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NURSING INTERVENTIONS FOR PATIENTS UNDERGOING DENTAL IMPLANT SURGERY: A SYSTEMATIC REVIEW

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Abstract

Dental implant surgery increasingly benefits from structured peri-operative and maintenance care that prevents peri-implant disease and improves patient-reported outcomes. This systematic review synthesized randomized, quasi-experimental, and pilot evidence on nursing-led or nursing-delivered interventions for patients undergoing dental implant surgery, including experiential education with health coaching, structured postoperative nursing protocols, telemedicine follow-up, and supportive peri-implant therapy (SPiT) within nursing pathways. In seven original studies, these strategies consistently improved oral-hygiene behaviors and clinical parameters such as plaque index, bleeding on probing, and probing depths. Several trials reported additional gains in pain, aesthetics, satisfaction, and adherence; complication signals generally favored structured nursing approaches. Evidence comparing professional maintenance modalities (ultrasonic vs. Er:YAG laser) showed both are effective short-term, with select advantages in bleeding, plaque and comfort that may support adherence. Heterogeneity in intervention content, follow-up duration, and outcome definitions limited pooling. Overall, patient-centric nursing interventions and risk-based supportive maintenance appear to enhance peri-implant health and care experience after implant surgery. Future trials should standardize outcome sets, report fidelity, adherence, and evaluate long-term disease recurrence and cost-effectiveness.

Keywords: Dental Implant Surgery; Peri-Implant Mucositis; Nursing Intervention; Health Coaching; Telemedicine; Supportive Peri-Implant Therapy; Maintenance Care.

INTRODUCTION

Peri-implant diseases are prevalent, progressive complications that can compromise implant longevity and wellbeing. Contemporary maintenance frameworks emphasize risk-based supportive peri-implant therapy (SPiT), individualized recall, and patient-centered self-care to limit disease progression and preserve function (Mojaver et al., 2025; Araújo

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et al., 2024; Monje et al., 2016). Systematic syntheses consistently highlight that professional, mechanical plaque control coupled with effective home care underpins mucositis control; variability in adjuncts and compliance often drives outcome heterogeneity (Monje et al., 2016; Araújo et al., 2024). Adjunctive approaches within SPiT (lasers, air-polishing, antiseptics, probiotics, postbiotics) may confer short-term benefits for selected outcomes, but adherence to core maintenance remains the major determinant (Baldi et al., 2022; Ye et al., 2023; Araújo et al., 2024). Updated evidence for chlorhexidine, for example, shows mixed added value when layered onto non-surgical therapy, reinforcing the primacy of mechanical debridement and targeted, goal-directed adjunct use (Ye et al., 2023). Within this context, nursing teams are pivotal in the implant pathway: peri-operative education, behavior coaching, remote follow-up, complication triage, and delivery, coordination of professional maintenance. Broader peri-operative literature supports nursing-enabled enhanced-recovery principles to standardize care, reduce morbidity, and improve patient experience (Bär et al., 2024). For implant recipients, risk-tailored recall that integrates patient risk factors (history of periodontitis, smoking, systemic health) and tracks both clinical and patient-reported outcomes is repeatedly advocated (Mojaver et al., 2025; Araújo et al., 2024). We collate original trials and quasi-experimental studies where nurses led or co-delivered peri-operative education, remote monitoring, or supportive maintenance after implant surgery. We evaluate impacts on plaque, bleeding indices, probing depths, compliance, attendance, satisfaction, pain, aesthetics, quality of life, and complications to assess how nursing-centered strategies operationalize maintenance guidance.

METHODS

Reporting and protocol: The review followed PRISMA principles for identification, screening, eligibility, and inclusion, using a predefined PICOS, dual screening, and structured extraction (design; setting; participants; intervention, comparator; follow-up; outcomes; adverse events).

Eligibility (PICOS)

Population: Adults undergoing dental implant surgery and, or presenting with peri-implant mucositis during maintenance.

Interventions: Nursing-led, delivered components (experiential education with health coaching; structured postoperative nursing protocols; telemedicine, remote follow-up) and supportive maintenance elements coordinated within nursing pathways; professional plaque-control modalities and home-care adjuncts evaluated within maintenance programs.

