

EVALUATION OF QUALITY INDICATORS IN ENDODONTIC CARE : *The case of a university hospital department*

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ABSTRACT :

Endodontics is a fundamental discipline in dentistry, essential for the treatment of pulp pathologies and requires optimal conditions to ensure satisfactory results. High quality endodontic treatment eliminates microorganisms, prevents re-infection and restores tooth function. Lack of proper care can lead to serious complications that affect the patient's quality of life. The aim of this study is to carry out a self-assessment of the quality of endodontic treatment performed in the Department of Conservative Dentistry at the University Hospital of Oran. This was a descriptive observational epidemiological study conducted at the department of conservative dentistry and endodontics in university hospital centre of Oran. A questionnaire with 26 questions was used. Data were collected on 74 treatments carried out by 40 practitioners over a period from 12 February to 3 April 2024. This study identified several strengths, such as the systematic use of autoclaves for instrument sterilisation. In addition, effective infection control is evident through the systematic use of rubber dams, irrigation and disinfectants, and a committed approach to practices such as local anaesthesia and pre-, per- and post-operative radiography. However, certain gaps were identified in some aspects, including physical and organisational factors in terms of inadequate equipment and materials and non-standardised protocols. Conclusion, improving the quality of endodontic care requires a comprehensive and integrated approach that combines efforts in training, service organisation and resource optimisation. Only such an approach can ensure high quality care that meets patient expectations and international oral health standards.

Key words: Endodontic care, Practitioners, Quality, Evaluation, Survey, Equipment.

RÉSUMÉ : ÉVALUATION DE LA QUALITÉ DES SOINS EN ENDODONTIE : étude au sein du Service d'Odontologie Conservatrice du Centre Hospitalo-Universitaire d'Oran.

L'endodontie est une discipline clé de la dentisterie, essentielle pour le traitement des pathologies pulpaires, nécessitant des conditions optimales pour garantir des résultats satisfaisants. Un traitement endodontique de qualité permet d'éliminer les micro-organismes, de prévenir la réinfection et de restaurer la fonction de la dent. L'absence de soins adéquats peut entraîner des complications graves affectant la qualité de vie du patient. L'objectif de cette étude est d'auto-évaluer la qualité des traitements endodontiques réalisés au sein du service d'odontologie conservatrice du centre hospitalo-universitaire d'Oran. Il s'agit d'une étude épidémiologique observationnelle descriptive, menée au sein du service d'odontologie conservatrice-endodontie - CHU - Oran. Un questionnaire composé de 26 questions a été utilisé. Les données ont été collectées auprès de 74 soins réalisés par 40 praticiens sur une période s'étendant du 12 février au 3 avril 2024. Cette étude a révélé la présence de plusieurs points forts tels que l'utilisation systématique de l'autoclave pour la stérilisation des instruments. De plus, le contrôle efficace des infections est évident par l'utilisation généralisée de la digue, de l'irrigation et des agents désinfectants, ainsi que par l'engagement envers des pratiques telles que l'anesthésie locale et la radiographie pré, per et post-opératoire. Cependant, certaines lacunes ont été identifiées dans certains aspects comprenant des facteurs matériels et organisationnels en termes de l'insuffisance des équipements et des matériaux adéquats et les protocoles non standardisés. Conclusion, l'amélioration de la qualité des soins endodontiques nécessite une approche globale et intégrée, combinant des efforts au niveau de la formation, de l'organisation des services et de l'optimisation des ressources. Seule une telle approche permettra de garantir des soins de haute qualité, répondant aux attentes des patients et aux standards internationaux en matière de santé bucco-dentaire.

Mots clés : Soin endodontique, Praticien, Qualité, Évaluation, Questionnaire, Équipement.

INTRODUCTION

Continuous improvement in the quality of endodontic care is an essential aspect of dental health care. In this context, the evaluation of quality indicators is essential to measure and improve clinical practice. However, non-compliance with these indicators can have a significant impact on the quality of endodontic care, clinical outcomes and patient satisfaction.

With this in mind, we undertook this study to evaluate the quality indicators of endodontic treatments performed in the Conservative Dentistry Department of the University Hospital of Oran. However, the absence or poor quality of endodontic treatment will lead to infectious complications of increasing severity, which may extend to the periodontium and cause local inflammatory and infectious complications, as well as locoregional and general complications, leading to a deterioration in the patient's quality of life.

