

INTERPROFESSIONAL NURSING–DENTAL ASSISTANT ORAL CARE BUNDLES FOR ONCOLOGY PATIENTS: A SYSTEMATIC REVIEW OF EFFECTS ON ORAL MUCOSITIS, INFECTION RATES, AND TREATMENT TOLERANCE

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Abstract

Background: Oral mucositis (OM) and infectious complications frequently interrupt cancer therapy. Interprofessional oral-care bundles, delivered by nurses with dental professionals (dentists, dental hygienists, dental assistants), may mitigate these harms. We aimed to synthesize evidence on the effects of nursing–dental oral-care bundles on (1) OM incidence/severity, (2) infection and febrile neutropenia (FN), and (3) treatment tolerance (dose reductions/interruptions). **Methods:** We conducted a systematic review (PRISMA-aligned) of randomized and non-randomized studies in patients receiving chemotherapy, radiotherapy or hematopoietic stem-cell transplantation (HSCT). Eligible interventions were multicomponent oral-care programs delivered by nursing and/or dental teams; outcomes were OM, infection/FN, and treatment tolerance. **Results:** Twelve original studies (five randomized trials and seven observational/quasi-experimental studies) met inclusion. Across chemotherapy and HSCT, professional oral health care and nurse-implemented hygiene protocols consistently reduced OM severity; several studies also reported lower FN or infection signals. In head-and-neck radiotherapy, comprehensive oral management protocols and nurse-led mucositis programs reduced severe OM and supported completion of planned radiotherapy. Evidence for direct effects on dose reductions was most explicit in a phase III trial in breast cancer receiving targeted therapy, which showed clinically meaningful stomatitis prevention and improved manageability. **Conclusions:** Interprofessional oral-care bundles improve clinically important toxicity outcomes and likely support treatment continuity. Implementation in oncology services, especially those with established nursing workforces and dental assistants, appears feasible and valuable. Standardization of bundle components and reporting (including infection endpoints and treatment tolerance) is the next step.

Keywords: Oral Mucositis; Febrile Neutropenia; Interprofessional Care; Nursing; Dental Assistant; Professional Oral Health Care; Head and Neck Radiotherapy; Hematopoietic Stem-Cell Transplantation; Chemotherapy Tolerance.

INTRODUCTION

Oral mucositis (OM) remains one of the most debilitating toxicities of cancer therapy, impairing nutrition, increasing pain, prolonging hospitalization, and triggering unplanned dose modifications. Contemporary practice guidelines emphasize systematic prevention and early management, with particular attention to coordinated, multidisciplinary care spanning oncology, nursing, and dental services [1]. Authoritative professional resources also stress that dental professionals should be integrated into the cancer care team before and during therapy to identify oral disease, deliver preventive care, and coach daily oral hygiene, ideally several weeks before treatment begins, so that necessary procedures can heal [2].

Beyond individual measures, evidence syntheses indicate that well-structured oral-care programs can reduce the severity of OM and some infectious outcomes, although the literature has been heterogeneous in populations, bundle content, and outcome definitions [3,4]. Recent international consensus highlights the need for consistent mucositis assessment, standardized reporting, and multidisciplinary implementation pathways to translate evidence into reliable practice [5]. The dental oncology literature further details the scope of oral management required before and during therapy, caries control, periodontal stabilization, prosthesis adjustments, salivary support, and behavior change counseling, tasks that can be shared across dentists, hygienists, and dental assistants alongside nursing teams [6,7].

On the nursing side, procedure-based and self-care–focused interventions (structured hygiene, evidence-supported cryotherapy during short-half-life chemotherapy) are recommended to mitigate OM burden and help patients maintain intake and treatment adherence [8]. Observational service-level data from pre-radiotherapy dental clinics also suggest that timely multidisciplinary assessment identifies, and addresses, substantial treatment needs, enabling safer radiotherapy courses and post-treatment oral rehabilitation [9].

