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A Narrative Review: The Role of Nursing and Physical Therapy in Post-Dental Surgery Rehabilitation—Microbial Risk Management and Sterilization Standards

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Abstract

Background: Post-dental surgery rehabilitation, a critical phase for optimal patient recovery, integrates nursing and physical therapy (PT) interventions within environments posing significant microbial risks. Surgical sites are vulnerable to infections, complicating healing and functional restoration. Strict sterilization and infection control protocols are paramount, yet their application and interdisciplinary coordination in rehabilitation contexts require thorough examination.

Aim: This narrative review synthesizes current evidence to elucidate the collaborative roles of nursing and PT in post-dental surgery rehabilitation, with a specific focus on microbial risk management and adherence to sterilization standards to prevent surgical site infections (SSIs) and promote recovery.

Methods: A comprehensive literature search was conducted across PubMed, CINAHL, Scopus, and Web of Science databases (2010-2024). Peer-reviewed articles, clinical guidelines, and systematic reviews were analyzed thematically.

Results: Nursing is pivotal in direct wound care, patient education, and systemic monitoring for infection, while PT addresses functional impairments, edema, and pain through targeted exercises, both operating within rigorous infection control frameworks. Key challenges include biofilm formation on rehabilitation equipment, inconsistent protocol adherence, and interprofessional communication gaps. Enhanced bundled interventions and standardized sterilization protocols for shared equipment significantly reduce SSI incidence.

Conclusion: Effective post-dental surgery rehabilitation necessitates a tightly integrated, bi-nodal model of care where nursing and PT roles are synergistically aligned under uncompromising infection prevention principles. Future efforts must standardize interdisciplinary protocols and leverage technology for better compliance and patient outcomes.

Keywords: Dental Surgery Rehabilitation, Nursing Care, Physical Therapy, Infection Control, Sterilization Standards, Surgical Site Infection.

Introduction

The landscape of dental surgery has evolved considerably, encompassing procedures from complex maxillofacial reconstructions and dental implantology to third molar extractions and periodontal surgeries. The success of these interventions is not solely determined by surgical precision but is profoundly influenced by the subsequent postoperative rehabilitation phase (Khairnar et al., 2015). This period is characterized by vulnerabilities, including pain, trismus (limited jaw opening), swelling, and, most critically, the risk of surgical site infections (SSIs). SSIs represent a formidable complication, potentially leading to delayed healing, implant failure, increased morbidity, and heightened healthcare costs (Ata-Ali & Ata-Ali, 2014). Consequently, postoperative care has transitioned from a passive

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recovery observation to an active, interdisciplinary rehabilitation paradigm.

Within this paradigm, nursing and physical therapy (PT) emerge as two indispensable pillars. Nursing care provides the foundational continuum, managing immediate postoperative needs, wound care, patient education, and vigilant monitoring for signs of infection (Ju et al., 2019). Simultaneously, physical therapy interventions are increasingly recognized for their efficacy in mitigating functional sequelae, such as reducing edema, managing pain through modalities, and restoring range of motion, particularly following surgeries that impact the muscles of mastication and cervical region (Kulesa-Mrowiecka et al., 2021). However, the execution of these rehabilitative roles does not occur in a sterile vacuum. Both disciplines engage with the patient in clinical environments—from hospital wards and outpatient clinics to home settings—where microbial exposure is a constant threat.

The intersection of active rehabilitation and infection prevention forms the critical nexus of this review. Effective microbial risk management and stringent adherence to sterilization standards are non-negotiable prerequisites that underpin all nursing and PT activities post-dental surgery. Breaches in these protocols can negate the benefits of both surgical and rehabilitative efforts, introducing pathogens directly to compromised tissues or via contaminated equipment (Verbeek et al., 2020). This review, therefore, aims to synthesize contemporary literature (2010-2024) to elucidate the integrated roles of nursing and physical therapy in post-dental surgery rehabilitation, with a concentrated lens on how microbial risk is managed, and sterilization standards are implemented and maintained within their respective and collaborative scopes of practice. It will explore current evidence, identify persistent challenges—such as biofilm formation on rehabilitation equipment and interprofessional communication barriers—and propose directions for standardized, evidence-based protocols.