The aim of this study was to find answers to the following questions: To what extent do practitioners follow the established protocols for endodontic treatment? How does this affect the quality of care and clinical outcomes? And how could endodontic treatment protocols be optimized to improve the quality of patient care ?

The assessment of the quality of endodontic treatment has been the subject of numerous published studies in recent years. The reported results reflect considerable variation in sampling, treatment and methodology.

The implementation and adoption of good practice recommendations by practitioners has become essential to promote quality. The expected aim of this study is to improve the identified weaknesses, minimise the risks associated with the care provided and propose new approaches.

QUALITY MANAGEMENT AND ENDODONTICS

1. Continuous improvement

In general terms, quality management is a management policy aimed at optimizing and maximising the quality of a company's processes, production and organization. It is a process whose main objective is continuous improvement, which applies to the whole organization. Improvement is essential if an organization is to maintain its current level of performance, respond to changes in the internal and external environment and create new opportunities.

Quality is the result of the organization's continuous investigation to ensure the quality of the product or service, and this depends on the degree of control of the processes associated with all the stages that directly and indirectly affect continuous improvement (figure 1) [1].

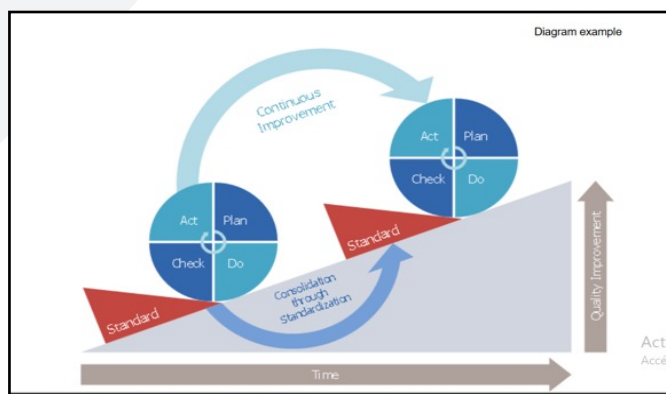


Figure 1. Deming quality wheel or PDCA [7].

Deming's wheel represents the theory of continuous improvement. Depicted on a slope with a wedge, it represents the impotence of maintaining efforts to maintain the same level of quality achieved previously; however, the wheel illustrates the continuity of action, while the slope refers to the permanence of effort: 'Plan', 'Do', 'Check' and 'Act'. By 'Plan' Deming means the planning of quality actions; 'Do' means the implementation of these actions; 'Check' means the evaluation of the actions taken from an economic and medical point of view and finally the 'Act' phase symbolises the implementation of corrective actions following the results of the evaluation [1-3].

To improve the quality of endodontic treatment, it is recommended that strategies be implemented to ensure that treatments achieve their intended objectives with optimal precision, reliability and durability [4].

2. The impact of quality on endodontic care

It is imperative to obtain objective examination results and review radiographs before making a diagnosis. High quality diagnostic methods, such as imaging and the use of modern technology, allow accurate diagnosis and lead to a more precise and effective treatment plan [5,6]. High-quality endodontic treatment helps maintain long-term dental health and contributes to the preservation of natural teeth, preventing premature tooth loss, which is important for overall oral health [7,8].

Rigorous postoperative follow-up, practitioner skill and prevention of iatrogenic trauma all help to reduce the risk of complications. In addition, patient education on appropriate postoperative care plays an important role in preventing potential complications. A high-quality approach ensures optimal results, promotes a smooth recovery and increases patient confidence in endodontic treatment [4,5].

Modern obturation techniques ensure effective three-dimensional obturation, minimising the risk of re-infection. In addition, the practitioner's ongoing training and expertise in the use of the latest technology are essential to ensure the quality of treatment. The integration of these elements creates an environment conducive to long-term endodontic treatment, limiting long-term complications and contributing to the long-term success of procedures [8,9]. Successful endodontic treatment reduces patients' dental anxiety and encourages regular dental visits [6]. Optimal clinical outcomes, reduced risk of complications, transparent communication, adherence to professional standards, patient satisfaction, expectation management, continuing education and a positive reputation all contribute to building this trust [7].

By implementing these practices, professionals strengthen their credibility, demonstrate their responsibility for patient safety and reduce the potential legal risks associated with the provision of dental care [10].

