Machine Translated by Google
RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Quality of care in endodontics: clinical evidence, patient safety, and service management.

Quality of endodontic care: clinical evidence, patient safety and service management
Quality of care in endodontics: clinical evidence, patient safety and service management

Édina Vendrame
Dentist; specialist in Endodontics; Master's degree in Dentistry, area of Public Health; professor and manager of a dental clinic.

SUMMARY
This article discusses the quality of endodontic care from the perspective of integrating clinical effectiveness, patient safety, and service management. Through a narrative review, it analyzes disease burden, diagnosis, microbial control, obturation, restoration, follow-up, patient experience, and quality indicators. The literature demonstrates that laboratory differences between techniques rarely translate into measurable clinical superiority and that the outcome depends on a chain that includes planning, execution, continuity, and documentation. It concludes that endodontic excellence results from technical competence supported by reliable processes, shared decision-making, and continuous learning.
Keywords: Endodontics; quality of care; apical periodontitis; patient safety; clinical management.

ABSTRACT
This article discusses the quality of endodontic care by integrating clinical effectiveness, patient safety, and service management. A narrative review addresses disease burden, diagnosis, microbial control, obturation, restoration, follow-up, patient experience, and quality indicators.
Laboratory differences between techniques do not always translate into clinical superiority, while outcomes depend on a chain involving planning, execution, continuity, and documentation.
Endodontic excellence therefore arises from technical competence supported by reliable processes, shared decision-making, and continuous learning.
Keywords: Endodontics; quality of care; apical periodontitis; patient safety; clinical management.

1 INTRODUCTION

Endodontics occupies a unique position in contemporary dentistry: at the same time
dealing with pain, infection, and emergencies, seeks to preserve natural teeth through
technically demanding interventions. The result does not depend on a single instrument or
Material. Diagnosis, isolation, chemomechanical preparation, obturation, restoration.
Coronary care and follow-up form a chain of care in which an initial failure can...
compromising subsequent stages. Discussing endodontic quality, therefore, requires looking at the
The procedure and the clinical organization that supports it.
Apical periodontitis remains common in different populations, and its occurrence is...
related both to the presence of infection in the canal system and to the quality and to

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

monitoring of treatments performed. The review by Jakovljevic et al. (2020) compiled
Epidemiological studies have shown important variations between countries and assessment methods.
This heterogeneity prevents simplistic conclusions, but confirms that periapical health
This constitutes a significant oral health problem, and the evaluation of results should go beyond...
The immediate impression is that the procedure went well.
In recent years, reviews produced within the framework of the European Society of Endodontology
They examined instrumentation, irrigation, obturation materials, and therapies separately.
adjuvants and other stages of apical periodontitis treatment. This body of research is...
especially useful because it demonstrates that commercial innovations do not always translate into
measurable clinical superiority. For the specialist, this finding does not mean
immobility; it means incorporating resources based on indication, evidence, experience and
patient needs.
This article analyzes the quality of care in Endodontics from three dimensions.
Inseparable: clinical effectiveness, patient safety, and service management. The discussion
He believes that technical expertise remains central, but produces more consistent results.
when supported by protocols, communication, traceability, and adequate working conditions
and follow-up. The goal is not to turn the service into a rigid sequence, but rather
To show how a clinic can reduce avoidable variations without eliminating judgment.
A professional will handle each case individually.

2 METHODOLOGY

A narrative and documentary literature review was conducted, focusing on the quality of treatment.
non-surgical endodontic treatment, in the prognostic factors of apical periodontitis, in the safety of
The guiding question was: what clinical elements are involved in patient care and clinical process management?
and organizational factors allow for the evaluation and improvement of the quality of endodontic care without
Should the outcome be reduced to the technical execution or to the final radiographic image?
The search was conducted in PubMed/MEDLINE, Scopus, and Google Scholar, prioritizing reviews.
systematics, meta-analyses, observational outcome studies, and position papers
the European Society of Endodontology (ESE), the American Association of Endodontists
(AAE), the American Academy of Oral and Maxillofacial Radiology (AAOMR) and the
World Health Organization. Descriptors in Portuguese and English were used (apical
periodontitis, root canal treatment, treatment outcome, irrigation, instrumentation, patient

