

Treatment Standards

Purpose

To assist educational institutions, organized dentistry, and other stakeholders in developing minimum educational requirements and practice standards for nonsurgical endodontic treatment.

Note: Nonsurgical root canal treatment is indicated primarily in cases of irreversible pulpitis and pulpal necrosis. Elective root canal treatment may be indicated based on restorative treatment planning or when extraction is contraindicated in patients with a history of head and neck radiation, chemotherapy, and bisphosphonate or corticosteroid use.

Standards in Imaging

Intent: The dentist *should be able to*:

1. Achieve high quality diagnostic preoperative images.
2. Determine whether alternative imaging methods are appropriate.

Standards:

1. Intraoral radiographs should be considered the imaging modality of choice in the evaluation of the endodontic patient.
2. Well-angulated preoperative radiographic images are mandatory to facilitate safe and efficient access.
3. Although two radiographs with different angulations are often sufficient to develop a more complete image of the tooth to be treated, cone beam computed tomography (CBCT) images may be justified and necessary to evaluate the existence of extra canals, complex morphologies, curvatures, or dental developmental anomalies.

Standards in Access Cavity Preparation

Intent: The dentist *should be able to*:

1. Conservatively access the pulp chamber and locate all main canal orifices.
2. When accessing a pulp chamber, minimize excessive removal of tooth structure, and iatrogenic damage to the tooth.

Standards:

1. The dental operating microscope currently provides the highest level of illumination and magnification. Its use is recommended for cases with complex anatomy, calcifications or other complications.
2. Cases that are beyond a practitioner's skill level should be referred to a provider with more advanced skills or specialty training in endodontics.

Competence in accessing root canal systems is demonstrated by the following skills:

1. Preoperative evaluation of anatomy and morphology to determine the appropriate outline form to predictably reveal all canal orifices and allow instrumentation of all canals.
2. Assessment of structural parameters to determine the prognosis for restorability following treatment.
3. Preservation of tooth structure, and prevention of iatrogenic damage to the tooth.

Standards in Disinfection

Intent: The dentist *should be able to*:

1. Safely and effectively utilize standard disinfection protocols during root canal therapy.

Standards:

1. The use of a rubber dam during treatment is mandatory to avoid microbial contamination of the root canal system, limit aerosols, retract tissues, protect the patient from damage by chemicals, and prevent aspiration or swallowing of instruments and materials.
2. Decisions on which irrigant(s) to employ should be based on factors such as efficacy, cost, toxicity, case selection and the clinicians' skill level.
3. Canals must be enlarged sufficiently to allow the irrigation needle to be placed loosely in the canal to the desired depth, avoid needle binding, and to prevent apical extrusion of irrigant.
4. NaOCl is the preferred endodontic irrigant for disinfection of the root canal. If a predisposing risk for irrigant extrusion into the periradicular tissues is suspected, (open apices, root perforation or vertical root fracture), clinicians should proceed with caution, using diluted NaOCl or an alternative proven antimicrobial solution.

Standards in Canal Preparation

Intent: The dentist *should be able to*:

1. Determine and maintain an appropriate working length.
2. Prepare a canal adequately to facilitate debridement, antimicrobial treatment, and obturation.
3. Avoid procedural mishaps, including but not limited to: damage to major vascular and/or neural structures, canal transportation, ledge formation, canal blockage, file fracture, and perforation.

Standards:

1. The ideal apical termination, (working length), has been established empirically to be 0.5 to 1.0mm from the anatomical apex. To determine working length, it is recommended that an electronic apex locator is used in conjunction with verifying radiographs.
2. The decision of where to terminate the apical preparation should be based on apical anatomy, information from apex locators, and radiographic interpretation.
3. The degree of enlargement is dictated by the initial canal size, the irrigation regime, and the obturation technique. Apical canal enlargement must not be done at the expense of coronal dentin.
4. Complete removal of vital and necrotic tissue, and creation of sufficient space for obturation materials is the objective.
5. In addition to mechanical preparation techniques, the use of antimicrobial irrigants is essential to completely debride the canal system.
6. Funnel-shaped, tapered preparations impart "resistance form" to canal preparations and can help prevent extrusion of gutta percha during obturation.
7. Instrumentation must only be performed after proper understanding of canal complexities and with consideration of the specific instruments that are used.

Competence in shaping of root canals is demonstrated by the ability to:

1. Predictably enlarge canal spaces to remove vital and necrotic tissues and microorganisms, introduce antimicrobial solutions, and place obturation materials.
2. Determine and maintain working length.
3. Select instruments and treatment sequences that minimize damage to radicular structures and restrict canal preparation to the confines of the root canal.
4. Avoid procedural errors.
5. Make patient-oriented decisions when procedural errors occur.