3. Indicators for the evaluation of endodontic treatment

The evaluation of quality indicators is an approach which must make it possible to guarantee an evaluation based on observed operative criteria. Patients must be assured of the combination of diagnostic and therapeutic procedures that will give them the best health outcome, in accordance with the current state of medical science, at the best cost for the same result, with the least iatrogenic risk (table 1).

MATERIALS AND METHODS

This was a descriptive observational epidemiological study carried out at the department of conservative dentistry and endodontics in university hospital centre of Oran.

Table 1. Endodontic treatment indicators [11-19].

Quality Indicators	Interest of the criterion	Proof
Competence	- May indirectly influence treatment prognosis.	- Seniority
Precise diagnosis	- A false diagnosis leads to twofold damage : unnecessary damage to a tooth and the persistence of the undiagnosed pathology.	- Written on the file.
Sterilisation	- Managing the risk of infection is essential to the success of any endodontic procedure.	- Processing of instruments
Use of the dam	- Effectively prevents accidents involving ingestion or inhalation of instruments. - Provides a clean, dry operating field.	Utilisation de la digue Use of the dam
Preoperative radiography	- A key stage that is often overlooked.	- Taking a pre-operative X-ray.
The use of an anaesthetic solution	- Patient confort. - Avoid sudden movements during treatment.	Acte sans douleurs A painless act
Using optical aids	- Allows better control of details during dental treatment.	- The use of magnification systems.
Root canal preparation technique	- Strict compliance with protocols and precautions for clinical use is essential to limit the complications of these techniques.	- The technique used.
Root canal filling technique	- An important part of root canal treatment. - The combination of gutta-percha and a sealant is the most widely used.	- The technique used.
Prescription drugs	- Disinfection must be as complete as possible and carried out with the constant aim of permeabilising the canals while avoiding traumatic over-instrumentation of the periapical tissues.	- Drug prescription.
Number of clinical sessions	- Single-session endodontic treatment has a number of advantages, including a reduced relapse rate.	- Number of sessions
The choice of catering	- The quality of the coronal restoration had a significant influence on the success of endodontic treatment.	- The type of restoration

It is important to remember that the monitoring of quality indicators used in our study is a method validated by the French Health Authority - Haute Autorité de Santé- (HAS) for carrying out this type of analysis [20].

A multiple-choice questionnaire was carefully tested for one week on 06 practitioners of different grades. The questionnaire was then revised and simplified before use. The study involved all practitioners working in the department on a permanent basis (6th year students, residents and teachers). All participants were informed about the nature and interest of the study. Questions were also asked about specific aspects of the teeth treated (monoradic or pluriradicular, live or necrotic) and the clinical methods used during endodontic treatment.

A questionnaire with 26 questions was used. Data were collected on 74 treatments performed by 40 practitioners over a period from 12 February to 03 April 2024. The data were collected by analysing the questionnaires. The information was then processed using SPSS 27 software. To facilitate data entry, the results were transferred to an Excel spreadsheet. The conclusions were supported by graphs created using Microsoft Excel 2021.

DISCUSSION OF RESULTS

The total number of endodontic treatments performed was 74, of which the majority (79.7%) were performed by female practitioners and only 20.3% by male practitioners. 41.9% of the treatments were carried out by practitioners aged between 22 and 24, 36.5% by practitioners aged between 24 and 27, 20.3% of the practitioners were aged between 27 and 30, while only one teacher was over 30.

36.5% are 6th year students, 21.6% are 1st year residents, 17.6% are 2nd year residents, 17.6% are 3rd year residents, 5.4% are 4th

year residents and only one teacher is female. 58.1% had been teaching for less than one year, 17.6% between one and two years, 17.6% between two and three years, 5.4% between three and four years and one teacher for more than four years.

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Although no significant difference was found between silver and digital radiographs for diagnosis and implementation of an endodontic protocol. RVG radiovisiography is a faster, cheaper and more desirable technique [21].

It should be noted that 36.5% of the endodontic procedures performed during the study period were performed using silver retro alveolar radiographs, compared to a rate of 51.9% found in Chitwan Nepal by Pujan and al in 2021. In addition, 63.5% of our practitioners use radiovisiography (RVG).