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

safety, quality indicators, dental care, clinical governance), combined by operators
Boolean symbols. There were no language restrictions. The texts were selected for their relevance to the subject.
problem, methodological clarity, and possibility of bibliographic verification. Results of
Laboratory studies were employed to explain mechanisms and technical performance, without
to be treated as equivalent to healing, dental maintenance, or experience of
patient. When reviews found insufficient evidence, this uncertainty was preserved.
in the text, avoiding attributing superiority to techniques that have not yet demonstrated benefit.
Consistent clinical practice.

The analysis was organized into six axes: disease burden and dental preservation; diagnosis and
planning; microbial control; restoration and continuity of care; safety and
Patient experience and quality management in dental clinics. The chart uses
These are global estimates from the World Health Organization and are for contextual purposes. They were not
Data is collected from patients, proprietary success rates are produced, or results are attributed.
clinical advice to the author.

3. Disease Burden, Dental Preservation, and Purpose of TREATMENT

The World Health Organization estimates that oral diseases affect approximately 3.7 billion people.
people (YAN L. et al; 2025). Untreated caries in permanent teeth, one of the conditions
Most prevalent, it can progress to pulpal and periapical involvement when prevention and
Restorative care does not occur in time. Endodontics appears, in this process, as
possibility of controlling the infection and preserving a tooth that still has viable biological conditions
and restorative. Their relevance cannot be separated from unequal access to health services.
oral.

Preserving the natural tooth is an important goal, but it is not an absolute rule. The decision
one must consider restorability, periodontal condition, extent of fractures, possibility of
Decontamination, prognosis, and patient preferences. The American Association of
Endodontists recommend a systematic evaluation of the case's difficulty and the factors that may contribute to it.
requiring a referral. This precaution avoids both treatments with low predictability and
extraction methods were adopted without adequate discussion of alternatives.
The endodontic result has several layers. Reduction of signs and symptoms, healing of the
periapical tissues, function, tooth retention, and the absence of further interventions are

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

The outcomes are related, but not identical. A patient may be pain-free and still present with...
radiographic changes during follow-up; another may present with a favorable image and report...
discomfort or functional difficulty. Assessing quality requires recording these dimensions and
Respect the biological repair time.

Jakovljevic et al. (2020) drew attention to the prevalence of apical periodontitis and to
Methodological differences exist between surveys. Part of the variation stems from the way teeth are measured.
Treated lesions are identified, based on sample profiles and imaging technology.
employed. Comparisons between clinics or countries therefore need to specify criteria.
Isolated numbers, without population and method, can produce an appearance of precision that...
The evidence does not support this.

A public health perspective raises another question: how many teeth potentially
Preservable resources fail to receive timely treatment due to economic, geographic or other barriers.
Organizational? The excellence of an individual procedure remains indispensable, but not
It does not, on its own, solve the delay in diagnosis or the fragmentation of care. Quality of care.
This includes the ability to guide, refer, and monitor the patient, especially when the...
Treatment involves different professionals and clinical stages.

4. DIAGNOSIS, PLANNING AND SHARED DECISION-MAKING

Pain originating from endodontic issues can be confused with periodontal and muscular problems.
Sinus or neuropathic. Careful anamnesis, clinical tests, periodontal evaluation and examinations.
Image data must be interpreted together. No single test replaces the construction of a comprehensive study.
diagnostic. When findings are contradictory, postpone irreversible intervention and seek further information.
Additional information can lead to a safer decision than treating only...
Because there is extensive restoration work or a questionable image.
The planning needs to take into account anatomical difficulties, mouth opening, systemic condition,
Existing restoration, possible isolation, and the ability to complete coronary rehabilitation. The
The AAE difficulty assessment form is useful because it makes visible factors that, in a hurry,
They can be underestimated. It doesn't function as an automatic algorithm; it serves to support the
judgment, to favor responsible referrals and to prepare resources compatible with the
Expected complexity.

