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Effectiveness Of Infection Control And Sterilization Protocols In Preventing Cross-Contamination In Dental Clinics: A Systematic Review

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Abstract

Background:
Dental clinics are high-risk environments for infection transmission due to frequent exposure to saliva, blood, aerosols, and contaminated instruments. Effective infection-control and sterilisation protocols are essential to prevent cross-contamination among patients and dental staff.

Aim:
This systematic review aimed to evaluate the effectiveness of infection-control and sterilisation protocols in reducing cross-contamination within dental clinics and laboratories.

Methods:
Following PRISMA (2020) guidelines, an extensive search was conducted in PubMed, Scopus, CINAHL, Cochrane, and Embase databases for studies published between 2010 and 2025. Inclusion criteria comprised empirical studies investigating sterilisation, disinfection, or infection-control interventions in dental settings. Data were extracted, quality-appraised using JBI and CASP tools, and synthesised narratively under key thematic areas.

Results:
Thirty-six studies met the inclusion criteria. Evidence consistently showed that combined interventions—autoclave validation, waterline disinfection, PPE use, aerosol reduction, and impression sterilisation—significantly decreased microbial load and cross-contamination incidents. However, compliance varied across facilities, with private clinics showing lower adherence due to cost, workload, and limited training. Structured training and continuous audits improved compliance by up to 30%.

Conclusion:
Infection prevention in dentistry requires a multidisciplinary approach supported by leadership, continuous training, and digital monitoring systems. Aligning practices with CDC, WHO, and Saudi MOH standards ensures sustainable infection control and patient safety.

Keywords: Infection control; Sterilisation; Cross-contamination; Dental clinic; Dental staff; Aerosol management; Waterline disinfection; Patient safety.

Introduction

Dental clinics represent a unique and high-risk environment for infection transmission owing to

invasive procedures, frequent exposure to blood and saliva, aerosol generation, and close proximity among patients and dental-care personnel. In such settings, both patients and dental-care staff (dentists, dental assistants, hygienists, technicians) can act as sources or recipients of pathogenic microorganisms (Bromberg, 2023). Sterilisation and prevention of cross-contamination are fundamental to safe dental care: sterilisation refers to the elimination of all forms of microbial life (including spores) from instruments and devices intended for patient contact, while cross-contamination prevention encompasses breaking the chain of infection through standard precautions, surface and water-line disinfection, and appropriate use of personal protective equipment (PPE) (StatPearls, 2023). Failure in any element of the sterilisation or disinfection chain or in procedural protocols can enable transmission of blood-borne pathogens, airborne infections or surface-mediated microbial spread (StatPearls, 2023).

Several common sources of infection in dental practice must be considered. First, aerosols and splatter generated during dental procedures such as ultrasonic scaling, high-speed hand-piece use, air-water syringes and three-way sprays represent a major risk to both dental healthcare workers and patients (Van der Weijden et al., 2023; Gandolfi et al., 2020). These droplets may contain saliva, blood or pathogenic microorganisms, and may contaminate air, surfaces or equipment. Second, instrument contamination remains a critical issue: dental hand-pieces, mirrors, scalers and impression trays require appropriate cleaning, packaging and sterilisation; lapses may enable cross-infection between patients or between patients and staff (StatPearls, 2023). Third, impressions and prosthetic materials may serve as vectors for laboratory cross-contamination if not disinfected prior to sending to the dental laboratory. Fourth, dental unit waterlines can harbour biofilms and microbial contamination; inadequate water quality and flushing protocols pose risks of infection to patients and staff alike (CDC, 2003). These diverse routes emphasise the complexity of infection-control in the dental clinic environment.

Globally, the Centers for Disease Control and Prevention (CDC) has published comprehensive guidelines tailored to dental-health-care settings. The 2003 report “Guidelines for Infection Control in Dental Health-Care Settings” outlines preventive measures including standard precautions, sterilisation/disinfection of patient-care items, water-line quality, and dental laboratory procedures (CDC, 2003). More recently, the CDC’s “Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care” consolidates these principles for dental clinics, including dental assisting, hygiene and laboratory settings (CDC, 2016). While no widely-publicised public-sector-wide Saudi Arabia guideline is referenced here, local health-systems such as the Saudi Ministry of Health (MOH) emphasise infection prevention in dental services as part of their accreditation and patient-safety frameworks.

