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Dental follow-up during pediatric cancer treatment

Acompanhamento odontológico durante o tratamento do câncer pediátrico

Seguimiento odontológico durante el tratamiento del cáncer pediátrico

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ABSTRACT

Objective: Identify, on pediatric oncology patients, the reasons and dental procedures performed during antineoplastic treatment. **Methods:** A retrospective descriptive analysis of dental records from pediatric oncology patients treated between 2010 and 2020 was conducted. **Results:** Forty-one patient records were analyzed, with the majority being male (N=25, 61%), 20 (48.8%) white, and 22 (53.7%) from the treatment municipality. The most common oncological diagnoses were CNS tumors, intracranial and intraspinal neoplasms (19.5%), and lymphomas and reticuloendothelial neoplasms (14.6%). The motivation for dental consultations included dental evaluations (23, 56.1%), carious lesions (8, 19.5%), and oral pain (3, 7.3%). A total of 374 dental procedures were performed, with an average of 8.9 procedures per patient, ranging from 1 to 50 procedures in a single patient. The procedures included 71 glass ionomer restorations, 23 sealant/fluoride varnish/cariostatic, 154 composite resins, 7 amalgams, 11 fluoride, 38 extractions, among others. **Conclusion:** The findings indicate that pediatric oncology patients not only experience side effects of therapy but also require routine dental procedures, which are often underdiagnosed. Therefore, systematic dental evaluation is crucial, emphasizing the importance of dental monitoring.

Keywords: Cancer survivors, Hospital oncology service, Hospital dental team.

RESUMO

Objetivo: Identificar, em pacientes oncológicos pediátricos, os motivos e os procedimentos odontológicos realizados durante o tratamento antineoplásico. **Métodos:** Foi realizada uma análise descritiva retrospectiva dos prontuários odontológicos de pacientes oncológicos pediátricos tratados entre 2010 e 2020. **Resultados:** Foram analisados 41 prontuários de pacientes, sendo a maioria do sexo masculino (N=25, 61%), 20 (48,8%) brancos e 22 (53,7%) do município de tratamento. Os diagnósticos oncológicos mais comuns foram os tumores do SNC, neoplasias intracranianas e intraespinhais (19,5%), e linfomas e neoplasias reticuloendoteliais (14,6%). A motivação das consultas de medicina dentária incluiu avaliações dentárias (23, 56,1%), lesões cariosas (8, 19,5%) e dor oral (3, 7,3%). Foram realizados 374 procedimentos

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dentários, média de 8,9 procedimentos por paciente, variando de 1 a 50 procedimentos num único paciente. Os procedimentos incluíram 71 restaurações de ionômero de vidro, 23 selante/verniz fluoretado/cariostático, 154 resinas compostas, 7 amálgamas, 11 flúor, 38 extrações, entre outros. **Conclusão:** Os achados indicam que os pacientes oncológicos pediátricos não só experimentam efeitos colaterais da terapia, mas também necessitam de procedimentos odontológicos de rotina, que muitas vezes são subdiagnosticados. Portanto, a avaliação odontológica sistemática é crucial, enfatizando a importância do monitoramento odontológico.

Palavras-chave: Sobreviventes de câncer, Serviço de oncologia hospitalar, Equipe odontológica hospitalar.

RESUMEN

Objetivo: Identificar, en pacientes oncológicos pediátricos, los motivos y procedimientos odontológicos realizados durante el tratamiento antineoplásico. **Metodos:** Se realizó un análisis descriptivo retrospectivo de los registros odontológicos de pacientes oncológicos pediátricos tratados entre 2010 y 2020. **Resultados:** Se analizaron 41 registros de pacientes, siendo la mayoría varones (N=25, 61%), 20 (48,8%) de raza blanca y 22 (53,7%) del municipio de tratamiento. Los diagnósticos oncológicos más frecuentes fueron tumores del SNC, neoplasias intracraneales e intraespinales (19,5%), y linfomas y neoplasias reticuloendoteliales (14,6%). La motivación de las consultas odontológicas incluyó evaluaciones dentales (23, 56,1%), lesiones cariosas (8, 19,5%) y dolor oral (3, 7,3%). Se realizaron un total de 374 procedimientos dentales, con una media de 8,9 procedimientos por paciente, oscilando entre 1 y 50 procedimientos en un mismo paciente. Los procedimientos incluyeron 71 restauraciones con ionómero de vidrio, 23 sellantes/barniz de flúor/caristático, 154 resinas compuestas, 7 amalgamas, 11 flúor, 38 extracciones, entre otros. **Conclusión:** Los hallazgos indican que los pacientes oncológicos pediátricos no sólo experimentan efectos secundarios de la terapia, sino que también requieren procedimientos dentales de rutina, que a menudo no se reportan. Por lo tanto, la evaluación dental sistemática es crucial, enfatizando la importancia de la monitorización dental.