Methodology

This narrative review employed a systematic approach to literature identification and synthesis. A comprehensive search was conducted across major electronic databases, including PubMed/MEDLINE, CINAHL, Scopus, and Web of Science. The search strategy utilized a combination of Medical Subject Headings (MeSH) terms and keywords: ("dental surgery" OR "oral surgery" OR "maxillofacial surgery") AND ("rehabilitation" OR "postoperative care") AND ("nursing" OR "physical therapy" OR "physiotherapy") AND ("infection control" OR "sterilization" OR "disinfection" OR "surgical site infection" OR "cross infection") AND ("standards" OR "guidelines"). Boolean operators (AND, OR) were used to refine the search. The publication date filter was set from January 2010 to December 2024 to ensure contemporary relevance.

Inclusion criteria encompassed: (1) peer-reviewed original research articles (randomized controlled trials, cohort studies, case-control studies), (2) systematic reviews and meta-analyses, (3) clinical practice guidelines from authoritative bodies (e.g., CDC, WHO, ADA), and (4) seminal textbooks or book chapters providing foundational knowledge. Articles were excluded if they were not in English, focused solely on intraoperative infection control without postoperative relevance, or addressed non-dental surgical contexts without transferable principles. The initial search yielded over 800 citations. Titles and abstracts were screened for relevance, followed by a full-text review of selected articles. The reference lists of key papers were also hand-searched for additional sources. Data from included studies were extracted and organized thematically into the following categories: the nursing role in infection prevention, the physical therapy role in a contaminated environment, microbial risks specific to rehabilitation settings, sterilization and disinfection standards for patient-care equipment, and models for interprofessional collaboration. The synthesis is presented narratively, supported by two summary tables.

The Nursing Role in Post-Dental Surgery Rehabilitation and Infection Surveillance

The nurse's role in post-dental surgery care is multifaceted, extending from the immediate post-anesthesia recovery period to long-term follow-up, with infection prevention as a golden thread throughout. This role is operationalized through direct clinical care, patient education, and continuous surveillance (Mendes et al., 2018).

Direct Wound Care and Aseptic Technique

Following dental surgery, nurses are often responsible for the initial and ongoing care of the surgical site. This includes managing dressings, irrigating sockets or intraoral incisions, and monitoring drains if present. The imperative for aseptic non-touch technique during any wound interaction cannot be overstated. Compromised oral mucosa presents a direct portal for endogenous (oral flora) and exogenous pathogens (Lazarin & Chappuis, 2019). Nurses must balance the need to inspect and clean the area with the paramount goal of preventing contamination. Evidence supports the use of sterile saline for gentle irrigation and the application of prescribed antimicrobial dressings (e.g., those containing chlorhexidine) under strict aseptic conditions to reduce bacterial load at the site (Sánchez et al., 2018).

Systemic Monitoring and Early Detection of SSIs

Nurses serve as the first line of defense in early SSI detection. This involves vigilant assessment beyond the wound itself, including monitoring vital signs for pyrexia, tachycardia, or unexplained

changes; evaluating increased or odorous exudate; and assessing the patient's report of escalating pain disproportionate to the expected trajectory (Ju et al., 2019). For dental surgeries involving bone, such as implants or osteotomies, nurses must also be alert to signs of deeper infections like osteomyelitis, which may present with persistent swelling, lymphadenopathy, and malaise (Khairnar et al., 2015). Timely recognition and escalation to the surgical team are critical for initiating appropriate antimicrobial therapy and preventing systemic complications.

Patient and Caregiver Education

A cornerstone of nursing practice is empowering patients for self-care. Effective education reduces infection risk by ensuring compliance with postoperative instructions. Nurses educate patients on proper oral hygiene techniques during the healing phase, such as the use of antimicrobial mouthwashes (e.g., chlorhexidine gluconate 0.12%) and methods for cleaning unaffected areas while protecting the surgical site (Curtis et al., 2021). Instructions on medication adherence (especially antibiotics if prescribed), dietary modifications (soft, non-irritating foods), and the critical importance of hand hygiene before any intraoral manipulation are essential components (Verbeek et al., 2020). Furthermore, nurses educate patients to recognize and report early signs of infection, thereby closing the surveillance loop after discharge.

Antibiotic Stewardship Advocacy

In an era of growing antimicrobial resistance, nurses play a vital role in antibiotic stewardship. While prophylactic or therapeutic antibiotics are sometimes indicated in dental surgery, their misuse is a concern. Nurses, through their constant patient contact, can assess the clinical response, report potential adverse effects, and advocate for the appropriate duration of therapy as per guidelines, thus helping to prevent *Clostridioides difficile* infections and resistance development (Luyt et al., 2014).

