Cancer Observatory (GLOBOCAN) 2022, lip and oral cavity cancer ranks as the 16th most common cancer, with approximately 389,485 new cases and 188,230 deaths annually[4]. Although its incidence is lower than that of other tumors for which organized screening programs exist[4], oral cancer has a strong potential for early detection and is highly mutilating when diagnosed at advanced stages. The disease disproportionately affects low- and middle-income countries, where early detection and access to specialized care are limited. In LAC, an estimated 19,000 new cases were reported in 2022, representing roughly 5.0% of global incidence and 4.4% of global mortality[5]. However, these figures likely underestimate the actual disease burden in the region. For instance, GLOBOCAN 2020 projected only 17,888 new cases of lip and oral cavity cancers across all LAC countries combined[3], whereas Brazil alone, which comprises 30% of the region's population, estimated more than 17,190 new cases annually, according to the Brazilian National Cancer Institute (INCA)[6]. This stark discrepancy highlights a critical problem of

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underreporting and incomplete cancer registration, which undermines effective surveillance, resource allocation, and public health planning.

The 17,190 new cases of oral cavity cancer estimated annually by INCA for the period 2026-2028 rank the disease as the eighth most common cancer in Brazil (excluding non-melanoma skin cancer). It is the fourth most frequent malignancy among men in the Southeast region, fifth in the Midwest, South and Northeast, and sixth in the North, highlighting its substantial epidemiological and social burden within Brazil. Although women are less affected, incidence has increased in both sexes over recent years[6,7]. Addressing this underestimation through strengthened cancer registries and harmonized reporting is essential to accurately define the burden of disease, guide prevention strategies, and evaluate the impact of national and regional oral cancer control initiatives.

In this context, the National Policy for Cancer Prevention and Control[8] highlights the importance of actions aimed at reducing the incidence of various types of cancer, including oral cancer, as well as decreasing related mortality and disabilities. To this end, coordinated primary and secondary prevention measures for the population are essential. High incidence and mortality rates of oral cancer are linked to social, economic, political, cultural and demographic determinants that fragment and limit healthcare access across Latin America[9-11]. In Brazil, more than 75% of oral cancer cases are diagnosed in advanced stages, a reflection of systemic barriers that contribute to the country's persistently high mortality rates[12]. When detected late, the disease is highly mutilating, leading to substantial functional and psychosocial impairment. The five-year overall survival for oral cancer remains only 35.8% in Brazil[13], underscoring the dismal prognosis associated with late-stage diagnosis and the urgent need for effective preventive and early-detection strategies.

Primary prevention involves reducing or eliminating exposure to known risk factors such as tobacco (smoked or smokeless), alcohol consumption, and human papillomavirus (HPV) infection[2] (although relevant for oropharyngeal carcinomas, HPV accounts for only a small subset of oral cavity cancer cases). When combined, tobacco and alcohol use synergistically amplify the risk for oral cancer. The IARC Handbook of Oral Cancer Prevention provides robust evidence that cessation of either habit substantially reduces oral cancer incidence[2,3]. In alignment with these evaluations, the Brazilian National Health System (SUS) has long implemented nationwide programs targeting tobacco and alcohol cessation[14-18], and HPV vaccination for 9- to 14-year-old children[19], thereby reinforcing the central role of primary prevention in mitigating the country's cancer burden[20].

Secondary prevention aims to achieve early detection and timely access to treatment[3]. Early detection encompasses two main components: early diagnosis, defined as the identification of disease in its earliest stage, and screening, which consists of testing asymptomatic and otherwise healthy individuals for the disease. Clinical oral examination (COE) consists of systematic visual and tactile inspection of the oral cavity, perioral structures, and neck, to identify oral potentially malignant disorders (OPMDs) and early-stage oral cancers. COE has demonstrated sensitivity ranging from 50% to 99% and specificity between 75% to 99%[21] when performed by trained clinicians, underscoring its diagnostic reliability. Moreover, when screening is targeted toward high-risk populations, its efficiency and cost-effectiveness increase[2]. High-risk individuals typically include adults aged 40 years or older, tobacco and/or alcohol users, and patients with OPMDs[2,3]. The IARC Handbook concluded that performing clinical oral examination (COE) among high-risk individuals is associated with a reduced incidence of advanced oral cancer[2,3].