Palabras clave: Sobrevivientes de cáncer, Servicio de oncología del hospital, Equipo dental del hospital.

INTRODUCTION

Oral environment adequacy encompasses a set of measures aimed at reducing the number of pathogenic microorganisms residing in the oral cavity, seeking to control the health-disease process (REIS BF, et al., 2010). Therefore, it serves as both a therapeutic and prophylactic strategy by establishing an appropriate treatment plan and promoting good oral hygiene practices (NASCIMENTO HRP, et al., 2024).

In the context of systemically compromised patients, such as those with malignant neoplasms, oral health adequacy is fundamental. The absence of a prior dental evaluation before starting antineoplastic treatment in patients with poor oral health is associated with an increased risk of developing systemic complications and may lead to therapy interruptions (DIAS ST, et al., 2020). Therefore, oral health adequacy becomes vital, establishing a preventive strategy for the oral complications caused by oncological treatment, thereby avoiding delays in chemotherapy cycles or radiotherapy session (GONÇALVES ACS, et al., 2020).

The aim is to maintain pH balance, eliminate retentive niches, conduct dietary assessments (POLIMENO EL e CARVALHO MR, 2021), and implement educational actions involving the patient, guardians, and caregivers. To ensure oral health, a thorough evaluation of the oral cavity should be conducted, assessing the integrity of teeth and quality of restorations, presence/absence of periodontal disease, carious and non-carious lesions, and examination of the oral mucosa for any lesions or alterations that may predispose to complications (ROCHA AFL, et al., 2021). Oral adequacy procedures pre-antineoplastic treatment can be prophylactic or interventionist. Prophylactic measures to improve oral hygiene include the topical use of 0.12% chlorhexidine gluconate, plaque removal, oral hygiene guidance (ZELIK V, et al., 2022), and prescription of topical fluoride (in the form of gels or rinses). Interventionist measures include treatment of

mucosal lesions, endodontic treatments, removal of irritants factors, orthodontic appliance removal, sealants, tooth extractions, and provisional restorations (ALBUQUERQUE I e CAMARGO T, 2007).

It is known that the degree of oral hygiene influences the emergence of the main complaints presented by pediatric oncology patients, such as xerostomia, taste loss, hemorrhage, dermatitis, oral mucositis, osteoradionecrosis, trismus, oral candidiasis, and herpes. This situation highlights an essential aspect, the Health Surveillance, which understands that the multidisciplinary team and the population must jointly identify problems and needs, while also define priorities, focusing on lifestyle and health determinants, risk situations, damages, and injuries, in addition to diseases (ARANTES R, 2013).

In this context, Dental Surveillance is characterized by a thorough evaluation by the Dentist during the different phases of oncological treatment. This approach in pediatric oncology patients can determine therapeutic effectiveness by enabling the management of therapy complications as well as necessary and feasible dental procedures. Thus, the objective of this study was to identify the reasons for seeking dental treatment during antineoplastic therapy and the dental procedures performed.

METHODS

Study Design

A cross-sectional, retrospective descriptive study was conducted using secondary data, including medical and dental records of pediatric oncology patients diagnosed between 2010 and 2020.

Inclusion Criteria

Patients aged 0 to 18 years with an oncological diagnosis who were treated between 2010 and 2020 in oncology patient care units were included.

Exclusion Criteria

Patients whose records did not meet the methodological criteria of this study, meaning, records lacking information on demographic data, medical history, type of neoplasia, or dental procedures performed, were excluded.

Sample selection

The sample consisted of 41 medical and dental records of pediatric oncology patients diagnosed between 2010 and 2020, obtained consecutively. The data study included demographic data, type of neoplasia, and dental procedures performed.