The Physical Therapy Role in Functional Rehabilitation within a Framework of Infection Control

Physical therapy interventions are crucial for restoring form and function following dental surgeries that affect the temporomandibular joint (TMJ), muscles of mastication, or cervical spine. However, PT practice in this context inherently involves close physical contact and the use of equipment, introducing unique microbial risk vectors that must be managed (van der Meer et al., 2020).

Addressing Post-Surgical Sequelae

Common indications for PT include trismus, pain, swelling (edema), and cervical dysfunction. Therapeutic exercises, including passive, active-assisted, and active range-of-motion exercises for the mandible, are fundamental for preventing and treating trismus (Faravel et al., 2023). Manual therapy techniques, such as soft-tissue mobilization and gentle joint mobilization, may be used to reduce muscle guarding and improve mobility. Modalities like low-level laser therapy (LLLT), therapeutic ultrasound, and cryotherapy are frequently used for pain modulation and edema reduction (Martins et al., 2012; Carley et al., 2021). Each of these interventions requires consideration of infection control.

Infection Control in PT Practice

The physical therapist's responsibility for infection control is twofold: protecting the patient's surgical site and preventing cross-contamination between patients. Hand hygiene is the most critical measure. Therapists must perform hand hygiene with alcohol-based rub or soap and water immediately before and after contact with the patient or any equipment near the patient's oral/ facial region (World Health Organization, 2019). The use of personal protective equipment (PPE) is context-dependent. While gloves are mandatory for any contact with non-intact skin or mucous membranes (e.g., intraoral massage, manual stretching near sutures), a mask and eye protection are advisable during procedures that might generate splashes (Verbeek et al., 2020). For external modalities, gloves may not be mandatory if the skin is intact, but hand hygiene remains essential.

Decontamination of Rehabilitation Equipment

This represents a significant challenge. Equipment such as therapeutic ultrasound transducer heads, laser applicators, cervical collars, TheraBite® or other jaw-opening devices, and even exercise tools (e.g., tongue depressors for stretching) can become contaminated with blood, saliva, or skin flora. The CDC categorizes medical devices as critical, semicritical, or noncritical based on infection risk. Most PT equipment used externally is noncritical (touches only intact skin) and requires low-level disinfection between patients (Rutala & Weber, 2019). However, any item that may contact mucous membranes or non-intact skin (e.g., a transducer used over a damp surgical dressing) should be treated as semicritical, requiring high-level disinfection. A major risk is the formation of biofilms within the water reservoirs of hydrotherapy or moist heat units, which can aerosolize pathogens; these require strict cleaning and disinfection protocols (Høiby et al., 2015). Table 1 summarizes key equipment and recommended decontamination levels. Figure 1 shows the integrated roles of nursing and physical therapy in post-dental surgery rehabilitation

Table 1: Physical Therapy Equipment in Dental Rehabilitation and Recommended Decontamination Levels

Equipment/Item	Typical Use	Patient Contact Level	Recommended Decontamination Level (Between Patients)

Therapeutic Ultrasound Transducer	Applied with gel to skin over jaw/TMJ	Noncritical (if skin intact)	Clean with low-level disinfectant (e.g., 70% alcohol wipe). If gel cap is used, replace cap.
Low-Level Laser Applicator	Held close to or in contact with skin/oral mucosa	Semicritical (if contacting mucosa)	Clean with low-level disinfectant for skin; high-level disinfectant if contacting mucosa. Use disposable barriers if possible.
Cervical Collar	Supports cervical spine	Noncritical	Clean with low-level disinfectant.
Jaw Rehabilitation Device (e.g., TheraBite®)	Placed between teeth; handles touched	Semicritical (mouthpiece); Noncritical (handles)	Mouthpiece: High-level disinfection or sterilization. Handles: Low-level disinfection.
Exercise Tools (e.g., tongue depressors)	Used for passive stretching	Semicritical (intraoral contact)	**Single use is preferred.** If reusable, must be sterilized.
Hydrotherapy / Moist Heat Pack Unit	Reservoir for warm water	Noncritical (external) but high risk of biofilm	Drain and dry daily. Disinfect reservoir regularly per manufacturer's guidelines (often intermediate level).