Comparators: Usual care, standard education, alternative maintenance modality, placebo, vehicle.

Outcomes: Clinical indices (plaque index, bleeding on probing, gingival bleeding index, probing depth), patient-reported outcomes (pain, aesthetics, oral-health-related quality of life), satisfaction, compliance, attendance, and complications, adverse events.

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Design: Randomized or quasi-experimental original studies.

Information sources and search: Major databases (MEDLINE, PubMed, Embase, Cochrane Library, Web of Science) and trial registries were searched through 11 November 2025 with controlled vocabulary and keywords covering implants, mucositis, peri-implantitis, nursing education, coaching, telemedicine, SPiT, debridement modalities, antiseptics, probiotics, postbiotics, and patient-reported outcomes. Citation chaining supplemented the search. Study selection and extraction: Two reviewers screened titles, abstracts and full texts, extracted data to standardized forms, and resolved disagreements by consensus. We captured ethics, registration and adverse-event reporting when available. Risk of bias and synthesis: For randomized trials, we considered sequence generation, allocation concealment, blinding, attrition, and selective reporting; for quasi-experimental designs, baseline comparability and confounding. Anticipating heterogeneous interventions and follow-up, we undertook narrative synthesis with tabulation of characteristics and outcomes.

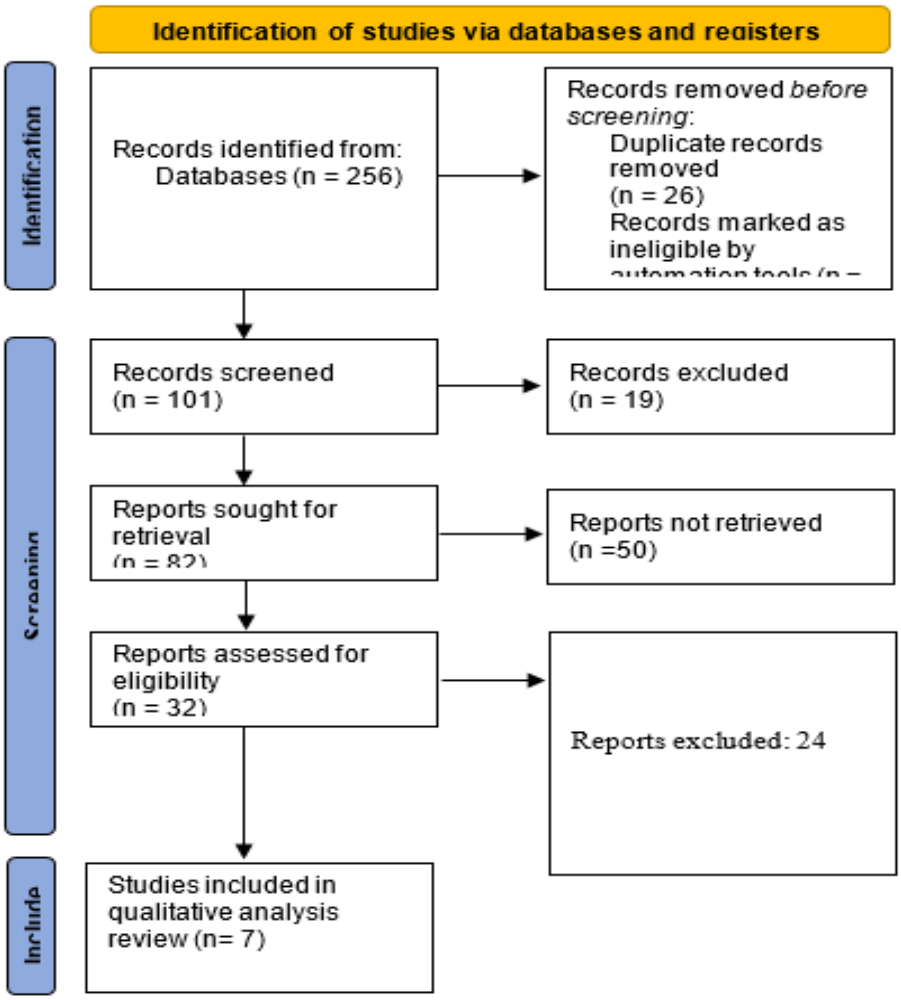

Figure 1: PRISMA consort chart

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RESULTS

Overview

Seven original studies met criteria and evaluated experiential education with health coaching, structured postoperative nursing protocols, telemedicine follow-up, and supportive maintenance (including professional debridement modalities and domiciliary adjuncts) delivered within nursing-centered pathways. Structured postoperative nursing protocol (quasi-experimental). A hospital-based nursing protocol after implant surgery for partially edentulous patients improved oral-health status and implant success while strengthening knowledge, self-care, and early complication monitoring, positioning nursing follow-up as essential in the early recovery window (Hassanien et al., 2023). Quality-control circle (QCC) in postoperative nursing (quasi-experimental). In older adults with implants, a QCC-driven program increased satisfaction and reduced complications versus routine care via iterative, team-based problem solving, targeted oral-hygiene instruction, and standardized surveillance (Zhao et al., 2024).

Telemedicine-assisted follow-up (pilot randomized study). A 30-patient pilot RCT found telemedicine follow-up after implant surgery achieved comparable satisfaction and clinical outcomes to in-person visits, supporting feasibility of remote postoperative nursing reinforcement and image-assisted wound assessment (Patel et al., 2024). Experiential education + health coaching (EE+HCT) for older adults (randomized study). An RCT reported that experiential education combined with structured coaching improved hygiene behaviors and peri-implant indices versus standard education in 1–6 months, illustrating a scalable nurse-delivered counseling model (Huang et al., 2025).

