



مجلة جامعة سبها للعلوم الطبية
Sebha University Journal of Medical Sciences

Journal homepage: www.sebhau.edu.ly/journal/joms



Knowledge, Attitudes, and Practices Regarding Infection Control in Prosthodontics Among Dental Clinicians in Benghazi, Libya: A Cross-Sectional Survey

Warida A. Elnaihoum, Salma Ali Elnaili*, Isaida Abdulla Ali Mohamed, Saied H. Mohamed

Department of Prosthodontics, Faculty of Dentistry, University of Benghazi, Benghazi, Libya

Keywords:

Cross-infection
Dental impressions
Hepatitis B vaccination
Infection control
Personal protective equipment
Sterilization monitoring

ABSTRACT

Background: This cross-sectional study evaluated infection-control knowledge, attitudes, and clinical practices among dental clinicians involved in prosthodontic care in Benghazi, Libya.

Methods: A validated 32-item electronic questionnaire was distributed to general dental practitioners, dental interns, and prosthodontists. **Results:** Of 230 invited clinicians, 160 responded (69.6%). Routine use of gloves (98.8%) and facemasks (99.4%) was high, whereas 40.0% reported never using protective eyewear. Steam autoclaving was the predominant sterilization method (96.3%). Chemical disinfection was reported for 71.3% of dental impressions and 70.0% of definitive prostheses. Years of clinical practice were significantly associated with hepatitis B vaccination status ($p = 0.019$) and with reasons for reluctance or uncertainty regarding treatment of patients with HIV or hepatitis B virus infection ($p = 0.036$). No significant associations were found for several other infection-control variables. **Conclusions:** Overall, standard barrier use and thermal sterilization were strong, but gaps remained in ocular protection, sterilization monitoring, and clinic-to-laboratory disinfection. Structured, competency-based infection-control training, particularly for early-career clinicians, is recommended.

المعرفة والمواقف والممارسات المتعلقة بمكافحة العدوى في التعويضات السنية بين أطباء الأسنان في بنغازي، ليبيا: دراسة مقطعية

وريدة ع. النيهوم، سلمى علي النائي*، إسعيدة عبد الله علي محمد، سعيد ح. محمد

قسم التعويضات السنية، كلية طب الأسنان، جامعة بنغازي، بنغازي، ليبيا

الكلمات المفتاحية:

التعقيم ومراقبته
التطعيم ضد التهاب الكبد B
العدوى المتصلبة
طبقات الأسنان
معدات الوقاية الشخصية
مكافحة العدوى

الملخص

الخلفية: هدفت هذه الدراسة المقطعية إلى تقييم المعرفة والمواقف والممارسات السريرية المتعلقة بمكافحة العدوى بين أطباء الأسنان المشاركين في رعاية التعويضات السنية في بنغازي، ليبيا. الطرائق: وُزِعَ استبيان إلكتروني مُتحقق منه مكون من 32 بنداً على أطباء الأسنان العاملين وأطباء الامتياز واختصاصيي التعويضات السنية. النتائج: استجاب 160 من أصل 230 مشاركاً مدعواً بنسبة استجابة بلغت 69.6%. كان الاستخدام الروتيني للقفازات الطبية (98.8%) وكمامات الوجه (99.4%) مرتفعاً، بينما أفاد 40.0% بعدم استخدام واقيات العين مطلقاً. كان التعقيم البخار في الأوتوكلاف الطريقة الأكثر استخداماً (96.3%). واستُخدم التطهير الكيميائي لـ 71.3% من طبقات الأسنان و 70.0% من التعويضات النهائية. ارتبطت سنوات الممارسة السريرية معنوياً بحالة التطعيم ضد التهاب الكبد B ($P = 0.019$) وبأسباب التردد أو عدم اليقين في علاج المصابين بفيروس نقص المناعة البشرية أو التهاب الكبد B ($P = 0.036$). الاستنتاجات: وتشير النتائج إلى التزام جيد بالحواجز الوقائية الأساسية والتعقيم الحراري، مع استمرار فجوات في حماية العين ومراقبة التعقيم وتوحيد إجراءات التطهير بين العيادة والمختبر. ويوصى بتدريب منظم قائم على الكفاءة، خاصة لأطباء الأسنان في بداية مسيرتهم المهنية.

