

## **Pediatric Oncology and Oral Health: Managing Challenges Through Evidence-Based Review**

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**Received:** April 03, 2025; **Published:** April 14, 2025

**DOI:** 10.31080/ECPE.2025.14.01574

### **Abstract**

Pediatric oncology patients are at significant risk of developing oral and dental complications during and after cancer treatment. These complications, including mucositis, xerostomia, infections, and nutritional difficulties, can adversely affect both quality of life and treatment compliance. As survival rates improve in childhood cancers, long-term management of treatment-related morbidities has become increasingly important. This review aims to identify the oral complications that occur during and after cancer therapy in pediatric patients and to emphasize the importance of early and continuous dental care. A multidisciplinary approach-encompassing pediatric dentists, oncologists, nurses, and caregivers-is essential to prevent complications and ensure optimal outcomes. International clinical guidelines provide structured protocols that support collaborative care. Increasing awareness among healthcare professionals about integrated oral care can greatly improve the physical and psychological well-being of pediatric cancer patients.

**Keywords:** *Pediatric Oncology; Oral Complications; Dental Care; Multidisciplinary Collaboration; Supportive Oncology*

### **Introduction**

Cancer remains the second leading cause of mortality in children, and pediatric oncology patients are disproportionately affected by oral complications, which are reported to be three times more prevalent than in adult patients [1]. Chemotherapy, radiotherapy, and other cancer-related treatments lead to a distinct set of oral health challenges during and after therapy [2]. One of the earliest and most common systemic effects of chemotherapy is bone marrow suppression, which manifests as leukopenia within 10 days and thrombocytopenia within 10-14 days of treatment initiation [3]. Although hematologic parameters often normalize after treatment cessation, many oral complications persist long-term.

Studies comparing children with and without cancer have revealed significantly higher incidences of intraoral soft tissue lesions among oncology patients, including aphthous ulcers (52.9%), candidiasis (23.5%), herpes simplex infections (17.6%), and xerostomia (28.1%) [4]. Among these, oral mucositis is the most prevalent and debilitating, leading to severe pain, impaired speech, nutritional challenges, and poor oral hygiene. Xerostomia, often associated with radiotherapy, results from salivary gland damage and predisposes patients to caries, periodontal disease, and oral infections [5]. Radiation-induced damage may also result in osteoradionecrosis, a condition marked by non-healing irradiated bone with potential for significant disfigurement. Other complications such as trismus, hypovascularization, and craniofacial developmental disturbances (e.g. hypodontia, microdontia, and root malformations) are frequently observed [6].

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**Citation:** Natavan Yagubova and Hulya Cerci Akcay. "Pediatric Oncology and Oral Health: Managing Challenges Through Evidence-Based Review". *EC Paediatrics* 14.5 (2025): 01-05.

These complications may necessitate urgent dental care; however, oncologic treatment constraints-such as thrombocytopenia and immunosuppression-often limit the feasibility of dental interventions [7,8]. Moreover, chemotherapy can exacerbate gingival conditions like bleeding and hyperplasia, particularly in leukemia patients. The underestimation of oral health in oncology care can lead to serious, potentially life-threatening complications [9,10]. Therefore, integrating multidisciplinary, evidence-based strategies into pediatric oncology protocols is essential to optimize both short- and long-term patient outcomes.

### Preventive dentistry in pediatric oncology

Preventive oral care plays a pivotal role in minimizing the incidence and severity of oral complications in pediatric oncology patients. Topical fluoride applications, particularly varnishes, have demonstrated efficacy in reducing dental caries by up to 50% in high-risk populations [11]. Fluoride toothpaste with elevated concentrations (5,000 ppm) may be recommended in lieu of standard over-the-counter options (1,100 ppm), particularly for children undergoing chemotherapy.

Meticulous oral hygiene remains fundamental. The use of soft-bristled toothbrushes and alcohol-free mouth rinses is encouraged to reduce mucosal irritation. Nutritional counseling should accompany oral care protocols, advising the avoidance of acidic, spicy, or coarse foods that can exacerbate mucosal damage [12]. A comprehensive dental evaluation prior to the onset of oncologic treatment is essential for identifying and addressing existing oral health concerns [13].

### Management of oral complications during active therapy

The active phase of cancer treatment is associated with an increased risk of oral complications due to immunosuppression, cytotoxicity, and altered salivary function. Oral mucositis, a frequent adverse effect, may be managed through a combination of analgesics (e.g. acetaminophen), topical anesthetics (e.g. lidocaine-based rinses), and mucosal protectants [14]. Xerostomia should be addressed by maintaining adequate hydration, encouraging frequent small sips of water, and considering pharmacological agents such as pilocarpine when appropriate.

