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Endodontic and HIV: Myths and Realities about the Dental Care Protocol. Systematic review

Endodontia e HIV: Mitos e Realidades sobre o Protocolo de Atendimento Odontológico. Revisão sistemática

Endodoncia y VIH: Mitos y Realidades sobre el Protocolo de Atención Odontológica. Revisión sistemática

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Abstract
The present systematic review aimed to know the indications for the approach to patients with HIV in endodontics and its correct execution, according to current literature. Methods: Five reviewers searched the electronic databases EBSCO host, Cochrane, Pubmed, and Lilacs from 2014 to 2024, followed by a hand search and citation extraction for all eligible articles according to the inclusion criteria. Results: A total of 1031 articles were screened and there were 641 duplicate articles, leaving 4 articles to be included in this review. Conclusions: The implementation of strict biosafety protocols and the personalization of treatment based on the health assessment of the HIV patient is essential to minimize infection risks and improve recovery in endodontic procedures. The rigorous application of biosafety protocols, such as the use of physical barriers and sterile materials, is essential to reduce the possibility of cross-contamination during endodontic treatments in HIV patients.
Keywords: Systematic Review; Endodontic; Dentistry; HIV.

Resumo
O objetivo da presente revisão sistemática foi conhecer as indicações para o atendimento de pacientes com HIV em endodontia e sua correta execução, de acordo com a literatura atual. Métodos: Cinco revisores realizaram buscas nas bases de dados eletrônicas EBSCO host, Cochrane, Pubmed e Lilacs de 2014 a 2024, seguidas de uma busca manual e extração de citações para todos os artigos elegíveis de acordo com os critérios de inclusão. Resultados: Um total de 1031 artigos foram analisadas e 641 artigos duplicados foram encontrados, restando um total de 4 artigos para serem incluídos nesta revisão. Conclusões: A implementação de protocolos rigorosos de biossegurança e a personalização do tratamento com base na avaliação de saúde do paciente com HIV são essenciais para minimizar os riscos de infecção e melhorar a recuperação em procedimentos endodônticos. A aplicação rigorosa de protocolos de biossegurança, como o uso de

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barreiras físicas e materiais estéreis, é fundamental para reduzir a possibilidade de contaminação cruzada durante os tratamentos endodônticos em pacientes com HIV.
Palavras-chave: Revisão Sistemática; Endodontia; Odontologia; HIV.

Resumen

El objetivo de la presente revisión sistemática fue conocer las indicaciones para el abordaje de pacientes con VIH en endodoncia y su correcta ejecución, según la literatura actual. Métodos: Cinco revisores realizaron búsquedas en las bases de datos electrónicas EBSCO host, Cochrane, Pubmed y Lilacs desde 2014 hasta 2024, seguidas de una búsqueda manual y extracción de citas para todos los artículos elegibles según los criterios de inclusión. Resultados: Se revisaron un total de 1031 artículos y se encontraron 641 artículos duplicados, dejando un total de 4 artículos para ser incluidos en esta revisión. Conclusiones: La implementación de protocolos estrictos de bioseguridad y la personalización del tratamiento en función de la evaluación de salud del paciente con VIH son esenciales para minimizar los riesgos de infección y mejorar la recuperación en procedimientos endodónticos. La aplicación rigurosa de protocolos de bioseguridad, como el uso de barreras físicas y materiales estériles, es fundamental para reducir la posibilidad de contaminación cruzada durante los tratamientos endodónticos en pacientes con VIH.
Palabras clave: Revisión Sistemática; Endodoncia; Odontología; VIH.

1. Introduction

Systemic diseases are mostly spontaneous, that is, unexpected, and the Human Immunodeficiency Virus "HIV" is a disease that hinders the human body's ability to fight infections. This disease represents an important public health problem throughout the planet. However, in Ecuador, according to the MSP, the first cases date back to 1984. From 2014 to 2022 there were between 3,000 and 5,000 cases per year. It is worth mentioning that morbidity has increased, considering that data from previous decades were between 2,000 and 3,000 patients. Therefore, it is important to deepen knowledge in case a patient with this pathology comes to the dental consultation (MSP., 2024).

The present research seeks to obtain the greatest amount of updated information related to the care and protocols to be followed by the endodontic specialist when attending a patient with HIV, it has been observed that there is a short research on this topic, the last document dates from the year 2022 and one of the objectives of this research is to provide the necessary confidence for the endodontic specialist to perform without any inconvenience any treatment that the patient needs (Cordero et al., 2016).