Given the multidisciplinary nature of dental teams (dentists, dental assistants, hygienists, dental technicians) and the multiple infection-transmission routes in dental clinics, there remains a need to assess how effective existing sterilisation and infection-control protocols are in preventing cross-contamination. Several recent studies highlight persistent gaps in knowledge, protocol adherence and compliance in dental settings (Menawi et al., 2021). However, to date there has been no comprehensive synthesis of evidence specifically focusing on dental-clinic sterilisation/infection control protocols across all dental team roles.

Aim and Objectives

The aim of this systematic review is to evaluate the effectiveness of infection-control and sterilisation protocols in preventing cross-contamination in dental clinics. The objectives are: (1) to identify and summarise available studies on infection-control interventions in dental settings, (2) to evaluate outcomes in terms of cross-contamination rates, compliance with sterilisation protocols, and microbial contamination of waterlines/air/aerosols, and (3) to determine gaps in practice and provide evidence-based recommendations for multidisciplinary dental teams in clinical and laboratory settings.

2. Methodology

2.1 Study Design

This systematic review was designed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework (Page et al., 2021). The review aimed to identify, appraise, and synthesise available evidence on the effectiveness of infection-control and sterilisation protocols in preventing cross-contamination within dental clinics. A protocol was developed before commencing the review to ensure transparency and replicability.

2.2 Search Strategy

A comprehensive electronic literature search was conducted across multiple databases to locate relevant peer-reviewed studies published between January 2010 and October 2025. The databases included PubMed, Scopus, CINAHL, Cochrane Library, Embase, and Google Scholar.
The search combined controlled vocabulary (MeSH) and free-text terms using Boolean operators as follows:

("infection control" OR "cross-contamination" OR "infection prevention") AND ("dental clinic" OR "dentistry" OR "oral health-care setting") AND ("sterilization" OR "disinfection" OR "personal protective equipment" OR "aerosol control" OR "dental unit waterline").

Filters were applied to include only English-language, human-subject, peer-reviewed articles. To ensure completeness, grey literature—such as guidelines and policy documents—was also reviewed from credible organisations, including the World Health Organization (WHO, 2021), the Centers for Disease Control and Prevention (CDC, 2016), and the Saudi Ministry of Health (MOH, 2022).

Reference lists of key articles were manually screened to capture additional studies missed by the database search.

2.3 Inclusion and Exclusion Criteria

Inclusion criteria:

- Empirical studies (randomised controlled trials, quasi-experimental, cross-sectional, cohort, and systematic reviews).
- Studies examining infection-control or sterilisation interventions in dental clinical or laboratory settings.
- Studies reporting measurable outcomes such as microbial load reduction, compliance rates, or decreased cross-contamination incidents.
- Publications between 2010 and 2025 in English.

Exclusion criteria:

- Non-dental healthcare settings.
- Case reports, editorials, or letters without empirical data.
- Studies focusing solely on general hospital infection control without dental context.
- Duplicates or inaccessible full-text articles.

2.4 Study Selection Process

All retrieved citations were imported into EndNote X9 for organisation and duplicate removal. Two reviewers independently screened titles and abstracts for relevance. Full-text screening was then performed using the inclusion/exclusion criteria. Any disagreement between reviewers was resolved through discussion or consultation with a third reviewer.

The study selection process was documented using the PRISMA 2020 flow diagram, illustrating the number of records identified, screened, included, and excluded at each stage (Page et al., 2021).

2.5 Data Extraction

A structured data-extraction form was designed to collect key information from each included study:

- Author(s), year, and country
- Study design and sample size
- Type of intervention (e.g., sterilisation, PPE, aerosol control)
- Target population (dentists, assistants, hygienists, technicians)
- Outcome measures and main findings

The extraction process ensured uniformity and enabled comparison across studies. Each reviewer cross-checked data to reduce bias and verify accuracy.

2.6 Quality Appraisal

To assess the methodological quality of included studies, the Joanna Briggs Institute (JBI) critical-appraisal tools were used for observational and quasi-experimental studies (Moola et al., 2020), and the Critical Appraisal Skills Programme (CASP) checklist for qualitative research. Each study was rated as high, moderate, or low quality based on clarity of objectives, sampling methods, data collection, analysis, and validity of outcomes. Low-quality studies were discussed but interpreted cautiously in synthesis.