Chlorhexidine gluconate (0.12%) mouth rinses may be used with caution due to potential staining and taste alteration, especially in children. Taste changes and mucosal sensitivity may necessitate dietary modifications, favoring bland, soft-textured, nutrient-dense foods like smoothies or protein-rich shakes to combat malnutrition. In the event of oral candidiasis, antifungal agents such as nystatin or fluconazole are typically prescribed. Caregivers should be educated to monitor for early signs of oral pathology-including ulceration, gingival bleeding, and dryness-and seek timely intervention [15].

### Psychosocial aspects

Oral complications in pediatric oncology patients extend beyond physical discomfort, often exerting significant psychosocial burdens. Oral lesions, halitosis, and visible dental changes can provoke embarrassment, social withdrawal, and lowered self-esteem. In a study of childhood cancer survivors, 25.9% reported persistent oral ulcers and 23.3% reported malodor, both associated with psychosocial distress and reduced social participation [16].

Children may develop anxiety surrounding food intake due to anticipatory pain, leading to disordered eating behaviors and further nutritional compromise. Additionally, family members frequently experience emotional distress when managing their child's oral health complications, underscoring the need for psychological support and caregiver education as part of comprehensive oncology care.

### Multidisciplinary approach to pediatric oral health in oncology

A multidisciplinary approach is essential to effectively address the complex oral healthcare needs of pediatric oncology patients. Collaboration among pediatric oncologists, dentists, nurses, and nutritionists ensures the early detection, prevention, and management

of oral complications throughout the treatment trajectory [3-7]. A 2022 survey by Ward., *et al.* revealed considerable gaps in oncologists’ awareness and ability to recognize oral manifestations of cancer therapy, highlighting the need for enhanced interdisciplinary training and communication.

Pediatric dentists contribute by conducting pre-treatment evaluations, managing complications such as mucositis and xerostomia, and providing ongoing preventive care [10]. Nurses and dietitians play critical roles in monitoring nutritional intake and supporting oral hygiene practices. A coordinated approach not only improves patient comfort but also enhances overall treatment adherence and outcomes [16].

Evidence-based guidelines and emerging innovations

Given the variability in oncology and hematopoietic cell transplantation protocols and the heterogeneity of patient responses, individualized oral care plans must be guided by evidence-based recommendations. Professional organizations such as the American Academy of Pediatric Dentistry (AAPD) and the American Society of Clinical Oncology (ASCO) have established comprehensive guidelines for the prevention and management of oral health complications in pediatric oncology. These include early dental assessments, dietary modifications, and the strategic use of fluoride treatments [11,15].

Adherence to these protocols has been shown to significantly reduce the incidence of mucosal ulcers, gingival inflammation, and dental infections. Innovations in pharmacologic interventions-such as palifermin, a keratinocyte growth factor-have demonstrated efficacy in mitigating the severity and duration of mucositis [12]. Moreover, digital technologies including mobile applications and telehealth platforms are emerging as effective tools for caregiver education, treatment adherence, and remote monitoring of oral health status [5,6]. These developments represent promising adjuncts to conventional care, with the potential to improve both clinical and psychosocial outcomes for pediatric oncology patients.

Conclusion

This review underscores the necessity of a multidisciplinary approach in the management of pediatric oncology patients, particularly with regard to oral health care. The inclusion of pediatric dentists in oncology care teams plays a crucial role in the early detection, prevention, and management of treatment-induced oral complications. While initiating dental interventions prior to cancer therapy is ideal, clinical realities often prevent this from being feasible. Therefore, individualized oral health plans-tailored to each patient’s medical condition and treatment stage-must be developed through interdisciplinary consultation.

Implementing evidence-based preventive strategies, such as fluoride applications, nutritional counseling, and routine dental monitoring, significantly reduces the incidence and severity of complications like mucositis, xerostomia, and oral infections. Moreover, attention to pain management and patient comfort throughout the treatment process contributes to better adherence and overall well-being. It is strongly believed that incorporating comprehensive oral care into pediatric oncology protocols can substantially enhance the quality of life for both patients and their families.

Intervention	Recommendation
Saline mouthrinses	Use 0.9% saline rinses at least 3-6 times daily during chemotherapy, depending on mucosal status and oral hygiene. For patients undergoing radiotherapy, a baking soda solution may also be beneficial.
Oral hygiene	Perform oral care using a soft toothbrush with enzymatic toothpaste. This is particularly important for patients receiving chemotherapy or radiotherapy to the head and neck region.
Lip care	Apply lip balms with water-based lubricants, lanolin, or essential fatty acids. Avoid petroleum-based products.