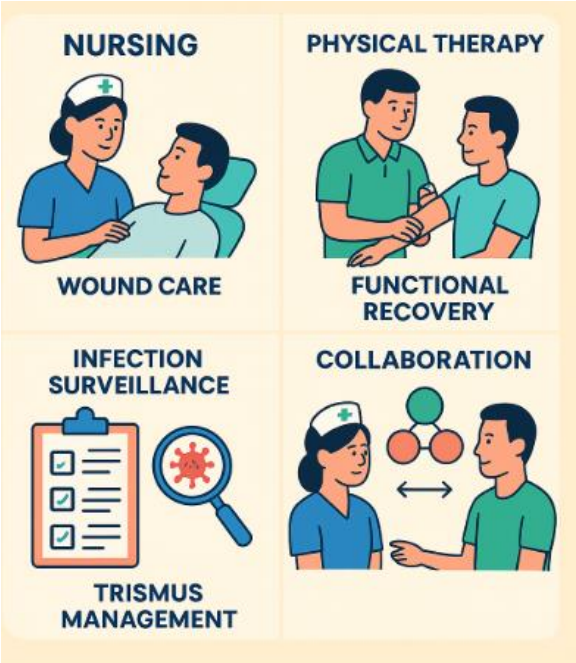

Figure 1: The integrated roles of nursing and physical therapy in post-dental surgery rehabilitation

Microbial Risks in Post-Dental Surgery Rehabilitation Environments

The rehabilitation environment, whether inpatient or outpatient, represents a critical interface where therapeutic goals intersect with significant microbial hazards. For nursing and physical therapy (PT) professionals managing post-dental surgery patients, navigating this landscape requires a detailed understanding of specific contamination sources, pathogen behaviors, and the persistent challenges to maintaining aseptic integrity. Effective microbial risk management is not a peripheral concern but a foundational component of safe rehabilitation practice, directly influencing surgical site infection (SSI) rates and overall patient outcomes (Figure 2).

Figure 2: Microbial risk management and sterilization standards in dental rehabilitation settings.

Primary Sources and Vectors of Contamination

The predominant microbial threat originates from the patient's own oral microbiome, a dense and complex ecosystem harboring bacteria, fungi, and viruses. Common pathogens implicated in dental SSIs include *Streptococcus* species, *Staphylococcus aureus* (including methicillin-resistant strains), anaerobic bacteria such as *Prevotella* and *Fusobacterium*, and *Candida* species (Schmidt et al., 2021). This endogenous flora can become pathogenic when introduced to deeper tissues during surgery or through compromised healing. Exacerbating this risk are environmental pathogens that persist on surfaces

and equipment. During rehabilitation activities—such as patient conversations, coughing, or exercises that strain the oral region—these microorganisms can be disseminated via droplets and aerosols, or transferred through direct contact with contaminated hands, therapy tools, or environmental surfaces. This creates a continuous cycle of potential exposure that staff must actively interrupt.

The Persistent Threat of Biofilm Formation

A particularly formidable and often underestimated risk is the development of biofilms on medical and rehabilitation equipment. Biofilms are structured, surface-adherent communities of microorganisms encased within a protective, self-produced polymeric matrix. This matrix confers profound resistance to both antibiotics and standard disinfectants, allowing pathogens to survive routine cleaning protocols (Høiby et al., 2015). In rehabilitation settings, biofilms can establish in the intricate tubing of cryotherapy units, within the water reservoirs and lines of hydrotherapy or moist heat equipment, and in the crevices of complex devices like adjustable jaw mobilization tools. Once established, these biofilms act as persistent reservoirs, continuously shedding planktonic (free-floating) bacteria that can seed infections and lead to cross-contamination between patients, thereby undermining all other infection control efforts.

The Escalating Challenge of Multidrug-Resistant Organisms

The increasing prevalence of multidrug-resistant organisms (MDROs), both in healthcare and community settings, adds a critical layer of complexity to risk management. Patients may be colonized with pathogens such as MRSA or vancomycin-resistant enterococci (VRE). Although not typical components of the oral flora, these organisms can colonize the nares, skin, or persist in the immediate environment. Their presence necessitates a heightened level of vigilance. When treating patients with known MDRO colonization or infection, strict Transmission-Based Precautions, specifically Contact Precautions, become mandatory. This requires the use of enhanced personal protective equipment (PPE), such as gowns and gloves, and, whenever feasible, the dedication of patient-specific equipment to prevent transmission (Alhumaid et al., 2021).