Despite these advances, clinicians still face practical questions: Which bundle components matter most? Do interprofessional bundles lower infection and febrile neutropenia (FN)? Do they reduce dose modifications or interruptions? This systematic review focuses on oral-care bundles delivered collaboratively by nursing and dental personnel (including dental assistants), and evaluates their effects on OM, infection/FN, and treatment tolerance across chemotherapy, radiotherapy, and HSCT settings.

METHODS

Design and registration. We performed a systematic review guided by PRISMA 2020 recommendations (checklist/flow principles) [10].

Eligibility criteria.

Population: Children or adults receiving anti-cancer therapy (chemotherapy, radiotherapy, targeted therapy, or HSCT).

Intervention: Multicomponent oral-care programs delivered by nursing and/or dental professionals (dentists/dental hygienists/dental assistants), including standardized daily hygiene protocols, professional oral health care (POHC), pre-treatment dental optimization, and adjuncts (cryotherapy) when part of a bundle.

Comparators: Usual care or alternative hygiene approaches.

Outcomes: At least one of (a) OM incidence/severity; (b) infection outcomes (microbiologically documented infection or FN); (c) treatment tolerance (dose reductions, delays, or unplanned radiotherapy interruptions).

Designs: Randomized or quasi-experimental trials, cohort studies (including pre–post service evaluations). Reviews, case series (<10), and studies evaluating a single pharmacologic agent without an oral-care program were excluded.

Information sources and search. We searched MEDLINE/PubMed, CINAHL, and the Cochrane Library (inception to 19 Oct 2025; English) using terms for *oral care*, *professional oral health care*, *nurs-led**, *dental*, *mucositis*, *stomatitis*, *febrile neutropenia*, *infection*, and *head and neck radiotherapy*. We complemented database searching with citation chaining of key trials and guidelines.

Study selection and data extraction. Two reviewers independently screened titles/abstracts and full texts against eligibility criteria and extracted study design, setting, population, bundle components, comparator, and outcomes (OM, infection/FN, tolerance). Disagreements were resolved by discussion. Given clinical heterogeneity (populations, regimens, outcome definitions), we prespecified a narrative synthesis.

Risk of bias. For randomized trials, we considered randomization, allocation concealment, blinding of outcome assessment, attrition, and selective reporting; for non-randomized designs, we considered confounding control and outcome ascertainment. Because of reporting variability in older trials, risk-of-bias judgments are summarized narratively in Results.

RESULTS

Overview

We included 12 original studies: five randomized trials and seven non-randomized/observational studies across chemotherapy, targeted therapy, radiotherapy, and HSCT. Interventions typically combined: pre-treatment dental assessment / management, scheduled professional oral care, nurse-delivered patient education and daily hygiene monitoring, and (in some trials) adjunctive measures (cryotherapy). Outcomes centered on OM (various scales), with several studies assessing FN/infections and a subset reporting treatment continuity measure.

Chemotherapy and targeted therapy

Breast cancer, professional oral health care (POHC). In a hospital program evaluating POHC during adjuvant chemotherapy for breast cancer, Saito et al. reported that patients receiving POHC experienced lower OM severity and fewer FN events compared with usual care, suggesting clinically relevant infection prevention alongside mucositis mitigation [11]. Although non-randomized, this pragmatic design reflected routine interprofessional collaboration between oncology nurses (education/monitoring) and dental professionals providing regular debridement/oral hygiene reinforcement.

Targeted therapy, everolimus/exemestane (Oral Care-BC RCT). The multicenter phase III Oral Care-BC randomized trial tested a structured, proactive oral-care program versus usual care among hormone-receptor–positive, HER2-negative metastatic breast cancer patients starting everolimus with exemestane. The interprofessional bundle significantly reduced the incidence and severity of stomatitis (OM), with earlier symptom control and better manageability compared with standard advice [12]. Although the primary endpoint was stomatitis, the clinical implication was improved tolerance to targeted therapy; contemporary expert summaries interpret these findings as enhancing adherence and continuation of therapy when stomatitis is prevented or quickly controlled [9].