Data Collection Description

Medical records were analyzed starting from the confirmation of the oncological diagnosis. To characterize the sample, demographic data and type of neoplasia were collected (MARTINS BLJ, et al., 2011; PAN E, et al., 2005).

In the dental records, oral health adequacy procedures were considered: professional dental prophylaxis, removal of dental calculus, sealing of cavities, use of fluorides, dietary and oral hygiene guidance, fractured teeth and/or restorations, endodontic treatment, periodontal therapy, and extraction of deciduous teeth in the exfoliation phase (MOORE S, et al., 2012; ROSSO MLP, et al., 2015; REIS BF, et al., 2010). Additionally, the number of months the patients were assisted by the philanthropic institution was analyzed.

Statistical Analysis

Quantitative variables were summarized using mean and standard deviation. Qualitative variables were described by frequencies and percentages. The results were then presented in tables and graphs. Pearson's chi-square test was used for multiple comparisons, while the binomial test was applied for specific

comparisons between pairs of groups. Statistical analysis was performed using SPSS (Statistical Package for the Social Sciences) version 26.0.

Ethical Procedures

For the study's execution, authorizations were obtained from a reference hospital in pediatric oncology and the philanthropic institution that assists these oncology patients

This study was approved by the Research Ethics Committee of the Federal University of Juiz de Fora (CEP-UFJF), under opinion number 5.858.728, Certificate of Presentation Ethical Appreciation number 62973222.5.0000.5147. As for the use of the Free and Informed Consent Form (TCLE), an exemption from the TCLE was approved.

RESULTS

Forty-one patients were evaluated, with a mean age of 10.2 years (3-18), including 6 patients aged 0 to 4 years, 16 aged 5 to 10 years, 6 aged 11 to 14 years, and 13 aged 15 to 19 years, p=0.058. Of these, 25 were male and 16 were female, p=0.042.

Regarding place of birth, 22 were from Juiz de Fora and the rest from other cities in the state of Minas Gerais, p=0.506. Regarding race, 20 patients were white, 12 were black, and 9 were mixed-race, p=0.058. Demographic data are detailed in **Table 1**.

Table 1 - Demographic data of children and adolescents diagnosed with neoplasia.

Parameter	Quantity (n)	Frequency (%)
Age		
0 to 4 years	6	14,6
5 to 10 years	16	39
11 to 14 years	6	14,6
15 to 19 years	13	31,7
Gender		
Female	16	39
Male	25	61
Place of birth		
Juiz de Fora	22	53,7
Others	29	46,3
Race		
White	20	48,8
Black	12	29,3
Brown	9	22

Source: Roeles ISO, et al., 2025.

Regarding the oncological diagnoses described in medical records, they were grouped according to the International Classification of Childhood Cancer, Third Edition (ICCC3) in **Table 2**, p=0.328.

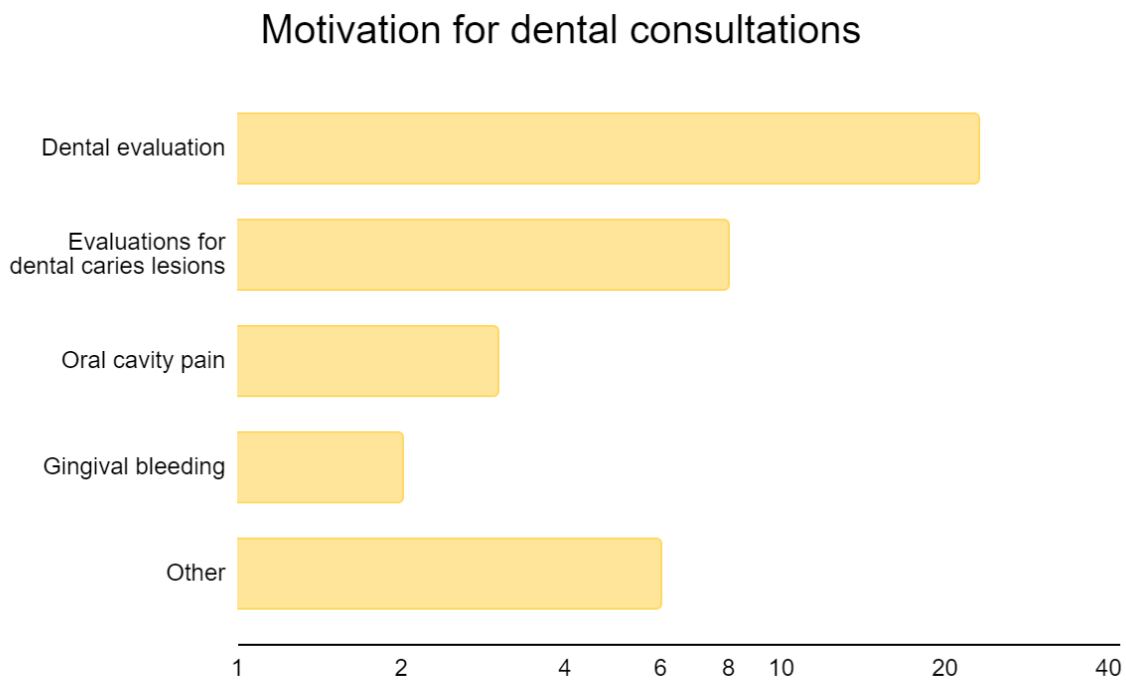
Table 2 - Distribution of oncological diagnoses according to the international classification of childhood cancer, third edition (ICCC3).