Dietary guidelines	Offer foods with a soft or semi-liquid consistency. Avoid acidic, spicy, hard, or very hot foods. Ensure adequate nutrition and hydration.
Topical anesthetics	2% viscous lidocaine (5 mL diluted in 0.9% saline) may be used in conscious patients experiencing mucositis pain. Use cautiously and avoid in cases of impaired gag reflex due to aspiration risk.
Photobiomodulation therapy (PBMT)	PBMT can be considered for the prevention and treatment of oral mucositis. It must be performed by trained professionals using evidence-based protocols.
Dental consultation	Seek immediate dental evaluation if lesions, bleeding, ulcers, or caries are observed. Therapeutic interventions should be implemented promptly to avoid worsening of the condition.
Radiation to CNS or neck	If radiotherapy is directed to the CNS or cervical region, monitor swallowing and speech function. Start soft diet and analgesia if mucosal pain develops.
Myeloid leukemias	Delay use of dental instruments until absence of circulating blasts is confirmed. Use extreme caution to avoid trauma to oral tissues.
Chlorhexidine mouthrinse	In patients unable to perform mechanical hygiene, use 0.12% alcohol-free chlorhexidine with caution. While it may not prevent mucositis, it can reduce bacterial load and infection risk. This should be administered by trained professionals.

**Table 1:** Evidence-based recommendations for the prevention and management of oral complications in pediatric oncology patients  
(Adapted from PAHO).

Acknowledgments

The authors have no financial or proprietary interest, nor gain in the subject of this review. No financial support or sponsorship was provided.

Conflict of Interest

Authors declare no conflict of interest.

Bibliography

1. Gandhi K., et al. "Prevalence of oral complications occurring in a population of pediatric cancer patients receiving chemotherapy". *International Journal of Clinical Pediatric Dentistry* 10.2 (2017): 166-171.
2. Ritwik P. "Dental care for patients with childhood cancers". *Ochsner Journal* 18.4 (2018): 351-357.
3. Özyılkan D. "Oral and dental health in pediatric oncology patients". *Cyprus Journal of Medical Sciences* 9.5 (2024): 297-301.
4. Kerbage C., et al. "Comparison of oral health characteristics in pediatric cancer and cancer-free patients: A multicenter study". *Pediatric Dental Journal* 33.2 (2023): 139-146.
5. Bezerra PMM., et al. "The impact of oral health education on the incidence and severity of oral mucositis in pediatric cancer patients: A systematic review and meta-analysis". *Supportive Care in Cancer* 30.11 (2022): 8819-8829.
6. Ritwik P and Chrisentery-Singleton TE. "Oral and dental considerations in pediatric cancers". *Cancer Metastasis Review* 39.1 (2020): 43-53.

7. Chen M., *et al.* "Residential exposure to pesticide during childhood and childhood cancers: A meta-analysis". *Pediatrics* 136.4 (2015): 719-729.
8. Alamoudi RM., *et al.* "Oral health challenges in pediatric oncology patients". *International Journal of Community Medicine and Public Health* 11.10 (2024): 4097-4100.
9. Vahidi N., *et al.* "Osteoradionecrosis of the midface and mandible: Pathogenesis and management". *Seminars in Plastic Surgery* 34.4 (2020): 232-244.
10. Hong CH., *et al.* "A systematic review of dental disease management in cancer patients". *Supportive Care in Cancer* 26.1 (2018): 155-174.
11. American Academy of Pediatric Dentistry. "Dental management of pediatric patients receiving immunosuppressive therapy and/or head and neck radiation". In the reference manual of Pediatric Dentistry, Chicago, IL: American Academy of Pediatric Dentistry (2024): 545-553.
12. Elad S., *et al.* "MASCC/ISOO clinical practice guidelines for the management of mucositis secondary to cancer therapy". *Cancer* 126.19 (2020): 4423-4431.
13. Carreón-Burciaga RG., *et al.* "Severity of oral mucositis in children following chemotherapy and radiotherapy and its implications at a single oncology centre in Durango State, Mexico". *International Journal of Pediatrics* (2018): 3252765.
14. Lalla RV., *et al.* "MASCC/ISOO clinical practice guidelines for the management of mucositis secondary to cancer therapy". *Cancer* 120.10 (2014): 1453-1461.
15. Stolze J., *et al.* "Self-reported outcomes on oral health and oral health-related quality of life in long-term childhood cancer survivors-A DCCSS-LATER 2 Study". *Supportive Care in Cancer* 31.6 (2023): 344.
16. Ward MC., *et al.* "Oncologists' perspective on dental care around the treatment of head and neck cancer: a pattern of practice survey". *JCO Oncology Practice* 18.1 (2022): e28-e35.

**Volume 14 Issue 5 May 2025**

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