Sometimes when a patient with HIV goes to the endodontist or any other specialist dentist, general dentist or even dental students in their practices, there are certain people who are afraid to attend the patient with this condition, either for fear of infection or ignorance of the management of this situation, it is for this and other reasons that this research seeks to clarify any doubts related to dental management in patients with HIV, also making clear the approach for endodontic management (Machado et al., 2022).

It should be noted that it is important to differentiate between a patient who has HIV and a patient who has already reached the AIDS stage since this factor is essential to differentiate the treatment method between one person and another. A patient with HIV AIDS is a patient who is systemically compromised, and his health status may vary from one moment to another, therefore the present research will focus on the endodontic management of a patient with HIV who has not yet reached the AIDS stage (Fontes et al., 2014).

HIV causes a significant decrease in the immune system of the human body, therefore, this infection can lead to a change in the protection or defense against a pathogen that causes a periapical or pulp disease, since in this infection the microorganisms present in the peri-root system directly or indirectly incite an anti-inflammatory response giving rise to different pathologies that spread to the outside from the infected root canal system (Gama et al., 2016).

The present systematic review aimed to know the indications for the approach to patients with HIV in endodontics and its correct execution, according to current literature.

2. Methodology

This systematic review (Gomes and Caminha., 2014) was conducted with the statement of preferred reporting items for systematic reviews and meta-analyses specialized in dental research and was patented in the International Prospective Register of Systematic Reviews “PROSPERO” with the key (CRD42024591525). We asked a question based on the PICO format (Patient/Population, Interventions, Comparison, Results) to address the correct management and biosafety protocol when performing endodontics in patients with HIV.

The population included HIV-positive patients diagnosed with symptomatic irreversible pulpitis, asymptomatic irreversible pulpitis, pulp necrosis, previously started therapy, previously treated tooth, or traumatic pulp exposures with persistent clinical or radiographic signs/symptoms of periapical pathology requiring nonsurgical endodontic treatment, interventions included biosafety standards applied during nonsurgical endodontic treatment, and outcomes incorporated lower incidence of cross-contamination in patients with HIV disease, the standardized question was: What are the specific biosafety guidelines that should be followed in the endodontic management of patients diagnosed with HIV/AIDS to ensure the protection of both dental personnel and the patient during treatment?.

The inclusion criteria considered were randomized cohort, case-control, cross-sectional, prospective or retrospective clinical trials conducted in patients with HIV and reported in English between 2014 and 2024, studies that include patients with irreversible pulpitis, pulp necrosis, previously started therapy, previously treated tooth or systematic traumatic pulp exposures that indicate a relationship with the topic to be discussed, studies that include biosecurity management in patients with HIV, while the exclusion criteria were in vitro studies, non-randomized studies in patients with HIV before 2014, which did not include results of training on management of systemic diseases, literature reviews and systematic reviews that indicate a relationship with the topic to be discussed, studies that include patients with HIV AIDS, studies conducted before 2014, case reports, case series (without controls), cell cultures, laboratory studies, animal studies and review articles, scientific manuscripts of patients with Acquired Immunodeficiency Syndrome and studies that do not include protocols or management mode. endodontic.