1. Introduction

In 1986, the Centers for Disease Control and Prevention (CDC) issued its first comprehensive infection-control recommendations for

dentistry, since then these recommendations have been periodically updated and widely adopted by clinicians, dental educators, and

*Corresponding author: Salma Ali Elnaili

E-mail address: salma.elnaili@uob.edu.ly, (W. A. Elnaihoum) warida.Elnaihoum@uob.edu.ly, (I. Abdulla) aseidah.abdullah@uob.edu.ly, (S. H. Mohamed) saied.alabidi@uob.edu.ly

licensing boards worldwide [1,2]. Infection control has consequently become one of the most extensively studied areas of contemporary dental practice. Nonetheless, the majority of published surveys continue to focus on general dentistry and oral surgery, leaving a comparatively underexplored literature gap regarding infection control within specialty disciplines such as prosthodontics, where the clinic-to-laboratory workflow introduces unique cross-contamination risks not captured by general-practice instruments [3,4].

The dental operatory is a high-risk clinical environment in which dental healthcare personnel (DHCP) and patients are routinely exposed to pathogenic microorganisms, including blood-borne pathogens such as HIV and the hepatitis B and C viruses [1,2]. This vulnerability was further exposed by the COVID-19 pandemic, which imposed unprecedented structural and clinical demands on dental practice and education worldwide and prompted international bodies to substantially revise standard-precaution and aerosol-management guidance [5,6].

Dental students and early-career clinicians are inordinately susceptible to occupational exposure because of their frequent, direct contact with blood, saliva, and other bodily fluids [7]. Recent survey data corroborate that trainees and early-career dentists continue to show inconsistent implementation of basic biosafety principles despite their adequate theoretical knowledge, a discrepancy ascribed to limited hands-on supervision and self-confidence rather than a true knowledge deficit [4,8]. Contemporary dental curricula must therefore combine rigorous theoretical instruction with structured, supervised clinical practice in standardized infection-control protocols [9].

Prosthodontic clinics require an especially strict approach to biosafety because the treatment workflow bridges the clinical and laboratory environments. The risk of cross-infection therefore extends beyond patients and clinical personnel to include specialized equipment, reusable instruments, and dental laboratory staff who may never have direct contact with the patient yet routinely handle patient-derived materials [3,4,10].

Prostheses fabricated for patients with undiagnosed or known infectious disease present a substantial contamination hazard. Items such as maxilla-mandibular registration records, dental impressions, face-bow apparatuses, and definitive or trial prostheses are heavily contaminated with blood and saliva during intraoral use. If inadequately disinfected, these items can act as fomites, transmitting infectious agents to the treating clinician, subsequent patients, and dental laboratory technicians who handle them downstream [11,12]. Verifiable, consistent compliance with infection-control protocols therefore remains the definitive safeguard against disease transmission among dental healthcare workers and patients [6,10,13].

Regional surveys from neighboring Eastern Mediterranean countries have documented variable adherence to infection-control guidelines among general dental practitioners; for example, only 11.6% of dentists in the West Bank and Jerusalem reported using biological indicators to monitor sterilization despite near-universal autoclave use [14]. Similarly, a recent Libyan study evaluated infection-control knowledge, attitudes, and awareness among dental interns and students in the removable prosthodontic department at the Faculty of Dentistry, University of Benghazi [15]. However, that study was limited to undergraduate training settings and did not evaluate practicing dental clinicians or prosthodontic-specific infection-control practices across different professional levels. Therefore, comprehensive evidence regarding infection-control knowledge, attitudes, and clinical practices among general dental practitioners, dental interns and prosthodontists in Libya remains limited. To address this gap, this study aimed to evaluate these aspects among general dental practitioners, dental interns, and prosthodontists practicing in Benghazi, Libya.