The indication for three-dimensional examinations should be selective. The joint position of the AAE and the
AAOMR argues that cone beam computed tomography (CBCT) should not be

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Used for routine screening without signs or symptoms. Its value increases in certain situations.
specific factors, such as complex anatomy, suspected reabsorption, complications, trauma, or
surgical planning. The correct question is not whether three-dimensional imaging is superior in surgical planning.
detail, but if the additional information could modify a decision relevant to that
patient.

Shared decision-making means explaining the likely diagnosis, alternatives, uncertainties, and steps.
risks and the need for restoration and return. The language needs to be understandable without
To hide the complexity. To promise absence of pain or indefinite tooth durability would be...
incompatible with biological variability. A well-documented conversation allows that the
The patient participates in the choice and reduces the risk of interpreting a clinical prediction as a guarantee.

The plan should also anticipate what will happen if the initial strategy cannot proceed.
Extensive calcification, fracture identified during access, difficulty in isolation or
Unexpected changes may require interruption, referral, or a change of approach.
Defining stopping criteria in advance doesn't demonstrate insecurity; it demonstrates maturity.
Clinical safety improves when the team knows how to recognize limits and communicate changes.
No improvisation.

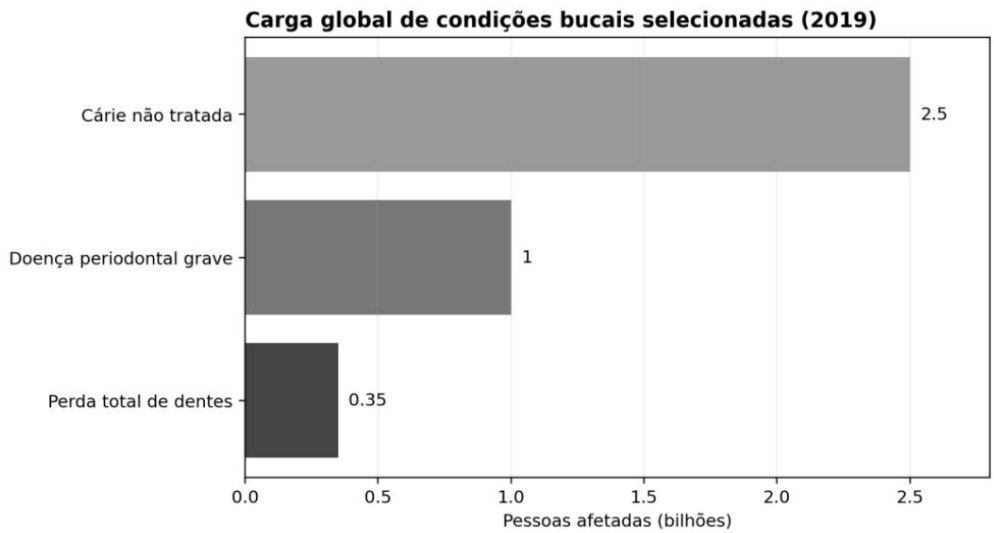

Figure 1 – People affected by selected oral conditions

Source: author's elaboration using data from the WHO Global Oral Health Data Portal (estimates)
(from 2019). The categories may overlap.

5. INFECTION CONTROL AND BIOLOGICAL COHERENCE OF TREATMENT

Treatment of apical periodontitis is guided by controlling infection in the root canal system.

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Instrumentation, irrigation, and intracanal medication act in a complementary manner, but
They encounter limits imposed by anatomy. Isthmuses, ramifications, curvatures and irregularities.
are not fully achieved by the instruments (Siqueira JJF 2018). For this reason,
Expanding preparation without criteria can remove structure and still not resolve the complexity.
Microbiological; the strategy needs to balance disinfection, safety, and dentin preservation.
The systematic review and meta-analysis by Bürklein et al. (2023) examined the effectiveness of
Instrumentation in the treatment of apical periodontitis was studied, but limitations were found in the clinical evidence.
available. The practical message is not that brewing systems are equivalent everywhere.
situation, but laboratory differences should not be automatically converted into
Promises of healing. Instrument selection, anatomy, mastery of technique and protocol.
Irrigation issues continue to interfere with the process.
Rossi-Fedele et al. (2023) evaluated irrigation and medication and highlighted the insufficiency of
evidence for several clinical comparisons. Irrigants require concentration, volume,
Renewal, application time and method compatible with safety. Extrusion beyond the apex.
can cause significant damage. Absolute isolation, determining the length of
Needle operation and control are components of the same protective barrier, not
Accessory details.