International Classification of Childhood Cancer (ICCC-3)	Quantity (n)	Frequency (%)
I. Leukemias, myeloproliferative diseases, and myelodysplastic diseases	1	2.4
II. Lymphomas and reticuloendothelial neoplasms	6	14.6
III. CNS and various intracranial and intraspinal neoplasms	8	19.5
IV. Neuroblastoma and other peripheral nerve cell tumors	4	9.8
V. Retinoblastoma	0	0
VI. Renal tumors	5	12.2
VII. Hepatic tumors	1	2.4
VIII. Malignant bone tumors	5	12.2
IX. Soft tissue sarcomas and other extraosseous sarcomas	5	12.2
X. Germ cell tumors, trophoblastic tumors, and gonadal neoplasms	3	7.3
XI. Other malignant epithelial neoplasms and malignant melanomas	3	7.3
XII. Other malignant and unspecified neoplasms	0	0

Source: Roeles ISO, et al., 2025.

When analyzing the motivation for dental consultations, the following were observed: dental evaluation in 23 (56.1%) patients, 8 (19.5%) evaluations for dental caries lesions, 3 (7.3%) patients with oral cavity pain, 2 (4.9%) patients with gingival bleeding, and other reasons accounting for 12.2%, including bruxism, opportunistic infection by Candida Albicans, dental staining, tooth mobility, and repair of composite resin restorations, p=0.00. It is noted that the majority of patients' consultations were for dental evaluations, as shown in **Graph 1**.

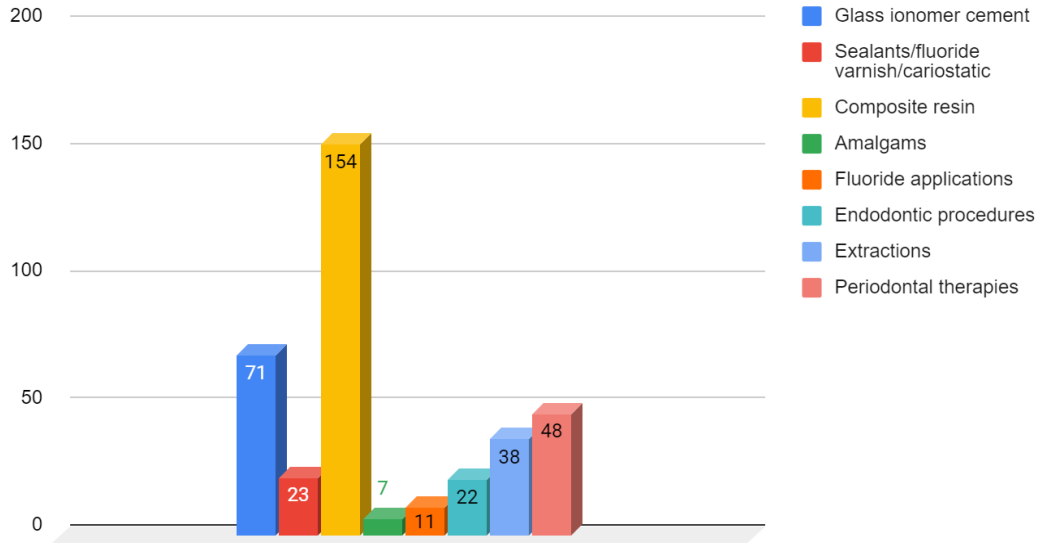
Graph 1 - Representation of the proportions of dental consultation purposes.