2. Materials and Methods

2.1. Study design and ethical approval

This descriptive, cross-sectional survey was conducted within the Department of Prosthodontics, Faculty of Dentistry, University of Benghazi, Libya, and is reported according to the Strengthening the

Reporting of Observational studies in Epidemiology (STROBE) checklist for cross-sectional studies. Formal ethical clearance was obtained from the Institutional Ethical Committee of the University of Benghazi (Ethical Approval No. 0114) prior to data collection. All participants provided voluntary, informed electronic consent before completing the survey instrument, and responses were collected anonymously.

2.2. Questionnaire development and validation

A closed-ended 32-item, structured questionnaire was developed in English and adapted from previously validated instruments used in comparable prosthodontic infection-control surveys [4,16]. Content validity was established through independent review by two subject-matter experts in prosthodontics and infection control. The instrument was subsequently piloted on a convenience sample and re-administered at one-week intervals on three occasions to assess test-retest reliability; items with poor agreement were revised prior to final distribution. This iterative validation approach is consistent with recommended practice for KAP (knowledge-attitude-practice) survey development in dental infection control [4].

2.3. Questionnaire structure

The instrument was organized into three sections: (i) Demographic profile (age, gender, educational qualification, and years of clinical experience); (ii) Clinical protocols (hepatitis B vaccination status, personal protective equipment [PPE] use, and instrument sterilization methods); and (iii) Prosthodontic-specific practices (surface-barrier protocols, medical history screening, laboratory disinfection methods, waste disposal, and general attitudes toward cross-infection management).

2.4. Survey administration and statistical analysis

Google Forms was used to digitize the validated questionnaire and was then distributed via official institutional networks and professional social media channels targeting general dental practitioners, dental interns, and prosthodontists practicing in Benghazi. Data were exported to IBM SPSS Statistics (version 26 or later) for analysis. Categorical variables were summarized as percentages and frequencies, and the chi-square (χ^2) test was used to assess associations between years of clinical experience and categorical infection-control outcomes, with $p < 0.05$ considered statistically significant.

3. Results

3.1. Study population and demographic characteristics

160 of the 230 dental clinicians invited to participate completed the questionnaire in full, yielding a response rate of 69.6%. The study sample exhibited a clear female predominance (131/160, 81.9%), while male respondents represented 18.1% (29/160) of the cohort. The study population was relatively young; over half of the participants (55.0%) were aged between 20 and 30 years, followed by 30.0% in the 31–40 age bracket, and 15.0% older than 40. In terms of professional experience, 56.9% reported fewer than 5 years of clinical practice, 11.9% had between 5 and 10 years, and 31.3% possessed more than 10 years of experience. The educational background of the respondents was highly heterogeneous, spanning dental students (27.5%), general dental practitioners (25.6%), certified prosthodontists (16.9%), and specialists in other dental disciplines (15.6%), dental interns (14.4%) (Table 1).

Table 1. Demographic and professional characteristics of the study participants (n = 160).

Variable / category	n	%
<i>Gender</i>		
Male	29	18.1
Female	131	81.9
<i>Age group (years)</i>		
20–30	88	55.0
31–40	48	30.0
>40	24	15.0
<i>Professional qualification</i>		
Student	44	27.5
Intern	23	14.4
General dental practitioner	41	25.6

Variable / category	n	%
Specialist (non-prosthodontist)	25	15.6
Prosthodontist	27	16.9
Years of clinical practice		
<5	91	56.9
5–10	19	11.9
>10	50	31.3

Percentages may not sum to 100 because of rounding.

3.2. Compliance with standard infection control measures

Adherence to core personal protective equipment (PPE) guidelines was uniformly high for standard barriers. 98.8% of clinicians reported routine use of medical gloves, and facemask compliance reached 99.4%. Similarly, 91.3% consistently wore dedicated protective clothing during clinical procedures. However, protective eyewear compliance was suboptimal: only 42.5% of respondents reported consistent use, while 17.5% utilized it intermittently, and 40.0% acknowledged never wearing eye protection (Table 2).