Human Factors and Adherence Gaps

Despite advanced protocols, human factors consistently represent the weakest link in the infection prevention chain. Lapses in hand hygiene and the shortcutting of equipment cleaning protocols are frequently driven by systemic issues such as time pressures, high patient volumes, cognitive overload, and simple forgetfulness (Ruiz-Ramos et al., 2023). These breaches can negate the benefits of even the most sophisticated sterilization technology. Mitigating this risk requires a multifaceted approach that includes consistent and engaging training, adequate staffing levels to manage workload, and the strategic placement of accessible supplies—such as alcohol-based hand rub at every point of care—to make compliance the easiest option.

Sterilization and Disinfection Standards: Bridging the Gap Between Theory and Practice

The establishment of robust standards for sterilization and disinfection by authoritative global bodies, such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO), provides a critical foundation for infection prevention. However, the principal and persistent challenge within post-dental surgery rehabilitation lies not in the existence of these guidelines, but in their consistent, correct, and practical application within a dynamic clinical setting that is often constrained by resources, time, and variable staff expertise. The translation of theoretical protocols into daily, reliable, and uncompromised practice is therefore essential for closing the safety loop and preventing iatrogenic infections that can undermine surgical outcomes and functional recovery.

The Spaulding Classification as a Foundational Framework

Central to the practical application of infection control is the Spaulding Classification, a risk-based system that remains the cornerstone for determining the appropriate level of reprocessing required for any patient-care item (Rutala & Weber, 2019). This framework categorizes items based on their intended use and the associated degree of infection risk, providing a clear decision-making pathway for clinicians. In the context of dental rehabilitation, its application is direct. Critical items, defined as those that enter sterile tissue or the vascular system, are rare in rehabilitation but include instruments like surgical scalpels used in a follow-up procedure; these items mandate mandatory sterilization.

Semicritical items are of paramount relevance, as they contact mucous membranes or non-intact skin. This category encompasses essential rehabilitation tools such as customized mouthpieces for jaw mobilization, suction tips for oral motor therapy, and any instrument used for intraoral manual therapy or stretching. These items require, at a minimum, high-level disinfection (HLD), a process capable of destroying all vegetative microorganisms, mycobacteria, and viruses, though not necessarily high numbers of bacterial spores. Sterilization is strongly preferred for semicritical items whenever feasible. Finally, noncritical items, which contact only intact skin, constitute the majority of external physical therapy modalities. This includes ultrasound transducer heads, cervical collars, therapy plinths, and vital signs monitoring equipment; these require low-level disinfection between patient uses to interrupt the chain of environmental transmission.

Operationalizing Disinfection and Sterilization Methods

The practical execution of these classifications requires specific, validated methods. For semicritical items, high-level disinfection is most commonly achieved through controlled chemical immersion. This involves the use of FDA-approved chemical sterilants/disinfectants—such as glutaraldehyde, ortho-phthalaldehyde, or accelerated hydrogen peroxide—applied for a manufacturer-specified and rigorously monitored contact time to ensure efficacy. Sterilization, representing the gold standard by eliminating all microbial life, including bacterial spores, is achieved through physical processes. These include steam autoclaving (moist heat under pressure), dry heat ovens, and, for heat-sensitive rehabilitation equipment, low-temperature methods such as ethylene oxide gas sterilization or hydrogen peroxide plasma (Rutala & Weber, 2019). Nursing and physical therapy departments must develop and maintain unambiguous, item-specific reprocessing protocols. Furthermore, the implementation of regular quality assurance monitoring, such as the routine use of biological indicators (spore tests) in sterilizers, is non-negotiable for verifying the ongoing efficacy of these life-critical processes.

Comprehensive Environmental Management and Adherence to Precautions

Effective microbial risk management extends far beyond portable patient-care equipment to encompass the entire built environment of the rehabilitation setting. All patient care surfaces—including hospital beds, treatment chairs, bedside tables, and therapy plinths—must be included in a scheduled cleaning and disinfection regimen using an EPA-registered hospital-grade disinfectant. Particular emphasis must be placed on high-touch surfaces, such as doorknobs, light switches, infusion pump controls, and adjustable components of rehabilitation equipment. These surfaces are recognized as significant vectors for indirect contact transmission and therefore require more frequent and meticulous disinfection (Donskey, 2019). Concurrently, a culture of strict adherence to precautionary principles is fundamental.