Oral bacterial burden and FN risk. Two complementary observational studies linked oral hygiene status with FN during chemotherapy. In a retrospective cohort of breast-cancer patients receiving docetaxel-based chemotherapy who also received POHC, higher oral bacterial counts predicted cycle-level FN events despite overall declines in bacterial load over successive cycles, identifying oral hygiene as an independent FN risk factor at the cycle level [13]. In hematologic malignancies, a large single-center study found that the periodontal inflamed surface area (PISA), a quantitative measure of active periodontal inflammation, was independently associated with FN during chemotherapy, even after propensity score matching, underscoring the infection-control rationale for periodontal stabilization as part of the bundle [14].

Acute leukemia, intensive dental care protocols (randomized and cohort). A classic randomized trial in acute leukemia compared intensive pre-chemotherapy dental care plus supervised oral hygiene against limited dental care; the intensive protocol reduced gingival inflammation and was associated with less severe and less painful OM across the induction period [15]. Earlier randomized work in transplant/chemotherapy contexts also suggested that intensive oral hygiene regimens can diminish OM compared with limited care [20], though reporting of infection endpoints was sparse.

Head-and-neck radiotherapy

Comprehensive oral management (multicenter randomized study). In head-and-neck radiotherapy, Kawashita et al. conducted a multicenter randomized study of a comprehensive oral management protocol, spacer fabrication, salivary support agents (pilocarpine), topical steroids, scheduled professional oral care, and patient self-care coaching, versus conventional care. The protocol reduced the proportion of patients

developing severe OM during radiotherapy, with particularly clear benefit in patients treated with radiotherapy alone [12]. The program required close coordination among dentists/dental hygienists, dental assistants (impressions/devices, chairside support), and radiotherapy nurses who reinforced daily care and symptom monitoring.

Nurse-led mucositis management (prospective cohort). A prospective program in a radiotherapy service found that a nurse-led mucositis bundle, systematic screening, structured education/counseling, and weekly follow-up, stabilized OM trajectories and supported nutrition during six weeks of treatment in head-and-neck and lung cancer patients, with high treatment compliance by the end of radiotherapy [16]. Although single-group, this work highlights the feasibility and added value of nurse leadership within an interprofessional framework.

Pre-radiotherapy dental clinics. Large-scale service data from a pre-RT dental assessment clinic demonstrated that most head-and-neck patients require dental extractions or restorative care before radiotherapy, and timely multidisciplinary assessment facilitates on-time radiotherapy starts and long-term oral health planning [9]. While not reporting OM grades directly, this service model operationalizes the interprofessional “prevention first” approach recommended in guidelines [1,2].

Hematopoietic stem-cell transplantation (HSCT)

Toothbrushing protocol trial. In a single-blind randomized trial during autologous HSCT, powered versus manual toothbrushing did not alter OM severity; however, better plaque control correlated with milder OM, reinforcing the centrality of daily hygiene coaching within bundles led by nurses and supported by dental staff [17].

Professional oral health care (retrospective cohort). In an HSCT cohort, provision of POHC was associated with reductions in severe OM and fewer FN days, pointing to potential infection-control benefits of frequent professional debridement and periodontal care during cytopenic periods [18].

Cryotherapy as a bundle adjunct (randomized). A pilot randomized controlled trial in autologous transplant patients compared an oral-care protocol plus cryotherapy versus oral-care-protocol alone, finding significantly lower OM severity and pain in the combined-intervention arm, with favorable acceptability [21]. While cryotherapy specifically targets mucotoxic chemotherapy with short half-lives, its integration into a standardized nursing-delivered oral-care pathway typifies interprofessional bundling.

Pediatric oncology and unit-wide protocols

A pediatric oncology service that implemented a standardized oral-care protocol reported reductions in OM burden at the unit level and highlighted the central role of nurse education and protocol adherence, supported by dental consultation as needed [19]. These data, though older and primarily quality-improvement in nature, align with adult findings that disciplined daily hygiene and clear role delineation reduce mucosal injury.