Professional maintenance modality: Er:YAG laser vs. ultrasonic (randomized trial). Both modalities were effective for peri-implant mucositis over 6 months; select advantages favored Er:YAG (fewer diseased sites at 6 months; lower FMBoP and implant-level plaque; less short-term pain), changes that may support recall adherence (Bengtsson et al., 2025).

Home-care adjunct during maintenance: postbiotic vs. chlorhexidine gel (randomized split-mouth). With professional mechanical debridement (PMPR) and structured home-care, both gels significantly improved indices; between-arm differences were small, with sensitivity analyses favoring the postbiotic on some inflammatory measures (Butera et al., 2022). Probiotic lozenges as an adjunct (randomized, double-blind). After initial debridement and instruction, both probiotic and placebo groups improved through 6 months, with no significant between-group difference, underscoring that high-quality PMPR plus reinforced home care is the primary driver (Hallström et al., 2016).

Effects on clinical indices and patient experience

In studies, nursing education, coaching and remote reinforcement improved plaque-control behaviors and reduced bleeding, probing depths relative to standard routines (Hassanien et al., 2023; Zhao et al., 2024; Huang et al., 2025; Patel et al., 2024).

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Table 1: Characteristics of the included studies

Study	Country, setting	Design	Population	Intervention (nursing, maintenance element)	Comparator	Follow-up	Main outcomes
Hassanien et al., 2023	Egypt (hospital)	Quasi-experimental	Post-operative implant patients	Structured postoperative nursing protocol (education, self-care, scheduled follow-up)	Routine care	Early post-op	Improved oral-health status and implant success; better knowledge, self-care
Zhao et al., 2024	China (inpatient geriatrics)	Quasi-experimental	Older adults with implants	QCC-based nursing (process improvement, education, surveillance)	Routine care	Inpatient →discharge	Higher satisfaction, fewer complications
Patel et al., 2024	India (multi-center)	Pilot RCT (n=30)	Implant surgery patients	Telemedicine follow-up with virtual consults and image sharing	In-person follow-up	Short-term	Satisfaction and clinical outcomes comparable between arms
Huang et al., 2025	China (multi-center)	RCT	Older adults post-implant	Experiential education + health coaching	Standard education	1–6 mo	Improved hygiene behaviors and peri-implant indices
Bengtsson et al., 2025	Sweden (university clinic)	RCT	Peri-implant mucositis	Er:YAG PMPR	Ultrasonic PMPR	6 mo	Both effective; Er:YAG showed select advantages (bleeding, plaque; less pain)
Butera et al., 2022	Italy (university clinics)	Randomized split-mouth	Peri-implant mucositis	Postbiotic gel + debridement	CHX gel + debridement	3–6 mo	Significant within-group improvements; small differences favoring postbiotic
Hallström et al., 2016	Sweden (multi-center)	RCT, double-blind	Peri-implant mucositis	Probiotic lozenges + standard care	Placebo + standard care	6 mo	Clinical improvement in both; no added probiotic benefit