Source: Roeles ISO, et al., 2025.

A total of 374 dental procedures were performed, with an average of 8.9 per individual, ranging from a minimum of 1 to a maximum of 50 procedures in a single patient. The procedures included: 71 glass ionomer cement restorations, 23 applications of sealants/fluoride varnish/cariostatic agents, 154 composite resin restorations, 7 amalgams, 11 fluoride applications, 22 endodontic procedures, 38 extractions, and 48 periodontal therapies. It is noted that the most frequently performed dental procedure was glass ionomer cement restorations, as shown in **Graph 2**.

Graph 2 - Representation of the quantity and types of dental procedures performed.



Source: Roeles ISO, et al., 2025.

Correspondence analysis evaluated the diagnosis, motivation for consultation, and follow-up in months for each age group. Patients aged 0-4 years presented with ICCC III, IV, or VII, with reasons for consultation being caries evaluation or restoration repair, with follow-up ranging from 25 to 48 months. Patients aged 5-10 years presented with ICCC VI or IX, with search for consultation being infection, pain, or bruxism, and follow-up from 61 to 72 months or more. Some patients had follow-up between 6-12 months. Patients aged 11-14 years presented with ICCC I, II, or VIII, with motivation for consultation being evaluation or staining, and follow-up from 1-6 months. Patients aged 15-19 years presented with ICCC X or XI, with reasons for consultation being bleeding or mobility, with follow-up from 49 to 60 months. The patients were assisted by the philanthropic institution during their oncological treatment, ranging from 1 to 72 months.

DISCUSSION

According to estimates from the National Cancer Institute (INCA), the number of new pediatric cancer cases expected in Brazil for each year of the 2023–2025 triennium is 7,930 cases, corresponding to an estimated risk of 134.81 per million children and adolescents (INCA, 2022). This study characterized dental surveillance during pediatric cancer treatment, emphasizing the importance of descriptive analysis of the main oral health needs of this specific population.

In this study, we observed a sample of 41 patients diagnosed with oncological diseases, with a mean age of 10.2 years, ranging from 3 to 18 years. Regarding age distribution, the incidence of childhood cancer is higher in the first year of life, with a second peak occurring between the second and third years of life (PERES P, et al., 2022). Concerning gender distribution, 62% of the sample were male and 38% female. Estimates point to 4,230 new cases in males and 3,700 in females (INCA, 2022), consistent with the sample, which shows a majority of male individuals.

Regarding diagnosis by age group, among patients aged 0 to 4 years, central nervous system and hepatic tumors were more frequent. These neoplasms are more common in children under 10 years old, both being embryonal tumors common in children under 5 years old that arise from primordial cells that have undergone spontaneous mutations and are therefore not acquired through environmental actions (WARD E, et al., 2014). In individuals aged 5 to 10 years, hepatic tumors and sarcomas were more prevalent. For the 11 to 14-year age group, there was a higher prevalence of lymphomas, leukemias, and bone tumors. Patients aged 15 to 19 years were mostly diagnosed with germ cell tumors and sarcomas. After age 10, in general, hepatic and central nervous system tumors tend to disappear, and other cancers, such as lymphomas, carcinomas, germ cell tumors, and bone tumors, become more frequent (ZOUAIN-FIGUEIREDO GP, et al., 2010; WARD E, et al., 2014). The results demonstrated a preference for lymphomas/reticuloendothelial neoplasms and malignant epithelial neoplasms/melanomas in those older than 10 years. Lymphomas (especially Hodgkin's), melanomas, and carcinomas are more common in adolescents (ZOUAIN-FIGUEIREDO GP, et al., 2010; WARD E, et al., 2014; LONGO BC, et al., 2021).