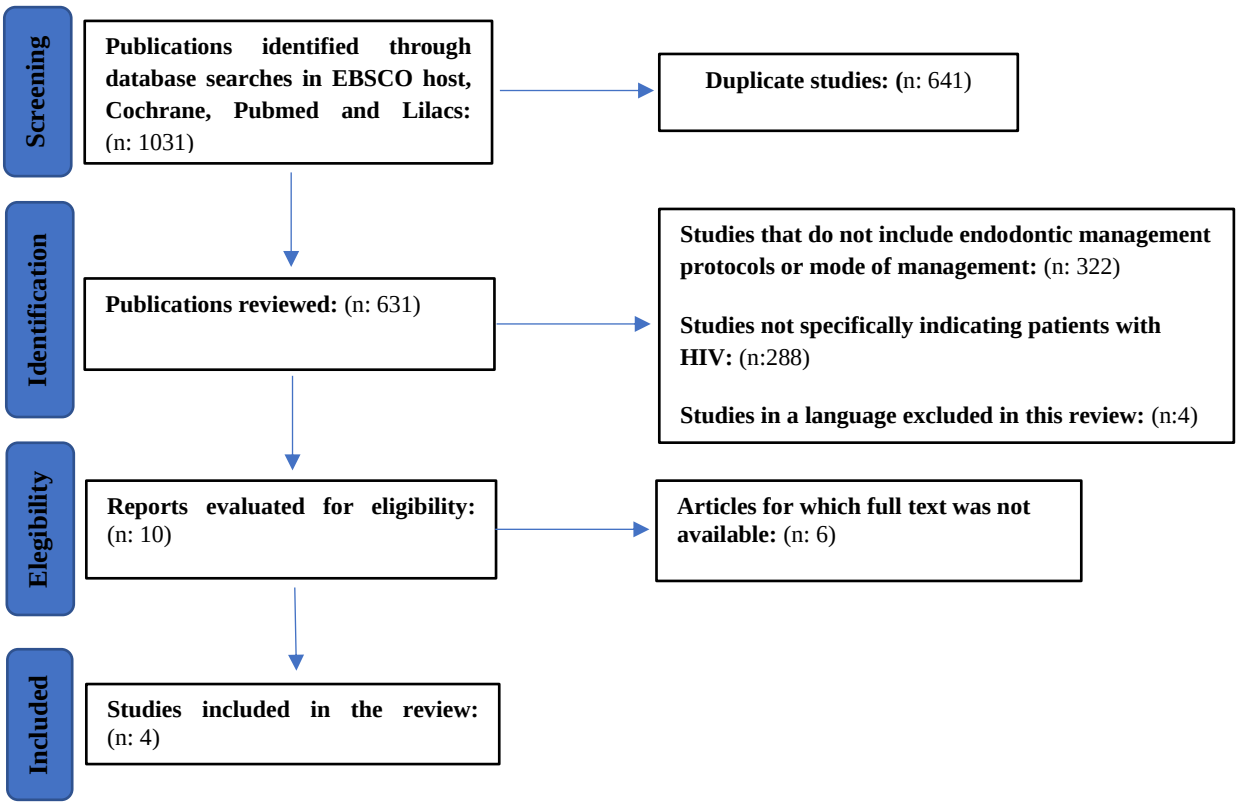
From the PICO question, medical subject heading terms combined with the boolean connector “AND” were generated to identify relevant studies, the keywords used in English were: (HIV and endodontic), (HIV and endodontic and biosecurity), (HIV and protocol and endodontic), (HIV and protocol and periapical), (HIV and periapical and security) and (HIV and endodontic and treatment) in the EBSCO host, Cochrane, Pubmed and Lilacs databases from 2014 to 2024, all included studies were written in English.

Four independent reviewers (G.M; J.F; A.G and M.A) conducted an exhaustive search in the mentioned electronic literature databases. We searched between February 28 and March 14, 2024, the studies found because of the literature search were categorized according to the databases and are shown in the flow chart.

The search results were exported to the Rayyan - Intelligent Systematic Review program, duplicates were eliminated using tools of that program, the reviewers selected the articles that met the inclusion and exclusion criteria, and titles or abstracts were analyzed according to the inclusion criteria if the title or abstract did not provide sufficient information for the inclusion or exclusion decision, the full text of the articles was read, and the same eligibility criteria described above were applied.

Four authors (G.M., A.G., J.F and M.A) independently reviewed the titles and abstracts of the articles from the search results, and the full texts of potentially relevant articles were reviewed and selected according to the inclusion and exclusion criteria, after reading the titles and abstracts, four independent reviewers (G.A.M.V., J.M.F.Q., M.J.A.V, and A.E.G.G.) selected the articles to be included, disagreements between reviewers were resolved by consensus after discussion and evaluation by a third researcher (I.R.G.M.), data extraction showed general information identifying the study (author and year), study topic, objective, design and sample (Figure 1).

Figure 1 - Flowchart of study selection following the statement of preferred reporting elements for systematic reviews.



Source: Authors.

Two reviewers (G.A.M.V. and A.E.G.G.) independently assessed the potential risk of bias using Review Manager 5.4.1 software; in case of disagreement, a third reviewer (J.M.F.Q.) was consulted to reach a consensus. Each item was evaluated by addressing specific guiding questions, resulting in a rating of "low risk of bias" (for negative responses), "high risk of bias" (for positive responses), or "unclear" for missing information), articles that were pre-selected using the "Rayyan - Intelligent Systematic Review" program will be excluded from duplicate articles, articles eliminated for not covering the topic studied will be excluded, as well as articles that were conducted on animals and articles that are not in Spanish and English.