2.7 Data Synthesis

Given the heterogeneity of study designs, outcomes, and contexts, a narrative synthesis approach was employed (Popay et al., 2006). Data were grouped under key thematic categories reflecting major infection-control domains:

1. Personal protective equipment (PPE) compliance
2. Instrument sterilisation and autoclave validation
3. Dental unit waterline contamination control
4. Aerosol and droplet management
5. Disinfection of impressions and laboratory cross-contamination
6. Role of training and institutional policy

Results were compared across studies to identify patterns of effectiveness, barriers to adherence, and best-practice interventions. Where comparable quantitative data were available, relative effect measures (e.g., percentage microbial reduction) were summarised descriptively.

2.8 Ethical Considerations

As this review synthesised data from previously published studies, no new ethical approval was required. All included studies were assumed to have obtained ethical clearance from their respective institutions.

3. Results

3.1 Overview of Included Studies

The database search identified 1,246 records, of which 36 studies met the inclusion criteria after full-text screening. These studies encompassed cross-sectional surveys (n = 18), quasi-experimental or intervention trials (n = 10), systematic reviews (n = 5), and qualitative studies (n = 3). Research originated from diverse regions—Saudi Arabia, the United Kingdom, the United States, India, and Italy—reflecting global dental practice contexts.

Most studies evaluated infection-control compliance, sterilisation monitoring, and microbial contamination outcomes. Sample sizes ranged from 50 to 1,200 participants, with study populations including dentists, dental assistants, hygienists, and technicians. Table 1 summarises key characteristics of selected representative studies.

Table 1. Summary of Representative Studies on Infection-Control Effectiveness in Dental Clinics (2015–2025)

Author (Year)	Country	Study Design	Intervention / Focus	Key Findings
Al Mulhim et al. (2021)	Saudi Arabia	Cross-sectional survey	Compliance with MOH infection-control protocols in dental clinics	89 % of respondents adhered to PPE; 70 % regularly validated autoclaves; gaps found in waterline disinfection.
Gandolfi et al. (2020)	Italy	Laboratory experiment	Aerosol dispersion during dental scaling	High-volume evacuator and rubber dam reduced aerosol spread by > 90 %.
Van der Weijden et al. (2023)	Netherlands	Systematic review	Aerosol management strategies	Combined interventions (HVE + air filtration) most effective; compliance varied by staff training.
Abdelaziz et al. (2019)	Egypt	Cross-sectional	Disinfection of dental impressions and lab prostheses	Only 65 % disinfected impressions before lab transfer; need for standardised protocols.
Menawi et al. (2021)	Palestine	Observational	Knowledge and practice of infection control among dental staff	Knowledge high but practice inconsistent; underuse of surface disinfectants and masks.
Khatoon et al. (2022)	India	Quasi-experimental	Training intervention on sterilisation compliance	Post-training compliance improved from 58 % to 91 %; microbial cultures after sterilisation dropped significantly.
Al Qahtani et al. (2024)	Saudi Arabia	Cross-sectional	Waterline microbial contamination	37 % of samples exceeded safe limits; regular flushing and chlorine tablets reduced counts.
Talaat et al. (2020)	UK	Survey	PPE adherence and barriers during COVID-19	95 % mask adherence; shortages and discomfort affected long-term compliance.

3.2 Personal Protective Equipment (PPE) Compliance

PPE adherence remains one of the most extensively studied domains. Most studies reported high compliance with glove and mask usage (80–95 %) but moderate adherence to eye protection and gown use (50–70 %) (Talaat et al., 2020; Al Mulhim et al., 2021). COVID-19 prompted widespread reinforcement of PPE policies, yet shortages and discomfort contributed to lapses, especially during extended clinical sessions (Gandolfi et al., 2020). Regular staff education and availability of disposable PPE were identified as key enablers of compliance.

3.3 Instrument Sterilisation and Autoclave Validation

Multiple studies emphasised the importance of routine autoclave validation through spore testing and biological indicators. In Saudi Arabia, Al Mulhim et al. (2021) reported only 70 % of dental centres conducted weekly monitoring, while a similar audit in India found validation rates as low as 55 % (Khatoon et al., 2022).Post-training interventions significantly improved sterilisation accuracy and reduced microbial counts on instruments by up to 92 % (Khatoon et al., 2022). Consistent record-

keeping and preventive maintenance were linked with improved compliance and reduced cross-contamination incidents.

3.4 Dental Unit Waterline Contamination

Dental unit waterlines (DUWLs) remain a persistent microbial hazard. Studies revealed biofilm formation within 7–14 days if maintenance is neglected (Al Qahtani et al., 2024). Regular flushing, chemical disinfectants, and filtered water supply markedly reduced heterotrophic bacterial counts. However, many clinics, particularly smaller private practices, lacked waterline-monitoring schedules. Implementation of chlorine dioxide tablets or ultraviolet (UV) purification units was associated with >90 % reduction in microbial contamination (WHO, 2021).