All clinical staff must demonstrate proficiency in Standard Precautions, which apply universally to every patient interaction and encompass core practices like hand hygiene, appropriate personal protective equipment (PPE) use, and respiratory hygiene/cough etiquette. These foundational measures are supplemented by Transmission-Based Precautions—specifically Contact, Droplet, and Airborne Precautions—which are activated based on a patient's known or suspected infectious status (Siegel et al., 2023). For instance, the management of a patient with a draining dental abscess would necessitate the implementation of Contact Precautions during all nursing wound care and physical therapy sessions to safely contain infectious exudate and prevent environmental contamination.

Table 2: Key Sterilization/Disinfection Standards and Their Application in Dental Rehabilitation

Standard / Guideline Source	Key Principle	Application in Nursing/PT for Dental Rehabilitation
CDC Guideline for Disinfection and Sterilization in Healthcare Facilities (Rutala & Weber, 2019)	Spaulding Classification: Process selection based on intended use of item.	Dictates whether a jaw exerciser (semicritical) needs HLD/sterilization vs. a treatment plinth cover (noncritical) needing low-level disinfection.
WHO Minimum Requirements for Infection Prevention and Control (WHO, 2021)	Core components for IPC programs at the national/facility level.	Supports the establishment of clear decontamination protocols, staff training, and adequate resource allocation in rehab departments.
CDC Core Infection Prevention and Control Practices for Safe Healthcare Delivery (Siegel et al., 2023)	Emphasis on Standard and Transmission-Based Precautions.	Guides PPE use during patient care (e.g., gloves for wound care, gown if risk of contamination).
OSHA Bloodborne Pathogens Standard (29 CFR 1910.1030)	Protects workers from exposure to blood and other potentially infectious materials (OPIM).	Mandates training, provision of PPE, and safe handling/disposal of contaminated sharps and dressings in post-surgical care.
Association for Professionals in Infection Control and Epidemiology (APIC) Guidelines	Best practices for implementation.	Provides detailed strategies for environmental cleaning in outpatient rehab settings and managing reprocessing of shared equipment.

Models for Interprofessional Collaboration and Bundled Interventions

Optimal outcomes in post-dental surgery rehabilitation are not achieved through isolated professional efforts but require seamless interprofessional collaboration (IPC) among surgeons, nurses, physical therapists, and other allied health professionals, such as dietitians and pharmacists (Ehrlich et al., 2022). This collaborative framework is essential for delivering cohesive care that prioritizes infection prevention alongside functional recovery. Effective IPC ensures that all team members operate

from a shared understanding of the patient's status, preventing gaps in care that could compromise the surgical site or hinder rehabilitation progress.

Communication Strategies and Shared Goal Setting

The foundation of effective IPC is clear, structured communication. Utilizing standardized tools, such as the SBAR (Situation, Background, Assessment, Recommendation) framework, can significantly improve the reliability of handoffs between nursing shifts and referrals to physical therapy (Müller et al., 2018). Establishing shared, patient-centered goals aligns the entire team's efforts; for example, a goal stating, "The patient will achieve a pain-free jaw opening of 35mm without clinical signs of infection by postoperative week four," provides a clear, measurable target for both nursing and PT interventions. Regular interdisciplinary meetings, even brief daily "huddles," are instrumental for proactive problem-solving, particularly for patients exhibiting complex needs or early signs of potential complications like infection (Paxino et al., 2020).

The Role of Care Bundles in Standardizing Practice

A highly effective strategy for translating collaboration into consistent action is the implementation of care bundles. Bundles are small, interrelated sets of evidence-based practices that, when performed collectively and reliably, lead to significantly improved patient outcomes (Foley et al., 2022). For post-dental surgery rehabilitation, a dedicated IPC bundle would integrate nursing and PT actions within a robust infection control framework. A proposed bundle could include: (1) nursing-led pre-discharge education on specific oral hygiene protocols and signs of surgical site infection (SSI); (2) performance of the first postoperative wound care or dressing change using strict aseptic technique; (3) a physical therapy initial assessment conducted with meticulous hand hygiene and confirmed use of disinfected equipment; (4) a shared verification of antibiotic prophylaxis or therapy (if indicated) and its timing relative to PT sessions; and (5) a mandated, documented communication pathway for reporting any concerning findings, such as increased swelling or purulence, to the surgical team within a specified timeframe, such as two hours. Applying this bundled model, proven to reduce SSI rates in other surgical fields, to dental rehabilitation holds considerable promise for standardizing high-quality, safe care (Zywot et al., 2017).