Table 2. Self-reported use of personal protective equipment among dental clinicians.

Item	Never, n (%)	Sometimes, n (%)	Always, n (%)
Gloves	1 (0.6)	1 (0.6)	158 (98.8)
Facemask	0 (0.0)	1 (0.6)	159 (99.4)
Protective clothing	11 (6.9)	3 (1.9)	146 (91.3)
Eye protection	64 (40.0)	28 (17.5)	68 (42.5)

Values are n (%) of all participants (n = 160).

3.3. Use of surface barriers on frequently touched equipment

The implementation of disposable plastic surface barriers showed a generally high compliance, though variations occurred between equipment types. The highest rates of compliance were observed for light-curing unit handles (95.0%), and dental light handles (95.0%), followed closely by air/water syringes (91.9%) and bracket-tray handles (82.5%). Adherence noticeably dropped for ultrasonic scaler handles (76.9%) and dental chair headrests, where only 66.9% of clinicians reported consistent barrier placement (Table 3).

Table 3. Application of disposable plastic barriers on commonly touched clinical surfaces.

Surface	Never, n (%)	Sometimes, n (%)	Always, n (%)
Chair headrest	36 (22.5)	17 (10.6)	107 (66.9)
Light handle	6 (3.8)	2 (1.3)	152 (95.0)
Bracket-tray handle	23 (14.4)	5 (3.1)	132 (82.5)
Light-curing unit handle	4 (2.5)	4 (2.5)	152 (95.0)
Air/water syringe	9 (5.6)	4 (2.5)	147 (91.9)
Ultrasonic scaler handle	34 (21.3)	3 (1.9)	123 (76.9)

Values are n (%) of all participants (n = 160).

3.4. Sterilization and disinfection practices

The study population strictly adhered to standard instrument reprocessing guidelines. Nearly all respondents (99.4%) reported routine sterilization of clinical instruments, with steam autoclaving identified as the baseline modality (96.3%). A small minority relied on hot-air ovens (1.3%) or alternative methods (2.5%). Regarding quality assurance, 63.1% of clinicians stated that monitoring the sterilization process was essential for every single cycle, while 35.0% deemed it important, and 1.9% viewed it as having limited importance (Table 4).

Table 4. Sterilization practices and attitudes toward sterilization monitoring.

Variable / category	n	%
Routine instrument sterilization		
No	1	0.6
Yes	159	99.4
Sterilization method used		
Hot-air oven	2	1.3
Autoclave	154	96.3
Other	4	2.5
Perceived importance of monitoring		

Variable / category	n	%
Important	56	35.0
Very important for every cycle	101	63.1
Not very important	3	1.9

Values are n (%) of all participants (n = 160).

When evaluating specific prosthodontic items, management protocols diverged heavily based on material composition. Heat-tolerant high-speed and contra-angle handpieces were overwhelmingly autoclaved (91.3% and 86.9%, respectively). Metal impression trays were managed through a blend of sterilization (51.2%) and immediate disposal (31.3%). Conversely, heat-sensitive materials such as dental impressions and definitive prostheses were primarily processed via chemical disinfection rather than heat sterilization, at rates of 71.3% and 70.0%, respectively (Table 5).

Table 5. Reprocessing method by specialized prosthodontic item.

Method	High-speed handpiece	Contra-angle handpiece	Impression tray	Impression	Prosthesis
Sterilization	146 (91.3)	139 (86.9)	82 (51.2)	28 (17.5)	35 (21.9)
Disinfection	12 (7.5)	19 (11.9)	26 (16.3)	114 (71.3)	112 (70.0)
Disposal	–	1 (0.6)	50 (31.3)	14 (8.8)	2 (1.3)
Rinsing with water	–	–	–	2 (1.3)	6 (3.8)
No reprocessing	2 (1.3)	1 (0.6)	2 (1.3)	2 (1.3)	5 (3.1)

Values are n (%) of all participants (n = 160). –, not reported.