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Professional maintenance comparisons reaffirm the cornerstone role of mechanical plaque removal within structured recall, with Er:YAG offering select advantages (bleeding, plaque; short-term pain) that may enhance comfort and adherence (Bengtsson et al., 2025). Adjunctive domiciliary gels (postbiotic or chlorhexidine) achieved meaningful within-group gains when anchored by PMPR and nurse-reinforced self-care; between-group differences were modest, consistent with broader syntheses showing mixed incremental benefits for antiseptics and other adjuncts (Butera et al., 2022; Ye et al., 2023). Patient-reported outcomes (pain, aesthetics, satisfaction) generally moved in favorable directions under structured nursing protocols and maintenance visits with practical home-care instruction (Hassanien et al., 2023; Zhao et al., 2024; Bengtsson et al., 2025).

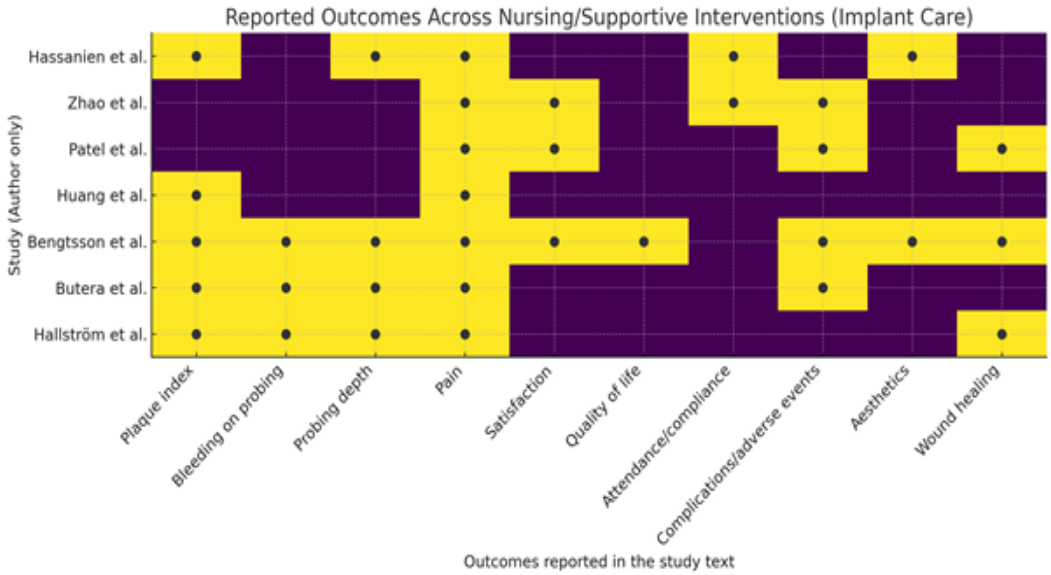

Figure 1: Outcomes heatmap

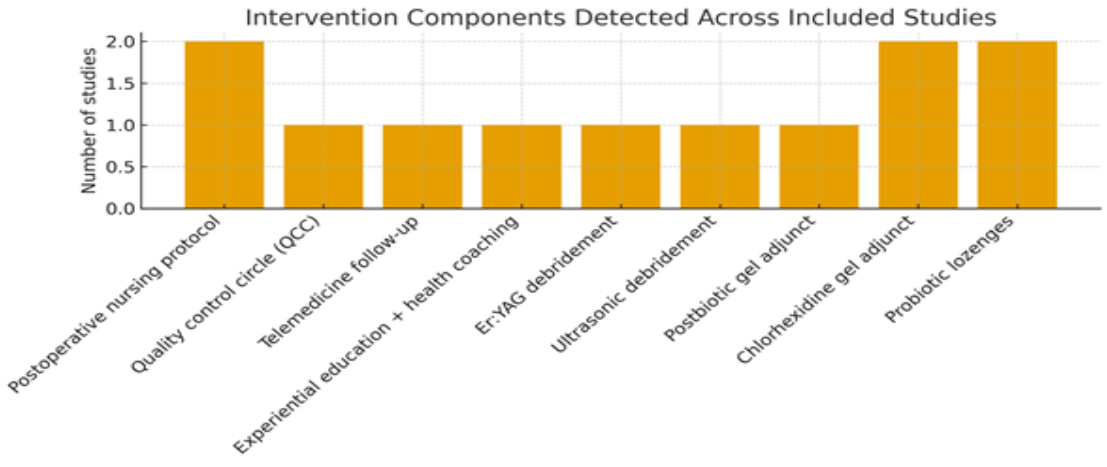

Figure 2: Intervention components chart

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DISCUSSION

This review indicates that patient-centric nursing interventions, experiential education with coaching, structured postoperative protocols, and telemedicine reinforcement, improve peri-implant hygiene behaviors and clinical indices after implant surgery, while enhancing experience and satisfaction. These findings extend maintenance reviews advocating individualized, risk-based SPiT to limit disease progression and support long-term outcomes (Mojaver et al., 2025; Araújo et al., 2024; Monje et al., 2016). Telemedicine appears feasible and acceptable for early follow-up, offering image-assisted triage and timely coaching when in-person access is difficult (Patel et al., 2024), and education-plus-coaching approaches accelerate behavior change beyond standard instruction (Huang et al., 2025).

Professional maintenance comparisons reinforce the primacy of effective mechanical plaque removal in structured recall. Laser-assisted and ultrasonic debridement both reduced inflammation; select advantages with Er:YAG (fewer diseased sites, lower FMBoP, plaque, less short-term pain) could promote adherence (Bengtsson et al., 2025). At home, adjuncts (postbiotic or chlorhexidine gels) produced meaningful within-group gains when combined with PMPR and reinforced self-care, while between-group differences were modest, mirroring broader syntheses with mixed incremental effects for chlorhexidine and underscoring the centrality of adherence to maintenance fundamentals (Butera et al., 2022; Ye et al., 2023; Baldi et al., 2022).