Challenges and Barriers to Implementation

Despite the availability of clear guidelines and proven collaborative models, significant barriers often impede their consistent application in clinical practice, potentially undermining rehabilitation success and patient safety.

While nurses and physical therapists receive foundational training in infection prevention and control (IPC), this education is frequently not specific to the unique needs of dental and oral surgery patients or the reprocessing of specialized rehabilitation equipment (da Silva et al., 2023; Ju et al., 2019). A lack of nuanced understanding regarding the oral microbiome, the specifics of dental wound management, and the correct classification and disinfection of devices like jaw mobilizers can lead to protocol deviations. Ongoing, discipline-specific, and interprofessional education is crucial to bridge these knowledge gaps and ensure all team members are competent in the specialized aspects of post-dental surgery care.

Resource limitations pose a substantial practical barrier. Time pressure in high-volume clinical settings can lead to perceived conflicts between thorough IPC practices and patient throughput. The meticulous execution of hand hygiene and equipment decontamination between every patient can be viewed as time-consuming, potentially leading to shortcuts (Meesters & Buonsenso, 2024). Furthermore, logistical challenges such as inadequate access to personal protective equipment (PPE), appropriate disinfectants, or on-site sterilization facilities (e.g., an autoclave) can force clinicians into suboptimal compromises that elevate infection risk.

The culture of a clinical unit regarding safety and protocol adherence is often a direct reflection of its leadership. If leaders do not consistently model, reinforce, and actively monitor compliance with IPC and collaborative practices, adherence among staff will inevitably wane (Saint et al., 2016). Conversely, fostering a culture of psychological safety, where team members feel empowered to speak up and respectfully remind one another about protocols without fear of blame, is essential for sustaining high-reliability practices and effective interprofessional communication.

The effectiveness of the entire rehabilitation and infection prevention plan is ultimately contingent on patient adherence after discharge. Non-compliance with prescribed oral hygiene routines, medication regimens, or home exercise programs remains a prevalent challenge that can negate the efforts of the clinical team (STEWARDSHIP, 2018). Overcoming this barrier requires delivering culturally competent, clear education using methods like "teach-back" to confirm patient understanding, thereby empowering patients as active partners in their own recovery.

Future Directions and Recommendations

To advance post-dental surgery rehabilitation, a multifaceted strategy is essential. First, professional bodies for nursing, physical therapy, dental surgery, and infection control must collaboratively establish specialized clinical guidelines to standardize care (Paxino et al., 2020). Second, technology integration, such as UV disinfection robots and electronic hand hygiene monitors, can enhance environmental decontamination and protocol compliance (Boyce, 2016). Third, interprofessional education (IPE)

modules must be embedded in curricula to foster essential collaborative skills early in clinical training. Fourth, patient engagement should be supported via digital tools like smartphone apps for medication reminders, exercise prompts, and symptom tracking to improve adherence and enable early intervention. Finally, a targeted research agenda is crucial to investigate the microbial impact of physical therapy modalities and to rigorously test the efficacy of bundled interprofessional interventions on critical outcomes like surgical site infection rates and functional recovery timelines, thereby generating the high-level evidence needed to refine best practices.

Conclusion

Post-dental surgery rehabilitation is a critical determinant of surgical success, demanding a sophisticated, integrated approach where functional restoration and infection prevention are inextricably linked. This review underscores that nursing and physical therapy are not ancillary services but central, complementary forces in this process. Nursing provides the vigilant, educative, and direct-care foundation for infection surveillance and prevention. Physical therapy delivers the specialized interventions necessary for functional recovery, all while navigating the microbial risks inherent in close patient contact and equipment use. Their collective effectiveness, however, is wholly dependent on a rigorous, unwavering commitment to microbial risk management principles: consistent application of the Spaulding classification, adherence to sterilization and disinfection standards, meticulous hand hygiene, and judicious use of PPE.

Overcoming the barriers of resource constraints, knowledge gaps, and siloed practice requires dedicated interprofessional collaboration, supported by institutional leadership and structured through models like care bundles. Moving forward, the field must prioritize the development of specialized guidelines, leverage technology, and foster a culture of safety. Ultimately, the goal is a seamless, bi-nodal model of care where the healing touch of rehabilitation never compromises the sterile imperative of post-surgical wound management, ensuring optimal outcomes for every patient undergoing dental surgery.

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