3. Results

Initially, 1031 potentially relevant studies were identified in all the databases searched, 400 duplicates were excluded, leaving a total of 631 articles, and removing articles that did not meet the inclusion criteria, 4 articles remained (Table 1).

Table 1 - Systematization of articles.

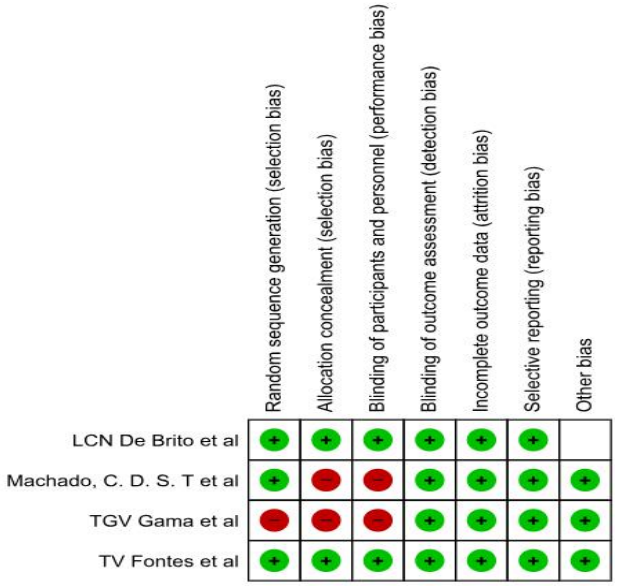
AUTHORS	TITLE	COUNTRY	STUDY
Camilla dos Santos Tibúrcio-Machado, Carlos Alexandre Souza Bier, Michael Væth, Gabriela Salatino Liedke, Melissa Orlandim Premaor, Lise-Lotte Kirkevang	Prevalence of apical periodontitis in people living with HIV in Southern Brazil	Brasil	Cross-sectional descriptive
Fontes, Tatiana Vasconcellos; Ferreira, Sonia Maria Soares; Silva-Júnior, Arley; dos Santos Marotta, Patrícia; Noce, Cesar Werneck; de Carvalho Ferreira, Dennis; Gonçalves, Lucio Souza	Periradicular lesions in HIV-infected patients attending the faculty of dentistry: clinical findings, socio-demographics status, habits and laboratory data - seeking an association	Brasil	Cross-sectional descriptive
Gama, Túlio Gustavo Veiga; Pires, Fabio Ramoa; Armada, Luciana; Gonçalves, Lucio Souza	Cellular Profile and Expression of Immunologic Markers in Chronic Apical Periodontitis from HIV-infected Patients Undergoing Highly Active Antiretroviral Therapy.	Brasil	Cross-sectional descriptive
Brito, L C N; Teles, F R; Teles, R P; Nogueira, P M; Vieira, L Q; Ribeiro Sobrinho, A P	Immunological profile of periapical endodontic infections from HIV- and HIV+ patients.	Brasil	Cross-sectional descriptive

Source: Authors.

3.1 Risk of bias within studies

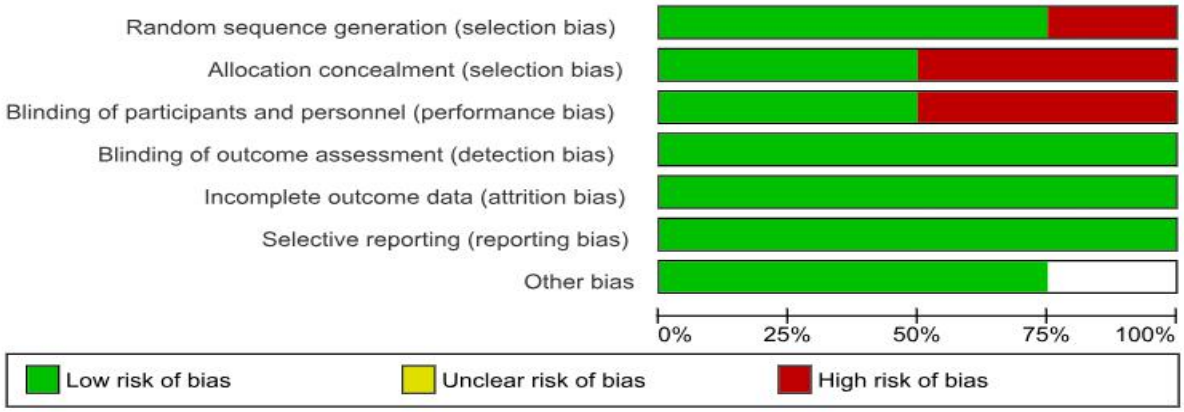
Figures 2A and 2B show the risk of bias in the included articles indicating a case report. The included clinical trial studies were assessed individually for each risk of bias domain (Figure. 2A). Three studies were considered high risk due to some allocation concealment, blinding of participants, and selective reporting, among other situations.