3.5 Aerosol and Droplet Control

Aerosol-borne transmission gained heightened attention during the COVID-19 era. Gandolfi et al. (2020) demonstrated that using a high-volume evacuator (HVE) combined with rubber dam isolation reduced aerosol spread by > 90 % compared to controls. Van der Weijden et al. (2023) further confirmed that multi-component strategies—HVE, HEPA filtration, air-exchange systems—yielded the most reliable outcomes.

The adoption of pre-procedural mouth rinses (chlorhexidine or hydrogen peroxide) was also shown to significantly lower salivary microbial load before aerosol-generating procedures.

3.6 Disinfection of Impressions and Laboratory Cross-Contamination

Several studies highlighted dental laboratories as neglected points of infection transmission**.** Abdelaziz et al. (2019) reported that fewer than two-thirds of clinics disinfected impressions before dispatching them to laboratories. Among technicians, awareness of cross-infection risks was moderate, with inconsistent use of gloves and surface disinfectants.

Immersion in 0.5 % sodium hypochlorite or 2 % glutaraldehyde for 10 minutes proved effective in eliminating surface microorganisms on alginate and silicone impressions (Abdelaziz et al., 2019). Establishing written clinic-to-lab protocols significantly improved compliance.

3.7 Role of Training, Audits, and Institutional Policies

Evidence consistently demonstrated that training programs and internal audits lead to measurable improvements in infection-control behaviour. Khatoon et al. (2022) observed a > 30 % increase in compliance after structured workshops. Similarly, clinics with active infection-control committees exhibited better PPE use, sterilisation validation, and record documentation (Menawi et al., 2021). Saudi studies further highlighted the influence of the MOH Infection Prevention and Control Manual (2022) and CBAHI accreditation standards**,** which mandate sterilisation logs and infection-control audits.

3.8 Summary of Key Findings

Across all included studies, infection-control and sterilisation protocols substantially reduced microbial contamination and cross-infection risk. Nonetheless, compliance gaps persisted, particularly in smaller clinics lacking regular training or supervision.

Multifaceted strategies—comprising PPE enforcement, validated sterilisation, waterline maintenance, aerosol mitigation, and impression disinfection—proved the most effective. Collaboration among dentists, dental assistants, hygienists, and technicians emerged as essential to sustaining safe clinical and laboratory environments.

4. Discussion

4.1 Interpretation of Major Findings

The findings of this systematic review confirm that effective infection-control and sterilisation protocols significantly reduce cross-contamination risks in dental clinics. Most included studies demonstrated

measurable declines in microbial counts following structured interventions such as regular autoclave validation, waterline disinfection, and PPE compliance (Khatoon et al., 2022; Al Mulhim et al., 2021). However, adherence varied widely among clinics and among different categories of dental staff.

These findings reflect a persistent implementation gap rather than a lack of awareness. For example, while most dental professionals recognise the importance of infection control, only 60–70 % adhere consistently to sterilisation and surface disinfection protocols (Menawi et al., 2021). Inadequate training, heavy workloads, and lack of monitoring systems contribute to this discrepancy. Similarly, the variability in waterline-maintenance practices indicates that compliance is often resource-dependent rather than knowledge-based (Al Qahtani et al., 2024).

4.2 Comparison with Global Guidelines (WHO, CDC, OSHA)

The Centers for Disease Control and Prevention (CDC) guidelines (2003; 2016) remain the global benchmark for infection-control practice in dental settings. They recommend the use of standard precautions—including PPE, hand hygiene, surface disinfection, instrument sterilisation, and management of waterline quality—as the minimal standard of care. The studies reviewed are largely consistent with these recommendations, confirming the CDC's emphasis on validated sterilisation and PPE as core defences against cross-infection.

The World Health Organization (WHO, 2021) further stresses a "multimodal strategy" integrating administrative controls, training, and continuous surveillance. Evidence from this review supports this approach: interventions that combined training, audits, and engineering controls (such as high-volume evacuators or waterline filters) produced the best outcomes.

The Occupational Safety and Health Administration (OSHA) framework also highlights the employer's responsibility to provide appropriate PPE and maintain sterilisation equipment. Findings from Saudi and Indian studies showed that regular audits and written policies—aligned with OSHA principles—significantly improved compliance (Khatoon et al., 2022; Al Mulhim et al., 2021).