Peri-operative optimization surrounding implant surgery should also consider general surgical nursing and enhanced-recovery principles to reduce morbidity and streamline care (Bär et al., 2024). While antibiotic protocols remain debated, a randomized trial suggests limited influence on one-year crestal bone remodeling and highlights the importance of standardized care pathways and vigilant monitoring rather than routine extended antibiotics (Durand et al., 2021). Collectively, the evidence supports embedding nurses at every step, peri-operative counseling, structured maintenance, and remote follow-up, aligned to risk-tailored recall and documented outcomes (Mojaver et al., 2025; Araújo et al., 2024).

Limitations. Heterogeneity in intervention content, follow-up, and outcome definitions precluded meta-analysis. Several studies were single-center with modest samples; fidelity, adherence reporting was variable. Longer-term data on disease recurrence and cost-effectiveness remain limited. Future multi-center RCTs should adopt standardized outcomes (clinical and patient-reported), explicitly measure adherence and implementation fidelity, and evaluate equity of access.

CONCLUSION

In randomized and pragmatic studies, nursing-led education, coaching, structured postoperative protocols, and telemedicine reinforcement improve peri-implant hygiene behaviors and clinical indices after implant surgery, while enhancing patient experience. Professional maintenance with ultrasonic or laser-assisted debridement is effective; domiciliary gels add within-group benefits but do not replace the fundamentals of

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mechanical plaque control and risk-tailored recall. Embedding nursing teams in the pathway operationalizes SPiT principles and may reduce preventable progression from mucositis to peri-implantitis. Future trials should extend follow-up, standardize outcomes, and assess implementation fidelity and cost-effectiveness.

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