Figure 2A: Risk of bias.



Source: Authors.

Figure 2B: Risk of bias



Source: Authors.

4. Discussion

Fontes et al, mention that dental care in the field of endodontics requires specific biosafety standards by the specialist, if we relate this to patients who present HIV (Human Immunodeficiency Virus), we must take into account that this disease is highly contagious and that its main routes of contamination are: Parenteral, sexual and percutaneous; the staff of Risk Management TDIC (The Dentists Insurance Company), supports within the biosafety standards, the standard precautions to be taken into account: Hand Hygiene, must be performed: The national center for preventive programs and disease control prior, while Brito et al. (2015) explains that it is essential direct contact with patients, before and after the placement of gloves, before the intervention of endodontic treatment, after contact with contaminated surfaces and objects, between patient and patient, staff protection, which should include the use of double gloves depending on the treatment to be performed, mask and goggles, safety against sharps, safe practices when injecting, sterile devices and instruments and clean and disinfected surfaces of the environment (Brito et al., 2015).

A good collection of patient information on clinical history and complementary examinations will help to prevent incidents. Thus, since endodontics is a treatment where fluids such as blood may be present, the patient must undergo antibiotic prophylaxis to avoid important conditions in our organism, such as bacterial endocarditis (Thornhill et al., 2022).

Before the intervention, accessories and jewelry should be removed from the patient, the specialist then proceeds to the placement of physical barriers for both, in the patient will be placed surgical gown, a disposable permeable cap, eye protection, chest protection and in some cases hearing protection, then the Endodontist will place their protective barriers, the mask will help protect airways from splashing blood or aerosol contaminants, this should cover nose and mouth (Malmberg., 2023).

Double gloving because an endodontic treatment is subject to exposed fluids in the working environment where the procedure is going to be performed, the clothing should be a disposable surgical gown, this will only be used in dental care and during the procedure, to avoid contact with body fluids of our patient and contaminated surfaces, eye protection should be used: Will help avoiding contamination by fluids and aerosols that are <5µm, spray from the triple syringe or high-speed handpiece when performing the chamber opening, during the procedure, it is recommended that all material should be sterile to avoid cross-contamination (Cintra et al., 2021).

The anesthetic solutions to be used in this type of patient do not differ from those of a healthy patient, since no special contraindications apply, however, among the most used anesthetic solutions we have lidocaine 2% with epinephrine and articaine 4% with epinephrine, Lidocaine has an effect time of 120 minutes (2 hours), and articaine 148 minutes (2 hours and 48 minutes),

however, the latency time of lidocaine is much faster, having a time of 0.67 minutes and articaine of 0.86 minutes (Bhalla et al., 2021).

Once the patient is anesthetized, we proceed to place the isolation material, which is composed of a) clamps that embrace the dental piece, the same that are used according to the tooth to be treated, b) rubber dam, c) rubber dam perforator, d) rubber dam arch, e) gingival barrier to ensure absolute isolation, on the other hand, Fontes, indicates that there are different types of Rubber Dams, of different shapes, sizes, and texture, however, the most used for endodontics will always be of thicknesses that are medium, strong and those of 5 inches, another important feature is color, there are: black, blue-green, pink-gray, lilac, beige and purple, however, the lighter colors will be chosen, since they will allow a better reflection of the operative field (Borges et al., 2020).

The treatment is performed according to the diagnosis evaluated by the endodontist, the irrigation of the canals for a patient with HIV+, will be performed with sodium hypochlorite, thus removing the tissue that needs to be eliminated and at the same time acting against bacteria, and viruses, spores, at the time of filling, care should be taken with the handling of the instruments to avoid cross-contamination (Siqueira et al., 2022).