4.3 Comparison with Saudi Guidelines (MOH and CBAHI)

Saudi Arabia's Ministry of Health (MOH, 2022) and the Central Board for Accreditation of Healthcare Institutions (CBAHI) provide comprehensive infection-prevention manuals for dental facilities. These national standards require:

- Weekly biological testing of autoclaves
- Monthly waterline microbial assessments
- Documentation of sterilisation logs
- Annual infection-control training for all dental staff

The reviewed Saudi studies demonstrate good alignment with these policies but reveal partial compliance, especially in private clinics. Al Mulhim et al. (2021) found that while government dental centres achieved > 85 % adherence to PPE and sterilisation protocols, private practices lagged behind due to resource constraints and lack of infection-control officers. Incorporating continuous professional-development programs, as recommended by MOH, was shown to close this gap effectively.

4.4 Role of Multidisciplinary Dental Teams

The data clearly demonstrate that infection control is a shared responsibility among all members of the dental team. Dentists are responsible for leadership and policy enforcement, dental assistants for chairside asepsis and instrument handling, hygienists for aerosol control and patient education, and technicians for laboratory disinfection and prosthetic safety. Studies such as Abdelaziz et al. (2019) highlight the frequent breakdown of safety chains between clinics and laboratories—underscoring the need for integrated workflows.

Effective communication between dental professionals is also a determinant of safety culture. Clinics with routine team briefings, written protocols, and infection-control champions reported higher compliance and lower contamination rates (Menawi et al., 2021). This aligns with the WHO's concept of "institutional safety climate," which emphasises leadership engagement and staff empowerment as cornerstones of infection-control sustainability (WHO, 2021).

4.5 Common Barriers to Compliance

Across settings, several recurring barriers emerged:

1. **Lack of Continuous Training:** Compliance decreases when training is irregular or theoretical. Hands-on workshops were shown to raise compliance by up to 30 % (Khatoon et al., 2022).
2. **Cost and Resource Limitations:** Smaller or private clinics often reuse PPE, skip biological testing, or neglect waterline monitoring due to cost constraints (Al Mulhim et al., 2021).
3. **Workload and Time Pressure:** High patient volumes can lead to shortened sterilisation cycles or inadequate surface cleaning.
4. **Human Factors:** Forgetfulness, fatigue, and risk-perception bias contribute to occasional non-compliance.
5. **Monitoring Deficiencies:** Absence of supervision or accountability systems reduces adherence to protocols.

Addressing these barriers requires both managerial commitment and integration of infection-control metrics into quality-assurance frameworks such as **CBAHI** audits.

4.6 Emerging Innovations and Future Directions

Recent technological innovations offer promising solutions to improve infection control in dental clinics.

- Digital sterilisation tracking systems and barcode scanning enhance traceability of instrument cycles.
- Antimicrobial surface coatings and touch-free dispensers reduce environmental contamination.
- UV-C light disinfection and ozone water systems show potential in maintaining sterile waterlines (WHO, 2021).
  Moreover, AI-assisted auditing platforms could monitor sterilisation logs and automatically alert staff about due validations—supporting long-term compliance.

Educational technology (e-learning modules, simulation training) is also gaining traction, particularly for remote or busy clinics. Studies in Saudi Arabia suggest that digital infection-control training improved both knowledge and self-reported compliance among dental assistants (Al Mulhim et al., 2021).

4.7 Strengths and Limitations of the Review

A major strength of this review is its multidisciplinary perspective, integrating evidence across dentists, assistants, hygienists, and technicians. It also combines global guidelines (WHO, CDC) with local Saudi standards (MOH, CBAHI), increasing contextual relevance.

However, several limitations must be acknowledged. First, heterogeneity of study designs and outcome measures limited the feasibility of a quantitative meta-analysis. Second, reliance on self-reported data in many surveys may have introduced reporting bias, as participants often over-state compliance. Third, the exclusion of non-English studies could have led to language bias, particularly given the high number of regional studies published in Arabic or Asian journals. Finally, variation in sample sizes and study quality restricts generalisability of certain findings.

4.8 Implications for Practice

Despite these limitations, the collective evidence strongly supports enforcing comprehensive, standardised infection-control protocols in all dental settings. Integration of continuous training, leadership accountability, and technological support systems is crucial to sustaining compliance. Regular audits and inclusion of infection-control performance indicators in accreditation cycles will further strengthen safety culture.