Adjunctive therapies are attracting interest because they promise to reach areas untouched by other treatments.
instruments. However, Meire et al. (2023) did not find sufficient evidence for
Generally, recommend a specific complementary therapy for apical periodontitis. This
It does not prevent research or justified use; it prevents the resource from being presented as
A substitute for well-executed fundamentals. Innovation needs to add demonstrable value.
to the protocol, and not just a billable step.
Infection control also depends on the environment. Field organization, processing
materials, batch traceability, barriers, hand hygiene and sharps disposal
These pertain to endodontic quality. A technically sophisticated clinic can produce risk.
If the circulation of instruments and people is not well defined, microbiological safety is...
result of repeated and supervised behavior, not a generic statement of
biosecurity.

6. Filling, Coronal Restoration, and Continuity of Care

Obturation aims to fill the space prepared after microbial control, but it does not...

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Corrects insufficient cleaning, drilling, or inadequate length. Pirani et al. (2023)
They reviewed obturation materials and techniques and showed that clinical evidence does not support them.
Strong conclusions of superiority for many alternatives. Performance should be
interpreted within the context of the complete treatment, and not based on the popularity of a particular cement or other factor.
visual aspect of a technique.

Coronal sealing and restorability influence the continuity of the outcome. Infiltration,
Fractures and delays in completing the restoration can compromise endodontic treatment.
Technically acceptable. Restorative planning, therefore, must begin before access is granted.
When endodontists and restorative professionals work without communication, the patient may
to complete a stage and remain exposed precisely during the interval in which he believes that
The problem has already been solved.

The outgoing documentation needs to detail what was done, any incidents, and materials used.
Relevant information, provisional condition, and recommended timeframe for restoration. Radiographs and records.
They should allow for later comparison. The usefulness of the medical record is not limited to the defense.
Legally: it ensures continuity, enables auditing, and prevents the next professional from...
rely solely on the patient's memory to understand the case.

Follow-up should not be presented as a formality. Symptoms, function, and repair.
Radiographic findings evolve at different rates. Cases with periapical lesions, trauma, resorption, or
Prognostic uncertainty may require individualized monitoring. Absence at the return visit is also...
This is an indicator of service quality, as it can reveal communication failures or difficulties.
financial, distance, or a mistaken perception that the disappearance of pain has ended the
Careful.

When the repair does not go as expected, the analysis needs to be comprehensive: initial diagnosis,
untreated root canal, restoration, fracture, persistent infection, periodontal condition and time of
Follow-up. Retreatment, surgery, or extraction have distinct indications. Bucchi et al.
(2023) observed differences between outcomes of non-surgical treatment, retreatment and
surgery, reinforcing that choice and comparison depend on the outcome considered, such as
healing, survival, or need for further intervention.

7. SAFETY, PATIENT EXPERIENCE, AND CLINICAL COMMUNICATION

Patient safety in endodontics begins with the correct identification of the patient and the tooth.
and the procedure. X-rays, tests, and charting need to align before the...

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS - Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Anesthesia and access. A confirmation pause is simple, but protects against adverse events.
significant impact. In treatments with multiple sessions, the check-up should be repeated because
Schedule changes and service by different teams increase the possibility of
confusion.