The analysis of the reasons for dental consultations revealed that 55% of the sample had no defined reason and were referred for dental evaluation by the medical team. It is noted that the medical team, aware of the importance of dental surveillance, emphasized the need for this follow-up to patients and caregivers. The remaining consultations were motivated by reasons such as evaluation of dental caries lesions, oral cavity pain, gingival bleeding, removal of orthodontic appliances, teeth grinding, opportunistic Candida Albicans infection, dental staining, tooth mobility, and composite resin restoration repair. It is known that the development of oral problems during cancer treatment, particularly during early childhood, can result in pain, fever, treatment delay, potential sepsis, additional hospitalization, and increased medical care costs (PADMINI C e BAI KY, 2014). Oral manifestations resulting from treatment or the disease, such as oral mucositis, dental caries, neuropathic pain, xerostomia, and secondary infections like herpes labialis and pseudomembranous candidiasis, may also occur during cancer therapy (RITWIK P, 2018). Thus, the dental care provided is essential as it complements medical treatment, ensuring the patient's well-being and quality of life during oncological treatment.

A significant finding is that restorations using composite resin and glass ionomer cement were performed during the analyzed period. This reflects the reality of children with oncological diseases, who may experience alterations in salivary gland function, a tendency towards a soft and sweet diet, changes in oral flora, and an inability to maintain oral hygiene due to pain and gingival inflammation (SHAYANI A, et al., 2021). Studies indicate that children undergoing antineoplastic treatment consume considerable amounts of poor-quality food, such as excessive sugar and salt intake, and inadequate consumption of fruits and vegetables (COHEN J, et al., 2021). They exhibit disturbed eating behaviors with issues like nausea, appetite changes, vomiting, food refusal, and agitated eating, affecting intake (GREEN R, et al., 2010). Consequently, parents often report changes in their parenting strategies after the diagnosis, including higher levels of overprotection, lower levels of discipline, and offering nutrient-poor food rewards (FLEMING CA, et al., 2015).

The restorative materials mentioned above are widely used in dental restorations. The use of glass ionomer cement is considered a form of atraumatic restorative treatment, ensuring a more conservative approach and reducing anxiety (GONÇALVES CF, et al., 2015), a favorable aspect for this patient profile. Additionally, it can increase the fluoride content in saliva, making it a bioactive material with cariostatic action (FRANÇOIS P, et al., 2020). Regarding the procedures performed, a high number of composite resin restorations were noted, something that was expected, given its aesthetic benefits and ease of use (RODRIGUES SAJ, et al., 2009).

This study also observed a significant number of sealant/fluoride varnish applications and fluoride applications. Regarding fluoride use, a previous study showed that adopting preventive protocols results in a change in oral health status, such as dental caries, dental plaque score, and gingival inflammation. Preventive protocols can be adopted in various forms: daily and nightly use of personalized fluoride trays at 2%, daily fluoride rinsing at 0.05%, or topical application of sealants/fluoride varnish per hemi-arch (LEE HJ, et al., 2021). Fluoride can be administered in various ways, such as personalized fluoride trays (FRYDRYCH AM, et al., 2017), brushing with fluoride toothpaste (THARIAT J, et al., 2012), and fluoride varnish (DHOLAM KP, et al., 2013).

Other procedures were described in the medical records, such as periodontal therapy and surgical procedures like extractions and endodontics. These procedures aim to prevent risk situations in oncological patients during periods of myelosuppression, where the mouth can serve as a source of systemic infections through chronic pulp and periodontal tissue infections (EPSTEIN JB, et al., 2009). Therefore, the need for continuous dental surveillance during treatment and for a close association between oncology and dental teams is emphasized. A study that followed children hospitalized for cancer treatment for one year reported that all 65 patients monitored presented at least one oral or perioral problem during the study (WANI V, et al., 2018).

The primary limitations of our study are related to its retrospective nature and the reliance on medical record documentation. However, its originality lies in demonstrating a relatively large number of dental procedures performed during cancer patient care, reflecting the need for routine dental procedures, highlighting the importance of dental surveillance.

CONCLUSION

This study underscores the significance of dental follow-up during pediatric cancer treatment through dental surveillance, maintaining oral care before, during, and after antineoplastic therapy. To make this process possible, it is essential to recognize the main indications for routine procedures in dental practice to implement systematic and individualized approaches. Thus, it is crucial that the dentist integrates into the multidisciplinary team to ensure the correct investigation of underdiagnosed oral diseases, contributing to a greater well-being and quality of life for the patient, ensuring comprehensive care and treatment effectiveness.

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