After the intervention, disposable materials such as surgical gowns, chest drapes, gloves, paper towels, cotton, gauze, etc., are highly contagious implements that should be placed in red plastic bags, which should be labeled, and sharps should be deposited in rigid containers (Borges et al., 2020).

The materials that have been used must undergo disinfection and sterilization processes, they are placed in a container of sodium at 5000 ppm for thirty minutes, then proceed to sterilize, after care, the sponge of the drum of the files must be discarded, the files and spacers used must be sterilized if they still maintain their proper form, otherwise they must be discarded, The stainless steel staples and paper tips should be sterilized in an autoclave, the radiographs that have been taken should be rinsed under a stream of water, then disinfected in 70º alcohol for 5 minutes, in the case of needles or scalpels it is necessary to perform a pre-disinfection in 2.5% sodium hypochlorite for 30 minutes, the disinfection of surfaces and work equipment is always performed at the end of the day (Kothekar et al., 2020).

If the specialist presents wounds or dermatological lesions, he/she should not handle the patient. If blood or any fluid is splashed on the skin, it is necessary to wash immediately with soap or a sodium hypochlorite-based disinfectant (Reddy et al., 2021).

According to Machado et al. the treatment that should be used will be according to the clinical assessment that we obtain from our patient, so before the dental appointment requires interconsultation with the professional treating the disease, laboratory studies should be performed: Once the dental care has been performed, the patient should be monitored between 24 and 72 hours. The development of a periapical lesion can destroy the periapical bone, due to the infiltration of T cells and the secretion of cytokines that are provoked in that place, thus presenting an altered periapical repair (Malamed., 2022).

In the context of endodontics, managing patients with HIV requires a careful approach that integrates both clinical assessment and the strict implementation of biosafety protocols (Marinho et al., 2023). Despite advances in antiretroviral treatment, which have significantly improved the quality of life and immune systems of people with HIV, these patients may still present a higher risk of infections due to potential immune response alterations. Endodontic treatment in HIV patients does not have absolute contraindications, but it is essential to personalize the treatment, considering factors such as viral load and CD4 count to adapt clinical practices to each patient's conditions. Current evidence suggests that using physical barriers, sterile materials, and strict disinfection of instruments significantly reduces the risk of cross-infections, protecting both the patient and the healthcare professional.

Based on a thorough assessment of the patient's health and adherence to biosafety standards, is key to achieving successful outcomes in endodontic treatments for people with HIV (Braga et al., 2021).

In addition to biosafety aspects, it is important to consider the potential side effects of antiretroviral treatments on the oral health of HIV patients (Souza et al., 2020). Some medications used in HIV management can cause xerostomia, gingivitis, or susceptibility to opportunistic infections, which may complicate endodontic procedures and affect tissue healing (Fornari et al., 2020). Endodontic treatment planning in these patients should include a detailed review of their medical and pharmacological history, as well as close monitoring of their response to treatment. Communication between the endodontist and other healthcare professionals involved in the patient's care is also essential to coordinate a comprehensive approach that minimizes risks and maximizes treatment effectiveness. Current literature supports that, with an individualized and precautionary approach, HIV patients can safely undergo endodontic treatments with positive clinical outcomes (Deramo et al., 2020).

5. Final Considerations

We believe that we have achieved the objective set at the beginning of this study. Current evidence suggests that the use of physical barriers, sterile materials, and strict disinfection of instruments significantly reduces the risk of cross-contamination, protecting both the patient and the healthcare professional. Communication between the endodontist and other healthcare professionals involved in patient care is also essential to coordinate a comprehensive approach that minimizes risks and maximizes treatment effectiveness.

The data obtained in this research highlight the importance of refining and updating the dental care protocol for patients with HIV. Future studies could contribute to this process by incorporating new techniques, materials, and characterizing the endodontic microbiome in this patient group. Furthermore, it would be relevant to identify the socioeconomic and cultural factors that hinder or limit access to dental services in this vulnerable population.

To address the questions on this topic, it is recommended to use different research methodologies, such as integrative reviews, reports, case studies, and field research. This will ensure a proper disciplinary investigation to foster better knowledge and improve the quality of life of patients with HIV.

Conflict of Interest

The authors declare that they have no conflicts of interest

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