The rubber dam protects against aspiration or swallowing of instruments, reducing the risk of accidents .
Contamination control and organization of the surgical field. Its use should be integrated into the standard of care.
and not depend on convenience. The same reasoning applies to length control,
Prevention of instrumental fractures and monitoring of irrigation solutions. Effective barriers.
They tend to be discreet; they only become visible when they fail.
Pain and anxiety should be evaluated before, during, and after the procedure. Explain.
Expected sensations, approximate duration, and signs that require contact reduce uncertainty.
Acceptance doesn't mean minimizing complaints or attributing all pain to fear. It's about listening.
Careful clinical examination helps to differentiate expected postoperative outcomes from complications that
They need reassessment.
Prescribing medication should be based on clinical indication and take allergies into account.
Interactions, systemic conditions, and risk of misuse. Antibiotics are not a substitute for...
Local treatment of endodontic infection when possible. Institutional protocols.
They can support decisions, but they do not replace individual evaluation. Register the recommendation.
Patient guidance and response promote responsible use and continuity.
Communication with the team is equally important. Assistants need to know the
sequence of care, critical materials, signs of reaction and procedures in the face of
Accidents. Short training sessions, simulations, and discussions of near misses produce...
More concrete learning than manuals that nobody consults. A safe culture.
It allows for reporting the potential error early, before it reaches the patient.

8. Quality Management and Indicators in Dental Clinics

Quality management does not mean turning the practice into a production line. Its objective
It's about ensuring that repeatable tasks are performed reliably and leave room for decision-making.
Individualized clinics. Scheduling tailored to the complexity and availability of...
Materials, equipment maintenance, and accessible medical records reduce interruptions that
Fatigue and improvisation increase. Care begins before the patient even occupies the chair.
Indicators should be few, understandable, and linked to decisions. Unfinished returns,

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Pending definitive restorations, unforeseen events, referrals, image reprints,
Time between diagnosis and treatment and identification failures are possible examples. Rates
Successful outcomes require a defined denominator, timeframe, and clinical criteria. Without these elements, the
The number serves more for dissemination than for improvement. Process indicators (such as percentage)
(cases with documented isolation or a registered restorative plan) tend to be more
useful for continuous improvement than isolated "success" rates, which are subject to loss of value.
heterogeneous follow-up and criteria.
Clinical audits can review sample medical records, documentation quality, and attendance.
isolation, restoration plan and follow-up. The purpose is not to find culprits, but
Identify where the system facilitates omissions. When the same information is missing in several
Regarding medical records, the most helpful response may be to redesign the form or workflow, rather than issuing warnings.
professionals working in isolation.
Continuing education needs to bridge the gap between literature and real-life cases. Clinical meetings can...
to discuss a systematic review alongside completed treatments, including those that
They demanded a change of plan. Teachers and experts play a decisive role in showing
reasoning, uncertainty, and limitations, and not just visually pleasing results. This stance
It strengthens the critical autonomy of students and staff.
Finally, financial sustainability and quality are not opposing goals, but neither are they mutually exclusive.
They automatically coincide. Rework, expired inventory, inadequate scheduling, and failures of
Communication consumes resources without benefiting the patient. More stable processes can...
Reduce waste, while investment decisions should consider volume, maintenance,
Training and evidence. The healthy growth of a clinic depends on consistency between training and evidence.
Proposed healthcare service, operational capacity, and professional responsibility.

CONCLUSION

Quality in endodontics results from a chain of clinical and organizational decisions.
The technical procedure remains central to the treatment, but cannot be separated from it.
diagnosis, infection control, restoration, communication and follow-up.
Evaluating only the final radiograph offers a short-term view of a process that begins before the...
access and continues after obturation.
The literature confirms the relevance of apical periodontitis and, at the same time, exposes its limitations.
Important evidence base. Many materials and technologies demonstrate performance.

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google
RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

Promising laboratory results without equivalent demonstration of clinical superiority. Recognizing this
Distance protects both science and the patient, as it prevents innovation from becoming mere promise before it is realized.
consistent results are available.

The diagnosis must remain integrated and prudent. Tests, clinical examination, and imaging.
They answer different questions. Three-dimensional exams offer valuable information in
Selected situations, but should not be used for automatic tracking. The indication
The person in charge considers whether the new data has the potential to change the way care is provided.

Microbial control requires biological coherence and attention to anatomy. Instrumentation,
Irrigation and medication do not act as independent solutions, and adjuvant therapies do not
They replace fundamentals. Safety during irrigation, isolation and handling of
Instruments contribute to the outcome as much as the ability to achieve the desired length.
planned work .