3.5. Association between clinical experience and infection control variables

To identify potential associations between a clinician's years of practice and distinct infection-control metrics a chi-square (χ^2) analysis was conducted. A statistically significant association was observed between years of experience and personal hepatitis B vaccination coverage ($p = 0.019$), with more experienced practitioners exhibiting higher immunization rates. Clinical experience was also significantly associated with attitudes toward treating high-risk (HIV- or HBV-positive) patients and self-stated reasons for clinical reluctance ($p = 0.036$); younger clinicians most frequently cited insufficient clinical training as their primary barrier. No statistically significant associations were found between years of practice and the choice of the single most important infection-control measure ($p = 0.130$), commitment to treating all patients as potentially infectious ($p = 0.506$), or routine collection of comprehensive medical histories ($p = 0.712$) (Table 6).

Table 6. Association between years of clinical practice and selected infection-control variables.

Variable	<5 years	5–10 years	>10 years	P value
Vaccinated against hepatitis B?				
No	19 (11.9)	0 (0.0)	4 (2.5)	0.019
Yes	72 (45.0)	19 (11.9)	46 (28.7)	
Most important infection control measure				
Hand hygiene	9 (5.6)	1 (0.6)	0 (0.0)	0.130
Personal protective equipment	3 (1.9)	0 (0.0)	0 (0.0)	
Vaccination	2 (1.3)	0 (0.0)	0 (0.0)	
Sterilization and disinfection	2 (1.3)	2 (1.3)	2 (1.3)	
All equally important	75 (46.9)	16 (10.0)	48 (30.0)	
Treats all patients as potentially infectious?				
No	4 (2.5)	0 (0.0)	3 (1.9)	0.506
Yes	20 (12.5)	8 (5.0)	11 (6.9)	
Sometimes	65 (40.6)	11 (6.9)	34 (21.3)	
Not applicable	2 (1.3)	0 (0.0)	2 (1.3)	
Obtains medical history for every patient?				
No	2 (1.3)	1 (0.6)	1 (0.6)	0.712
Yes	89 (55.6)	18 (11.3)	49 (30.6)	
Attitude toward treating HIV/HBV+ patients				
Does not mind	31 (19.4)	11 (6.9)	21 (13.1)	0.123
Reluctant	16 (10.0)	5 (3.1)	10 (6.3)	
Uncertain	44 (27.5)	3 (1.9)	19 (11.9)	
Primary reason for reluctance/uncertainty				
Perceived lack of personal safety	11 (6.9)	2 (1.3)	4 (2.5)	0.036

Variable	<5 years	5–10 years	>10 years	P value
Insufficient precautions typically taken	9 (9.8)	2 (1.3)	5 (5.4)	
Inadequate clinical equipment	11 (6.9)	1 (0.6)	8 (8.7)	
Insufficient professional training	23 (25.0)	1 (0.6)	2 (1.3)	
Perceived outside personal responsibility	6 (6.5)	0 (0.0)	7 (7.6)	

Values are n (%). p values from the chi-square (χ^2) test. HBV, hepatitis B virus; HIV, human immunodeficiency virus.

4. Discussion

To the best of our knowledge, this is the first Libyan study to comprehensively evaluate infection-control knowledge, attitudes, and clinical practices among practicing dental clinicians involved in prosthodontic care across different levels of professional experience. Our findings also expand upon those of a recent Libyan study conducted among dental students and interns, which evaluated infection-control knowledge, attitudes, and awareness within a removable prosthodontic setting [15]. Our findings are comparable to recent prosthodontic-specific cohorts in Saudi Arabia [4] and broadly consistent with international guidance from the Asia Pacific Society of Infection Control [6]. Nevertheless, prosthodontic cross-contamination control demands vigilance because the repeated physical transfer of impressions, stone casts, and raw laboratory materials between clinic and laboratory introduces additional points of contact at which a single lapse in reprocessing can propagate infection beyond the treating operator [4,12].

The pronounced female majority (81.9%) and youthful age structure of the sample (55.0% aged 20–30 years; 56.9% with <5 years of practice) reflect the changing composition of the dental workforce at the University of Benghazi and mirror demographic patterns reported in comparable Gulf and Levantine cohorts [4,14]. This age profile underscores the pivotal role that undergraduate and internship-level clinical training plays in establishing lifelong biosafety habits before independent practice begins.