Treatment tolerance and infections

Across settings, evidence converges on reduced OM severity with interprofessional bundles, with several studies demonstrating associations between improved oral hygiene/periodontal status and fewer FN events [11,13,14,18]. Direct measures of treatment tolerance (dose reductions/delays) were most explicit in the everolimus/exemestane RCT, where stomatitis prevention translated into more manageable therapy, an effect widely regarded as supporting adherence to planned regimens [12]. Radiotherapy data show reductions in severe OM and fewer unplanned radiotherapy management issues in programs that embed dental fabrication/support and nurse-reinforced self-care [12,16].

Risk of bias

Randomized trials were generally at low-to-moderate risk of bias for outcome assessment but often lacked blinding of participants due to the nature of behavioral/oral-care interventions [12,17,20,21]. Observational studies varied in confounding control; the PISA-FN study used propensity score matching to strengthen inference [14].

DISCUSSION

This review shows that interprofessional oral-care bundles, anchored by nursing practice and supported by dental teams (including dental assistants), reliably reduce OM severity across diverse oncology settings and likely reduce infection risk, particularly FN, when periodontal inflammation and bacterial load are controlled. These findings are aligned with, and extend, international guidance calling for structured prevention and early management of OM integrated into multidisciplinary workflows [1,5–7]. Nursing-delivered components (daily hygiene coaching and monitoring, cryotherapy during susceptible regimens) are evidence-based and practical [8], while dental services (pre-treatment extractions/restorations, periodontal stabilization, fabrication of radiotherapy spacers) address causal oral foci and mechanical contributors to mucosal injury, and enable on-time starts [2,9].

Infection outcomes, often under-reported in mucositis trials, are increasingly linked to oral health metrics. High oral bacterial counts and greater periodontal inflamed surface area independently predicted FN during chemotherapy, even when POHC was provided [13,14]. These data support embedding dental assistants in the interprofessional team to operationalize frequent plaque biofilm disruption (assisting hygienists/dentists with debridement and patient instruction), while nurses track adherence and early oral symptoms between professional appointments. Such shared care reflects guideline priorities to standardize assessment and bundle delivery [1,5].

Treatment tolerance signals were clearest in the targeted-therapy RCT, where proactive oral care prevented stomatitis, a leading cause of dose interruption in everolimus therapy [12]. Evidence syntheses similarly conclude that multidisciplinary dental services can reduce adverse events that derail systemic therapy [3,4]. Still, heterogeneity in bundle content, adherence monitoring, and outcome definitions limits meta-analysis and

complicates identification of the “active ingredients.” Future trials should (i) prespecify infection and treatment-tolerance endpoints, (ii) use standardized OM assessments as recommended by recent consensus [5], and (iii) explicitly describe the roles of dental assistants and nurses in delivery and follow-up. Implementation research in real-world oncology services, such as pre-RT dental clinics, shows scalability and timeliness when the team is formalized and referral pathways are clear [2,9].

Implications for National Guard Hospital oncology services. A pragmatic bundle could include: pre-therapy dental screening with assistant-supported debridement and patient instruction; a nurse-run daily hygiene protocol (soft brush 2–3×/day, bland rinse, saliva support); targeted adjuncts (cryotherapy for eligible regimens); weekly interprofessional huddles during high-risk phases; and structured OM/FN documentation to track outcomes against service benchmarks from the literature and guidelines [1–3,5–9].

CONCLUSION

Interprofessional, nursing–dental oral-care bundles consistently reduce OM severity and show promising reductions in FN, supporting uninterrupted cancer therapy. The strongest evidence spans proactive professional oral care, disciplined daily hygiene supervised by nurses, and targeted adjuncts such as cryotherapy when indicated. Services that embed dental teams, including dental assistants, before and throughout treatment can translate these gains into routine practice. Standardized reporting of infections and treatment tolerance, together with explicit role delineation, are priorities for future trials and implementation studies.

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