The choice of analgesic technique depends on the tooth being treated, the condition of the pulp tissue and the expected duration of the procedure. It is therefore essential that the practitioner is familiar with the different analgesic techniques and their indications, as well as the specific characteristics of endodontic treatment [22]. Regional analgesia is often used when local anaesthetic infiltration is inadequate due to inflammation or infection. Inferior alveolar nerve block anaesthesia is the most commonly used technique for endodontic treatment of mandibular molars [23].

All of our endodontic procedures on live teeth are performed under anaesthetic. Two thirds (63%) of these procedures were performed under paracolic anaesthesia, 23.9% under a combination of truncal and paracolic anaesthesia and 10.9% under a combination of paracolic and intrapulpal anaesthesia. Only 2.2% of endodontic procedures were performed under truncal anaesthesia.

All endodontic procedures must be performed with a dam, which is considered essential. The aim of protection is twofold, firstly

to reduce the risk of inhalation or ingestion of foreign bodies by the patient and secondly to provide an aseptic environment for endodontic procedures. In our study, 68.9% of endodontic procedures were performed under a dam, compared with a rate of 59% found in American dentists (Whitten and al, 1996) and a rate of 30.3% found in the North West of England (Palmer and al, 2009). Another study conducted in Iran (Raouf and al. in 2015) showed that only 16.5% of Iranian dentists used the dam. A minority of Flemish dentists, with a rate of 3.4%, use the dam for endodontic treatment, as shown in the study by Slaus and Bottenberg in 2002. Another study confirmed that only 8.1% of Turkish dentists use the dam (Kaptan and al, 2012), but only 1% of the population studied in Nepal use the dam (Pujan and al, 2021).

Visual aids have changed the approach to endodontics by providing a precise view of the root canal system, high brightness and accurate instrument handling. A study conducted in the United States of America in 2014 by Gina Savani and al., showed that only 17.2% of mesio vestibular canals (MV2) were located without the aid of magnification, although the practitioner was three times more likely to locate them with the aid of magnification [24].

In this department, no optical aids were used by the practitioners, which contradicts the study by Gina Savani and al., in 2014, where optical aids were widely used by 80% of practitioners, mainly in the form of binocular magnifiers (75%).

Determining the working length is one of the most critical steps in endodontics as it facilitates the preparation and obturation of the root canal system. Failure to accurately determine the working length can often lead to complications [25].

We found that the majority of endodontic treatments (92%) were performed using intraoperative radiography, compared to a rate of 86.5% found by Mothanna et al., 2015 [26]. Among practitioners in the northern part of Saudi Arabia and a rate of 85.5% found among Nepalese dentists (Pujan Kranti, 2021).

Apex locators have the advantage of accurately locating the apical foramen, but they do not replace radiography, which also provides valuable additional information on root canal morphology. It therefore seems logical to combine the use of the two techniques to allow efficient and accurate determination of the working length [25]. This protocol was used in 8% of the treatments performed in the department. In Turkey, this method was used in 41.1% of cases in the 2012 study by Kaptan and al.

Nickel-titanium instruments allow for faster root canal preparation as these instruments are able to produce a uniform root canal configuration with minimal root canal transport. However, stainless steel instruments do not offer optimal preparation of curved canals, but they remain the most commonly used instruments in many countries [27]. In our department, 66.2% of treatments are carried out with mechanised instruments and 29.7% with manual instruments only, considering that a similar study carried out in Niger by Shakeerah and al in 2021 showed that a large majority of practitioners (94.4%) use manual instruments only. Root canal systems are complex and no instrument or cleaning and shaping method available to the clinician can completely remove tissue debris or debris smeared on the canal walls. Therefore, the use of an irrigant is necessary to chemically debride the accessory anatomy. The ideal irrigant should combine antimicrobial activity with the ability to dissolve organic debris. Sodium hypochlorite solution has long been recognised for its efficacy and is a preferred agent for endodontic irrigation. Its advantages include a high capacity to dissolve and disinfect tissue [28].