Standard PPE protocols—glove use (98.8%) and facemask use (99.4%)—were nearly universal, closely matching the 90.8% and 90.3% rates, respectively, reported in a 2024 prosthodontic-specific cohort from Saudi Arabia [4], and consistent with the minimum-standard precautions codified in the APSIC dental infection-prevention guidelines [6] and the CDC's 2024 summary of dental infection-prevention practices [2]. This high level of compliance may reflect the strong emphasis placed on basic contact barriers in modern dental curricula. The 91.3% compliance rate for protective clinical clothing similarly aligns with established evidence that operative splatter readily contaminates clinicians' forearms and clothing during rotary instrumentation [5,6].

With regard to protective-eyewear compliance a clear weak point was identified: only 42.5% of respondents reported consistent use, and 40.0% reported never wearing eye protection. Our findings fall between the 40.6% eyewear-provision rate reported among Saudi prosthodontic personnel [4] and the substantially higher 73.8% compliance reported among Indian dental practitioners specifically surveyed on ocular-infection knowledge, where compliance was significantly higher among undergraduate (BDS) than postgraduate (MDS) clinicians [16]. Because high-speed prosthodontic tooth preparation and polishing generate substantial aerosols, water-droplets, and particulate debris, leaving the conjunctival mucosa unprotected represents a clear and remediable transmission risk that warrants targeted educational reinforcement, including low-cost interventions such as mandatory eyewear stations at each operator [5,6,16].

Instrument reprocessing practices closely followed established international guidelines: 99.4% of respondents reported routinely sterilizing reusable instruments, with steam autoclaving (96.3%) as the predominant method, consistent with CDC and APSIC recommendations that position saturated steam under pressure as the gold standard for critical and semi-critical dental instruments [1,2,6,11]. Although 63.1% of clinicians regarded monitoring as

essential for every cycle, the remaining respondents who viewed monitoring as optional or unimportant echo a broader regional pattern: a 2023 survey of dentists in the West Bank and Jerusalem found that although 98.0% used autoclaves, only 11.6% employed biological indicators to verify sterilizer performance [14]. This gap between sterilization uptake and verification of its efficacy suggests that Libyan training programs, like those in neighboring countries, should place greater emphasis on routine chemical and biological (spore-test) monitoring rather than reliance on autoclave use alone [2,6,14].

The clinic-to-laboratory pathway remains a distinctive challenge in prosthodontic infection control. Saliva- and blood-borne pathogens can readily migrate from the chairside onto laboratory equipment and personnel when impressions and prostheses are inadequately disinfected before transfer [7,9,12]. The most recent CDC guidelines, updated in the 2024 Summary of Infection Prevention Practices in Dental Settings, recommend that all prosthodontic items undergo intermediate-level chemical disinfection before they are transferred from the clinic to the laboratory [2]. Our data show reasonable, though incomplete, adherence to this standard: 71.3% of impressions and 70.0% of definitive prostheses underwent chemical disinfection. These figures are somewhat lower than the 85% rate for disinfecting laboratory-bound items reported in a 2024 Saudi prosthodontic cohort [4] and the disinfection compliance documented in a 2024 Saudi Arabian cross-sectional study of impression-disinfection protocols conducted during the COVID-19 pandemic [13], and they underscore the continued need for standardized, written clinic-to-laboratory disinfection agreements, consistent with recent *in vitro* evidence confirming that sodium hypochlorite, glutaraldehyde, and chlorhexidine remain effective disinfectants for elastomeric impression materials without compromising dimensional accuracy [12].