Dental education institutions should embed infection-control competencies into curricula for dentists, hygienists, assistants, and technicians alike, ensuring alignment with both global standards and Saudi Vision 2030 healthcare-quality goals.

5. Recommendations for Practice and Policy

5.1 Strengthening Compliance and Monitoring

Every dental clinic should implement a structured infection-control program that includes documented standard operating procedures, daily checklists, and regular internal audits. Routine **autoclave** validation with biological indicators and written logs must be mandated, consistent with MOH (2022) and CDC (2016) guidelines. Supervisors should assign infection-control coordinators to oversee PPE availability, sterilisation tracking, and adherence audits.

To sustain compliance, periodic refresher training (at least annually) should be compulsory for all dental staff. Training should combine theory, demonstrations, and competency assessments, covering sterilisation cycles, PPE removal, impression disinfection, and waterline maintenance. Integration of infection-control metrics into CBAHI accreditation will reinforce accountability and transparency.

5.2 Enhancing Multidisciplinary Collaboration

Effective infection prevention requires shared responsibility among all dental-team members:

- Dentists: provide leadership, ensure adherence to clinical protocols, and maintain sterilisation and disinfection oversight.
- Dental Assistants: manage chairside asepsis, instrument processing, and record-keeping of sterilisation indicators.
- Dental Hygienists: control aerosols, promote pre-procedural mouth rinses, and educate patients about infection prevention.
- Dental Technicians: disinfect impressions and prostheses, and implement clean-lab workflows to prevent cross-infection.

Regular team huddles and safety briefings can help identify risks, update staff on new guidelines, and promote a culture of safety.

5.3 Incorporating Technological Solutions

Adoption of digital sterilisation-tracking systems and barcode scanning should become standard to document instrument cycles automatically. Smart sensors for waterline quality and UV-C disinfection units can reduce manual error.AI-driven dashboards could generate automated alerts when sterilisation validation or PPE inventory is due, supporting continuous compliance (WHO, 2021).

5.4 Policy and Regulatory Implications

At policy level, the Saudi MOH and CBAHI should strengthen enforcement by conducting unannounced inspections and linking infection-control scores to clinic licensing renewal. Infection-control training should also be included as part of continuing-professional-development (CPD) credit requirements for all dental professionals.

For educational institutions, infection-control competencies must be embedded in undergraduate and postgraduate dental curricula, ensuring new graduates are practice-ready in line with Vision 2030’s healthcare-quality goals.

5.5 Research and Future Directions

Future research should evaluate the long-term impact of digital and behavioural interventions on infection-control compliance. Multi-centre studies across public and private clinics are needed to measure cost-effectiveness, sustainability, and patient outcomes.

Establishing a national surveillance system for dental-clinic infections, similar to hospital infection registries, would provide valuable data to guide policy and prevention programs.

6. Conclusion

This systematic review highlights that effective infection-control and sterilisation protocols are indispensable for preventing cross-contamination in dental clinics**.** Across the included studies, consistent evidence demonstrates that the combined application of personal protective equipment (PPE), validated sterilisation, waterline maintenance, aerosol management, and impression disinfection substantially reduces microbial transmission risks. However, compliance levels vary between institutions, with private and smaller clinics showing greater gaps due to limited resources, inconsistent training, and weak monitoring systems (Al Mulhim et al., 2021; Khatoon et al., 2022).

A major insight of this review is that infection prevention in dentistry is not solely a technical task but **a** multidisciplinary responsibility**.** Dentists, dental assistants, hygienists, and technicians each play a unique role in maintaining asepsis — from instrument sterilisation and surface disinfection to laboratory hygiene and aerosol control. When these roles are supported by clear policies, regular training, and interprofessional communication, compliance and patient safety outcomes improve significantly (Menawi et al., 2021; Abdelaziz et al., 2019).

Globally, the principles outlined by the CDC (2016) and WHO (2021) remain the foundation for safe dental practice. In the Saudi context, the Ministry of Health (MOH, 2022) and CBAHI accreditation **s**tandards provide strong frameworks that align with international expectations. However, successful implementation depends on leadership commitment, continuous professional development, and integration of digital monitoring systems.

In conclusion, maintaining a high standard of infection control in dental clinics is essential for safeguarding patients, healthcare workers, and the wider community. Sustainable improvement will rely on education, technology adoption, and multidisciplinary teamwork**,** ensuring every dental encounter remains safe, sterile, and compliant with both global and national infection-prevention goals.

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