In our department, all endodontic treatment is performed with

irrigation solution. In Turkey, (Kaptan and al, 2012) reported 90.2% use, while in Medina Al Munawarah, Mothanna and al, 2015 found a rate of 61.3%. In contrast, EDTA is used in 2.7% of endodontic procedures, compared to a rate of 44.1% in Turkey (Kaptan and al, 2012). In addition, 9.5% of our procedures are performed with a combination of NaOCl and EDTA, while 5.4% are performed with a combination of saline and NaOCl. Endodontic syringes were used for irrigation in 62.2% of cases. The crown-down approach to root canal preparation offers a number of advantages, including the early removal of organic debris and the creation of a large reservoir for irrigation solutions [28]. In our department, 66.2% of the treatments were carried out according to this principle, while 33.8% used the 'step back' principle, which is not consistent with a study carried out in Chennai by Thasleema Banu and Ganesh in 2021, in which only 23% of the practitioners used the crown-down technique.

Higher success rates and shorter treatment times have been attributed to the use of rotating instruments [29]. In our study, 70% of treatments were performed using continuous rotation, while 30% were prepared manually. Similar responses were observed in a survey conducted by Lucia K. Zaugg and al in 2014, which found that 74% of US general practitioners regularly used NiTi rotary instruments. Another study by Gina M. Savani and al in 2020 showed that 62% of Swiss dentists use rotary systems, while only 13.41% of Saudi Arabian practitioners use rotary instruments in the study by Rizwan Jouhar and al, 2022.

The intracanal use of calcium hydroxide is widely practiced and accepted in endodontics. (Sjögren and al, 1997) have shown that the success rate of root canal treatment of infected canals increases significantly in the presence of calcium hydroxide between sessions. In our department, two thirds (67.6%) of the treatments were carried out with this material. This result is in agreement with the study carried out in Chennai by Thasleema Banu and Ganesh in 2021 with a rate of 74%.

Complete obturation of the root canal system is critical to the clinical success of endodontic treatment, reducing the risk of apical microleakage and thus increasing the success rate [21]. In our department, approximately 73% of endodontic treatments are performed with conventional single-cone obturation, 8% with Thermafil, 8% with cold lateral condensation, 5% with hot vertical condensation and 5% with System B. These results are consistent with a survey of endodontic practice conducted in Turkey by Kaptan and al in 2012, where the use of gutta-percha with sealing cement without lateral condensation was preferred by 55.3% of respondents. However, another study conducted in Chennai by Thasleema Banu and Ganesh in 2021 found that cold lateral condensation was the most common obturation technique, used in 91% of cases, followed by hot condensation, used in 6% of cases, but the monocône technique was used in only 3% of cases.

It is important to limit the use of antibiotics to avoid bacterial resistance. Although antibiotics are sometimes prescribed in cases of infection, their necessity must be carefully assessed [25]. In our department, no endodontic treatment performed was followed by a prescription for antibiotics, in contrast to a study conducted in Hong Kong by Alex Wai Kwok and al., in 2006, which showed that practitioners tended to prescribe antibiotics in cases of infection.

Experienced operators combine instruments from different file systems and use different instrumentation techniques to achieve the best cleaning and shaping results with the fewest procedural errors. When endodontic files are used beyond their limits, they wear out or break. To prevent file breakage, operators should discard files after a certain period of use, which may be a rea-

sonable option as it is not possible to detect early fatigue cracks in frequently reused files [25]. In our department, 44.6% of endodontic files are used until they become blunt, while 16.2% are discarded after five uses, 18.9% after four uses, 16.2% after three uses and 4.1% after two uses.

It should be noted that 23% of the endodontic treatments carried out in our department are completed in a single session, 36.5% in two sessions, 23% in three sessions, 10% in four sessions, while 6.8% are completed in five sessions. This is in contrast to a Saudi study carried out in 2015 by Mothanna and al., which showed that most respondents carry out endodontic treatments in three or four sessions. However, another American study carried out in 2014 by Gina Savani and al., confirmed that the vast majority of root canal treatments are performed in a single session.

The tooth must be adequately restored to avoid recontamination of the root canal system or possible fracture [25]. In our study, 81.1% of the endodontic treatments performed were followed by a direct composite restoration, while 18.9% were followed by an indirect restoration. This is similar to a survey conducted in Turkey by Kaptan and al in 2012, who found that the final adhesive composite restoration was the most common.

The limitations of the study are known and identified; the limited sampling, although diversity of practitioners is observed, the number may not be representative of the population as a whole. diversity of practitioners is observed; the number may not be representative of the population as a whole. Practitioners may not be entirely accurate in their responses to questionnaires. Differences in the quality of equipment may affect the results. Not to mention the limited time available for observation and the expectations or prejudices of the observers, which may influence the ratings. Practitioners may change their behaviour in the knowledge that they are being observed, making the results less representative - the 'Hawthorne effect'.