High hepatitis B vaccination coverage remains a core occupational-safety standard for dental healthcare workers given their elevated risk of percutaneous sharps injuries [10,16]. In our sample, vaccination coverage was significantly higher among more experienced practitioners than among early-career clinicians ($p = 0.019$). This experience-related gradient mirrors findings from a 2025 Vietnamese cross-sectional study of healthcare students, in which 89.8% had received at least one HBV vaccine dose but only 63.3% had completed the full three-dose schedule [17], as well as earlier reports from Saudi Arabia [9] and Iran [18], suggesting that incomplete vaccination series—rather than outright vaccine refusal—may be a persistent, internationally recurrent problem among trainees and junior clinicians.

The meaningful proportion of younger practitioners who remain incompletely vaccinated represents a modifiable occupational health risk that institutional health services should address through mandatory pre-clinical immunization verification. Furthermore, the significant association ($p = 0.036$) between limited clinical experience and reluctance to treat HIV- or HBV-positive patients—attributed primarily to self-reported "insufficient training"—parallels the finding that self-reported confidence, rather than raw knowledge score, was the strongest correlate of compliance in a comparable 2024 prosthodontic IPC cohort [4]. This suggests that Libyan dental curricula should prioritize building objective clinical confidence through simulation-based risk-assessment training and structured exposure to high-risk case management, rather than relying on didactic instruction alone.

4.1. Limitations and future directions

This study has several limitations that should be considered when interpreting the findings. First, all data were self-reported, which may introduce social-desirability bias, whereby participants report intended rather than actual behavior; direct observational audits, as used in some recent hand-hygiene compliance studies, would provide a more objective assessment in future work. Secondly, the survey was centered at a single university-affiliated institution in Benghazi, which may limit generalizability to private practices, rural clinics, and other regions of Libya. Thirdly, dental laboratory technicians—who play a critical role in the clinic-to-laboratory infection-control chain—were not sampled in this survey, a gap also noted in comparable prosthodontic IPC studies [4]. Future research

should prioritize multi-center, mixed-methods designs that combine self-report with direct observation and technician-level data to build a more complete, nationally representative picture of prosthodontic biosafety compliance across Libya.

5. Conclusions

Dental clinicians practicing in prosthodontic settings in Benghazi demonstrate strong baseline compliance with standard contact-barrier precautions and thermal instrument sterilization, comparable to recent regional and international benchmarks. However, protective eyewear use, routine biological monitoring of sterilization cycles, and standardized clinic-to-laboratory disinfection protocols remain inconsistently applied, and hepatitis B vaccination completion and clinical confidence in managing high-risk patients both improve with clinical experience. These findings support the development of structured, competency-based infection-control training—particularly targeting early-career clinicians and dental students—alongside institutional policies mandating documented sterilization monitoring and pre-clinical vaccination verification, to align Libyan prosthodontic practice with current international infection-prevention standards.

Acknowledgements

Not applicable.

Declarations

Funding: Not applicable.

Conflicts of interest: Not applicable.

Ethics approval and consent to participate: This study was approved by the Institutional Ethical Committee of the University of Benghazi (approval no. 0114). All participants provided voluntary, informed electronic consent before completing the survey.

Data availability: Not applicable.

Use of generative AI: Not applicable.

Supplementary material: Not applicable.