In Brazil, however, public health efforts currently emphasize early diagnosis rather than screening programs for oral cancer; it is estimated that a general dentist diagnoses, on average, 1.66 cases of oral cancer and approximately 676 cases of OPMDs during a 35-year career in the country[22]. Although Brazil has a National Oral Health Policy[23] and guidelines that provide for the organization of oral health care within primary care and the diagnosis of oral tissue lesions within specialized care, several systemic and structural barriers continue to hinder early detection efforts. These include insufficient training in standardized COE protocols during dental consultations[2,24], a shortage of qualified professionals in stomatology (oral medicine) and oral and maxillofacial pathology, and unclear or fragmented referral pathways for patients with OPMDs and oral cancer[25]. Moreover, the uneven geographic distribution of stomatology (oral medicine) and oral and maxillofacial pathology specialists across the country further limits access to timely diagnosis. Addressing these challenges is essential for strengthening the national capacity for early detection and integrating evidence-based screening strategies within Brazil's SUS[8,26].

A national oral cancer screening program should be anchored in a risk-stratified, evidence-based, and context-sensitive framework based on the IARC evaluations[1]. Its design would integrate (1) systematic identification of high-risk individuals within primary healthcare networks using standardized risk assessment tools; (2) routine clinical oral examinations (COE) conducted by trained dental surgeons and healthcare professionals under calibrated protocols, leveraging the widespread presence of dental surgeons

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within Brazil's primary health care as a structural advantage for implementing screening at scale; (3) continuous professional development and certification modules supported by e-learning platforms to ensure diagnostic accuracy in detecting OPMDs and early-stage cancers; (4) clearly defined referral pathways linking primary care, specialized oral diagnostic centers, and oncology services to ensure continuity of care; (5) incorporation of digital technologies, including AI-assisted image analysis, to enable distance diagnosis of digital images in remote settings and enhance detection sensitivity and support clinical decision-making; and (6) a centralized national data repository modeled after the IARC CanScreen5 framework[27] to monitor screening coverage, diagnostic yield, follow-up adherence, and equity indicators.

As an essential extension of this framework, the development of a comprehensive oral cancer prevention toolkit, culturally adapted to the Brazilian context, represents a pivotal strategy for promoting sustained behavioral change and reinforcing community engagement in prevention. Building upon successful international experiences[28,29], this regional toolkit would serve as an operational bridge between global evidence and national health priorities. It would provide healthcare professionals and the public with access to evidence-based guidelines**,** standardized screening protocols, referral criteria, educational materials, and culturally sensitive communication strategies, offering structured guidance for the identification of high-risk individuals, the standardized performance of COE, and the promotion of awareness within primary healthcare networks. Moreover, the toolkit would function as an implementation catalyst, promoting alignment and integration of prevention efforts across Brazil's diverse social and regional landscapes.

Embedding these interdependent components within Brazil's SUS would transform oral cancer control from an opportunistic, fragmented approach into an organized, population-based program. Such integration would enable earlier diagnosis, improved survival rates, and measurable reductions in social and geographic disparities in oral cancer outcomes.

CONCLUSION

The comprehensive evidence presented in the IARC Handbook of Oral Cancer Prevention offers actionable guidance for national application. Developing an oral cancer care pathway represents an important step forward, especially if integrated with a national oral cancer screening program. The active involvement of stomatology (oral medicine) specialists, oral and maxillofacial pathologists, head and neck surgeons, public health professionals, patients, and other key stakeholders will be crucial for reshaping the challenging landscape of oral cancer treatment outcomes in Brazil.

ACKNOWLEDGMENTS

To Dr. Adriana Tavares de Moraes Atty of the Brazil's National Cancer Institute (INCA) for her contributions to the concept and organization of the manuscript.

CONTRIBUTIONS

All the authors contributed substantially for the conception and design of the study, acquisition, analysis and interpretation of the data, writing and critical review. They approved the final version for publication.

DECLARATION OF USE OF ARTIFICIAL INTELLIGENCE

The authors utilized Artificial Intelligence (AI), ChatGPT, only to support the writing of the manuscript. They are the sole responsible for the analysis, interpretation or synthesis of the results without AI.

DECLARATION OF CONFLICT OF INTERESTS

There is no conflict of interests to declare.

DATA AVAILABILITY STATEMENT

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

FUNDING SOURCES

Alan Roger Santos-Silva is a grantee of "*Fundação de Amparo à Pesquisa do Estado de São Paulo*" (Fapesp, process number 2024/20694-1). Thaís Cristina Esteves-Pereira is a recipient of a fellowship of "*CAPES – Coordenação de Aperfeiçoamento de Pessoal de Nível Superior"* (Capes, process number 88881.126094/2025-01).

DISCLAIMER

Where authors are identified as personnel of the International Agency for Research on Cancer/World Health Organization, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy or views of the International Agency for Research on Cancer/World Health Organization.

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Recebido em 22/12/2025
Aprovado em 26/1/2026

Associate editor: Caroline Madalena Ribeiro. Orcid iD: https://orcid.org/0000-0003-2690-5791
Scientific-editor: Anke Bergmann. Orcid iD: https://orcid.org/0000-0002-1972-8777

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