Standards in Endodontic Obturation

Intent: A practicing dentist *must*:

1. Utilize obturation techniques and materials that protect the patient from untoward outcomes and maximize the potential for healing.
2. Demonstrate well prepared root canals filled to working length with a homogenous radiopaque appearance free of voids.
3. Protect the patient by avoiding overfill in the presence of vulnerable structures or neurovascular anatomy.

Standards:

1. Debriding all canals to working length is effective in treating apical periodontitis. Preparation errors and/or filling beyond the confines of the root canal system is detrimental to the healing process.
2. Well prepared canal systems provide ideal conditions for appropriate obturation.
3. Root canal systems are inaccessible to the body's immune system and should be filled as completely as possible in all dimensions, to prevent ingress of nutrients or oral microorganisms.
4. A permanent coronal restoration should be placed as soon as feasible after endodontic treatment.
5. Ideally, a root canal filling should seal all foramina leading to the periodontium, be well adapted to the canal and its irregularities, be without voids, and end at the apical terminus.
6. Ideally, canals should only be filled when the canal can be dried, the patient is asymptomatic, and there are no signs or symptoms of pathosis.
7. Before solid core materials or gutta-percha cones are placed in a root canal, they should be disinfected by submerging them in sodium hypochlorite (NaOCl) solution.

8. Sealers and obturation material should not routinely be extruded into the periradicular tissues.
9. Syringable obturation techniques utilizing paste-fillers, or paraformaldehyde are not recommended because of the danger of overfill and toxicity of materials.
10. Obturation materials should be biocompatible.
11. When using thermoplastic techniques, it is important to understand the flow characteristics of the materials and the effects of heat generated within the canal.
12. In cases with an open apex, creating an apical barrier with a clean dentin plug or biocompatible material can prevent extrusion of material during obturation.

Standards in Endodontic Retreatment

Standards:

1. Persistent disease following root canal treatment does not necessitate tooth extraction. Clinical assessment and enhanced imaging may reveal the etiology of failure.
2. Incomplete treatment, missed canals, poor obturation, and coronal leakage are common causes of root canal failure that can be corrected with retreatment procedures.
3. Procedural errors that are not correctable with a non-surgical retreatment approach such as perforation, apical transportation, ledging, loss of length, or removal of separated instruments, are best treated surgically by an endodontic specialist.
4. Retreatment cases vary in complexity. Advanced knowledge and technical skills may be required to remove coronal restorative materials, (posts and cores), obturation materials, remaining necrotic tissues, and microbes.
5. For complex retreats, referral to an endodontic specialist is preferred over extraction and may provide the best long-term result for the patient.

Standards in Restoration of Endodontically Treated Teeth

Intent: A practicing dentist *must be able to*:

1. Recognize that the timely final restoration of an endodontically treated tooth is integral to the success of endodontic treatment.
2. Decide the appropriate restorative strategy for an endodontically treated tooth by considering factors such as tooth type, the extent and distribution of tissue loss, and the material to be used for the final restoration.

Standards:

1. Endodontically treated teeth are primarily susceptible to fracture due to loss of structure from caries, prior restorations, fractured cusps, and the access cavity, and not the loss of moisture.
2. Successful final restoration of endodontically treated teeth plays a major role in the long-term prognosis and must be considered as an integral part of the endodontic treatment.
3. Coronal bacterial leakage is a known cause of treatment failure. Placement of a definitive coronal restoration must be considered part of the obturation process to eliminate recontamination.
4. In teeth with minimal structural loss, intact marginal ridges, a conservative access preparation, and no preexisting cracks, the clinician may consider a direct intracoronal bonded restoration as a valid option.
5. Evidence finds that the use of posts for crown retention has no significant influence on tooth survival after endodontic treatment.
6. Restoration of anterior teeth: if the only loss of tooth structure results from a conservative access preparation, a bonded composite is adequate. If the tooth is weakened by a large access preparation, proximal caries, or proximal restorations, a crown should be considered as the final restoration. A post is necessary when the remaining tooth structure (after crown preparation) will not retain the core.
7. Restoration of posterior teeth: proper restoration of posterior teeth involves two phases: core placement and crown placement.
8. A post is not indicated if three supporting walls of dentin remain or if not otherwise necessary for core retention due to the potential for vertical root fracture.
9. Holistic dentistry that advocates extraction of endodontically treated teeth or removal of all metallic fillings, due to claims of systemic harm, is not based on sound science.

The guidance in this statement is not intended to substitute for a clinician's independent judgment in light of the conditions and needs of a specific patient.

Access additional resources at [aae.org](https://www.aae.org).

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