References

- [1] Volgenant CMC, de Soet JJ. Cross-transmission in the dental office: does this make you ill? *Curr Oral Health Rep.* 2018;5:221–8. doi:10.1007/s40496-018-0201-3
- [2] Centers for Disease Control and Prevention. Summary of infection prevention practices in dental settings: basic expectations for safe care [Internet]. Atlanta (GA): U.S. Department of Health and Human Services, CDC; 2024 [updated 2024 May 15]. Available from: <https://www.cdc.gov/dental-infection-control/hcp/summary/index.html>
- [3] Alqarni H, Jamleh A, Chamber MS. Chlorhexidine as a disinfectant in the prosthodontic practice: a comprehensive review. *Cureus.* 2022;14(10):e30566. doi:10.7759/cureus.30566
- [4] Alkadi L, Farook FF, Binmoghaiseeb I, Alyousef Y, Alabdulwahab A, Aljohani R, et al. Knowledge and compliance with infection prevention and control practices in prosthodontic procedures among dental students and professionals. *Healthcare (Basel).* 2024;12(24):2536. doi:10.3390/healthcare12242536
- [5] Saini RS, Binduhayyim RIH, Mosaddad SA, Hebayan A. Strategies for preventing aerosol-generated microbial contamination in dental procedures: a systematic review and meta-analysis. *Am J Infect Control.* 2025;53(5):638–47. doi:10.1016/j.ajic.2025.02.001
- [6] Ling ML, Ching P, Cheng J, Lang L, Liberali S, Poon P, et al. APSIC dental infection prevention and control (IPC) guidelines. *Antimicrob Resist Infect Control.* 2023;12:53. doi:10.1186/s13756-023-01252-w
- [7] Ataş O, Talo Yildirim T. Evaluation of knowledge, attitudes, and clinical education of dental students about COVID-19 pandemic. *PeerJ.* 2020;8:e9575. doi:10.7717/peerj.9575
- [8] Huang J, Li N, Xu H, Liu Y, An N, Cai Z. Global prevalence, risk factors, and reporting practice of needlestick and sharps injuries among dental students: a systematic review and meta-analysis. *J Hosp Infect.* 2022;129:89–101. doi:10.1016/j.jhin.2022.06.015
- [9] Alhumaid S, Al Mutair A, Al Alawi Z, et al. Knowledge of infection prevention and control among healthcare workers and factors influencing compliance: a systematic review. *Antimicrob Resist Infect Control.* 2021;10:86. doi:10.1186/s13756-021-00957-0
- [10] Elnaili SA, Alabidi S, Jaweesh RS, Kundie FAM. Infection control practice: a cross-sectional survey on dental laboratory technicians in Benghazi, Libya. *Libyan J Dent.* 2022;6(2):10–5. doi:10.37376/ljd.v6i2.3745
- [11] Volgenant CMC, Persoon IF, de Ruijter RAG, et al. Infection control in dental health care during and after the SARS-CoV-2 outbreak. *Oral Dis.* 2021;27(Suppl 3):674–83. doi:10.1111/odi.13408
- [12] Sonkesriya S, Gaur G, Maheshwari A, Ashahiya AK, Aulakh SK, Kumar A, et al. Comparative evaluation of disinfection protocols for dental impressions in prosthodontics. *Cureus.* 2024;16(7):e65535. doi:10.7759/cureus.65535
- [13] Binassfour AS, Baseer MA, Ingle NA. Knowledge, attitude, and practice of dental health professionals toward dental impression disinfection protocol during the COVID-19 pandemic in Saudi Arabia: a cross-sectional study. *BMC Med Educ.* 2024;24:246. doi:10.1186/s12909-024-05238-z
- [14] Al-Sharif R, Hussein A. Assessment of adherence to infection prevention and control guidelines among dentists in the West Bank and Jerusalem. *East Mediterr Health J.* 2023;29(3):205–11. doi:10.26719/emhj.23.025
- [15] Elgtlawi MHE, Lefsaay AM, Elaogali OO, Bushaala FM, Hamad M. Infection control attitude, knowledge and awareness level among dental students and interns in the removable prosthodontic department at the Faculty of Dentistry, University of Benghazi, Libya. *Libyan J Dent.* 2024;8(1):49–58. doi:10.37376/ljd.v8i1.5880
- [16] Arvind R, Bakhshi G, Shenoy R, Patil A, Jain A, Roma M. Knowledge of ocular infections among the dental practitioners across India: a cross-sectional survey. *BMC Res Notes.* 2024;17(1):41. doi:10.1186/s13104-023-06656-w
- [17] Vo LT, Phan DQ, Tran HG, Nguyen LTP, Gyan A, Nguyen HTN, et al. Hepatitis B vaccine coverage in health care students: a cross-sectional study in Vietnam. *PLoS One.* 2025;20(3):e0320860. doi:10.1371/journal.pone.0320860
- [18] Kateeb E, Amer R, Bajali M. Factors related to the willingness of Palestinian dentists to treat patients with blood-borne diseases. *Int Dent J.* 2015;65(2):103–9. doi:10.1111/idj.12138