Obturation completes a phase, not the entire process. Coronal sealing, restoration and
Follow-up care influences tooth maintenance. The clinic needs to organize the transition.
between professionals and inform the patient about deadlines and follow-up appointments; otherwise, a treatment
Technically correct results can be compromised by service failure.

Patient safety is built on simple check-ins, clear medical records, and barriers.
Effective and freedom to interrupt a dubious process. Near-failures should be discussed.
Because they offer an opportunity for correction without causing harm. A team that learns from small mistakes.
Inconsistencies tend to respond better when faced with complex situations.
Indicators can make quality observable, provided they have criteria and a purpose.
A clinic doesn't need to measure everything; it needs to track what helps in decision-making. Feedback data,
Pending restoration, setbacks, and rework reveal issues that everyday perception...
It usually returns to normal.

The integration of practice, teaching, research, and management fosters a more comprehensive understanding of...
Endodontics. The specialist who teaches and administers also observes how knowledge,
People and processes meet in customer service. This perspective does not diminish the skill.
operational; it creates conditions for it to be exercised consistently.

The literature reviewed allows us to conclude that endodontic excellence is not limited to performing...
a sophisticated technique. It manifests itself in the ability to indicate with discernment, to treat with
Safety, recognizing limits, documenting decisions, and monitoring results. A clinic.
Evidence-based and continuous learning-driven approaches better preserve not only the teeth, but also the
Patient confidence in the care received.

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Machine Translated by Google

Year VI, v.1 2025 | Submission: 09/22/2025 | Accepted: 09/25/2025 | Publication: 09/28/2025

REFERENCES

AMERICAN ASSOCIATION OF ENDODONTISTS. AAE endodontic case difficulty assessment form and guidelines. Chicago: AAE, 2022.
AMERICAN ASSOCIATION OF ENDODONTISTS; AMERICAN ACADEMY OF ORAL AND MAXILLOFACIAL RADIOLOGY. Use of cone beam computed tomography in endodontics: 2015 update. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, vol. 120, no. 4, p. 508-512, 2015.

BUCCHI, C. et al. Non-surgical root canal treatment and retreatment versus apical surgery in treating apical periodontitis: a systematic review. International Endodontic Journal, vol. 56, suppl. 3, p. 475-498, 2023.
BÜRKLEIN, S. et al. Effectiveness of root canal instrumentation for the treatment of apical periodontitis: a systematic review and meta-analysis. International Endodontic Journal, vol. 56, suppl. 3, p. 395-421, 2023.
JAKOVLJEVIC, A. et al. Prevalence of apical periodontitis and conventional nonsurgical root canal treatment in general adult population: an updated systematic review and meta-analysis. International Endodontic Journal, vol. 53, no. 5, p. 617-634, 2020.
MEIRE, MA et al. Effectiveness of adjunct therapy for the treatment of apical periodontitis: a systematic review and meta-analysis. International Endodontic Journal, vol. 56, suppl. 3, p. 439-465, 2023.
PIRANI, C. et al. Effectiveness of root canal filling materials and techniques for treatment of apical periodontitis: a systematic review. International Endodontic Journal, vol. 56, suppl. 3, p. 436-472, 2023.

ROSSI-FEDELE, G. et al. Effectiveness of root canal irrigation and dressing for the treatment of apical periodontitis: a systematic review and meta-analysis of clinical trials. International Endodontic Journal, vol. 56, suppl. 3, p. 421-435, 2023.
WORLD HEALTH ORGANIZATION. Global oral health status report: towards universal health coverage for oral health by 2030. Geneva: WHO, 2022.
YAN, L. et al. Global burden of oral disorders with projections over the next 30 years. Journal of Periodontology, issue 96, 1291-1303, 2025 Nov. v. 11, p. doi: 10.1002/JPER.24-0638. Epub 2025 Jul 17
SIQUEIRA JJF et al. Unprepared root canal surface areas: causes, clinical implications, and therapeutic strategies. Brazilian Oral Research, vol. 32, e65, 2018.

This article is published in open access under the Creative Commons Attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.