CONCLUSION

Endodontic treatment remains a complex and delicate procedure requiring competence, skill, mastery of gestures and respect for the different stages of endodontic therapy according to professional recommendations. The process of evaluating endodontic care must contribute to safety, efficiency of care and improvement of quality. Ensuring this quality is a fundamental process for ensuring the oral health of the population.

This study highlighted the importance of continuous and rigorous evaluation to ensure effective and safe treatment. The results obtained at the service level revealed both strengths and areas for improvement. It is encouraging to note that the sterilization protocol is optimal, with systematic use of the autoclave to sterilize endodontic instruments. In addition, effective infection control is evident through the widespread use of dampe-ning, irrigating and disinfecting agents and the commitment to practices such as local anesthesia and pre-, intra- and post-operative radiography. However, gaps have been identified in relation to material and organizational factors in the form of inadequate equipment and materials and non-standardized protocols. These deficiencies affect not only the effectiveness of endodontic treatment, but also the satisfaction of our patients and the long-term success rate of our treatments. To improve the quality of endodontic care within the department, several recommendations can be made. It is important to strengthen the training of health professionals, optimize the supply of specific materials and equipment, and standardize care protocols. In addition, the establishment of quality programmers and regular audits would monitor practices and quickly identify areas for improvement.

Improving the quality of endodontic care requires a global and integrated approach that combines efforts in training, service organization and resource optimization. Only such an approach will ensure high quality care that meets patient expectations and international oral health standards.

Date De Soumission : 10/12/2024.

Date D'acceptation : 28/04/2025.

Date De Publication : 16/12/2025.

BIBLIOGRAPHY

1. **Moukhafi S.** Management de la qualité : Fondements théoriques. Revue Marocaine de Gestion et d'Economie ; 5, <https://revues.imist.ma/index.php/RMGE/article/view/31306> (2019).
2. **Lavrat E, Vanlerberghe C, Farges G, et al.** Évolutions de la norme ISO 9001 :2015 : réponse aux besoins des services biomédicaux certifiés. IRBM News 2015 ; 36 : 158–162.
3. **Giacometti C.** De l'importance du traitement endodontique dans la réussite de la réhabilitation bucco-dentaire : échec thérapeutique et responsabilité civile du praticien, à propos d'un cas complexe. 2005.
4. **Collet P, Christelle S.** Évaluation d'indicateurs de qualité et de sécurité des soins endodontiques réalisés par les étudiants au CHU de Bordeaux. Apport de mesures correctives et réévaluation. 2020.
5. **Kane AW, Seck MT, Sarr M, et al.** Incidence de la qualité des traitements endodontiques sur la pérennité de la prothèse conjointe. Odonto-Stomato Tropicale 1999.
6. **Aryanpour S, Sabbagh J, Van Nieuwenhuysen J-P.** Facteurs influençant le résultat à long terme des traitements endodontiques - Cahiers de Prothèse n° 116 du 01/12/2001. Edition CDP.fr, <https://www.editionsmdp.fr/revues/les-cahiers-de-prothese/article/n-116/facteurs-influençant-le-résultat-a-long-terme-des-traitements-endodontiques.html> (2001, accessed 2 Octobre 2023).
7. **Millat B, Bally B, Bami J.** Guide pédagogique de l'OMS pour la sécurité des patients - édition multi professionnelle. Haute Autorité de Santé, https://www.has-sante.fr/jcms/c_2582471/fr/guide-pedagogique-de-l-oms-pour-la-securite-des-patients-edition-multiprofessionnelle (2015, accessed 2 June 2024).
8. **De La Motte De Broons De Vauvert B.** Développement et mise en place d'une démarche d'évaluation des pratiques professionnelles en endodontie au sein d'un service de médecine bucco-dentaire. Université de PARIS faculté de santé, <https://dumas.ccsd.cnrs.fr/dumas-03560439> (2021, accessed 2 October 2023).
9. **Medza M'allogo MM.** Traitement endodontique des dents pluriradiculées au service d'OCE du CHU-CNOS. Université des sciences des techniques et des technologies de BAMAKO, <https://drive.google.com/drive/u/1/folders/17Od-8d0YgvVpuH-zEIdJoEKmrX7blw9b> (2022, accessed 10 March 2024).
10. **Cochet J-E.** La responsabilité partagée en endodontie. AO news le magazine dentaire qui nous rassemble, 2022, <http://www.aonews-le-mag.fr/du-medico-legal-cochet-aonews/> (2022, accessed 10 December 2023).
11. **Georgelin M.** Limiter les risques d'échecs du traitement endodontique au CHU de Toulouse. Université Clermont I - Auvergne, 2012.
12. **Wad K, Benoist L.** Mode de stérilisation des instruments endodontiques : enquête auprès des chirurgiens-dentistes du Burkina Faso. Septembre 2019 2019 ; 26 : 72–76.
13. **Lin H-C, Pai S-F, Hsu Y-Y, et al.** Use of Rubber Dams During Root Canal Treatment in Taiwan. Journal of the Formosan Medical Association 2011; 110: 397–400.
14. **Nusstein JM, Reader A, Drum M.** Local anaesthesia strategies for

the patient with a 'hot' tooth. Dent Clin North Am 2010 ; 54 : 237–247.

15. Guyot M. Développement et applications des systèmes de grossissement en endodontie. 2007. other, UHP - Université Henri Poincaré.

16. Arbab-Chirani R, Chevalier V, Arbab Chirani S, et al. Instrumentation canalaire de préparation. Encyclopédie Médico Chirurgicale 2010 ; 1–15.

17. Yücel AC, Çiftçi A. Effects of different root canal obturation techniques on bacterial penetration. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2006; 102: e88–e92.

18. Deturmeny A. Une utilisation raisonnée des antibiotiques en endodontie - Clinic n° 05 du 01/05/2014. Edition CDP.fr, <https://www.editionsmdp.fr/revues/clinic/article/n-35-05/une-utilisation-raisonnee-des-antibiotiques-en-endodontie.html> (2014, accessed 21 January 2024).

19. Bouillaguet S, Rocca G. Restaurations coronaires et corono-radiculaires des dents dépulpees. In : Endodontie. 2012, pp. 309–320.

20. Liste_methodes_modalites_dpc_decembre_2012.pdf [Internet]. [Cité 16 févr 2020]. Disponible sur : https://www.has-sante.fr/upload/docs/application/pdf/2012_12/liste_methodes_modalites_dpc_decembre_2012.pdf

21. Kayastha PK, Shakya M, Shrestha L. Survey of standard protocols for endodontic treatment in CHITWAN, NEPAL: Standard Protocol for endodontic treatment. JCM.C 2021 ; 11 : 7–14.

22. Metref Z, Belmabrouk C, Serradj SA. L'anesthésie en endodontie : Revue de la littérature. African Journal of Dentistry & Implantology, <https://revues.imist.ma/index.php/AJDI/article/view/6795> (2014, accessed 21 May 2024).

23. Maniglia-Ferreira C, Almeida-Gomes F, Carvalho-Sousa B, et al. Clinical evaluation of the use of three anesthetics in endodontics. Acta Odontol Latinoam. 2009; 22: 21–26.

24. Savani GM, Sabbah W, Sadgley CM et al. Current trends in endodontic treatment by general dental practitioners: report of a United States national survey. J Endod. 2014; 40: 618–624.

25. Chan AW-K, Low D, Cheung GS-P, et al. A questionnaire survey of endodontic practice profile among dentists in Hong Kong. Hong Kong Dent J. 2002; 3 : 80–87.

26. Alrahabi M, Ahmad M. Knowledge regarding technical aspects of non-surgical root canal treatment in Al-Madinah Al-Munawarah private dental centers. Saudi Endodontic Journal. 2015; 5: 155–160.

27. Shakeerah GO, Deborah AM. Endodontic practice amongst Nigerian dentists undergoing postgraduate training. Pan Afr Med J. 39; Epub ahead of print 2021. DOI : 10.11604/pamj.2021.39.218.23205.

28. Kaptan RF, Haznedaroglu F, Kayahan MB, et al. An Investigation of Current Endodontic Practice in Turkey. Scientific World Journal 2012; 2012: 1–6.

29. Banu ST, Ganesh R. An Endodontic Practice Profile among General Practitioners in Chennai: A Questionnaire Survey. 5.