

ORIGINAL ARTICLE

UNCERTAIN DECISION-MAKING IN PRIMARY ROOT CANAL TREATMENT



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ABSTRACT

Objectives

A systematic review of literature was conducted to compare the success and survivability of primary root canal interventions.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta Analyses protocol was adopted in this study to systematically assess and report systematic reviews related to success or survival or failure rates of primary root canal interventions. MEDLINE and Cochrane Oral Health Library were both searched by using specific search terms to identify relevant literature, until June 2016. The search was augmented by handsearching. Then, the quality of the included systematic reviews was assessed by using the Revised Assessment of Multiple Systematic Reviews (RAMSTAR) protocol.

Results

Only 9 systematic reviews were identified. The RAMSTAR scores of the included reviews ranged from 43/44 to 29/44. Nevertheless, the later reviews did not provide sufficient evidence or statistically significant evidence to support any of the interventions used during primary root canal treatment. In addition, a number of key steps during primary root canal treatment, such as types of dental files, root canal instrumentation techniques, orthograde obturation materials, and techniques, were not assessed by systematic reviews.

Conclusion

The current status of evidence related to the success and survivability of primary root canal interventions is lacking. This puts dentists under marked degrees of uncertainty. Consequently, patients are potentially exposed to health care risks. It is then essential to develop tailored methods and tools for decision-making under uncertainty to aid both dentists and patients engaged in primary root canal treatment.

INTRODUCTION

Primary root canal treatment is the nonsurgical treatment of pathologic dental pulps by qualified and trained dentists. It often involves the application of a sequence of treatment steps, including cleaning of dental decay, preparation of the access cavity to the dental root canal, mechanical instrumentation of the dental root canal, bacterial elimination of the dental root canal via irrigation by chemical disinfectants and medical dressing (if required), and filling the dental root canal by specialized filling materials (orthograde obturation), followed by restoring the integrity of the dental crown (coronal rehabilitation).¹⁻³ Pathologic conditions may occur even after the completion of primary root canal treatment

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which may, in turn, require the performance of a secondary root canal treatment (retreatment) or even a surgical intervention.^{4,5} Thus, dentists are faced with a complex decision-making process before and during primary root canal treatment that involves critical selection of the most appropriate interventions among various options, materials, methods, instruments, and techniques to achieve optimal treatment outcomes and higher success rates.^{6,7}

Dentists have ethical and legal responsibilities for providing the most effective treatment options to meet the requirements and preferences of their patients.^{8,9} This can be carried out by effective application of evidence-based dentistry to augment shared decision-making.¹⁰⁻¹² According to Coulter, Price, and Leaver, including patients in decision-making enhances compliance and reduces errors that may lead to legal proceedings. This requires searching and sharing information extracted from the most valid evidence-based practices with the patients.¹³⁻¹⁵ Bauer further stipulated that decision-making in dentistry should be evidence based, provide options with estimates of probabilities and maximized utilities, be clinically significant, be current and updated, and be effective for shared decision-making.¹³ As a consequence, dentists are now required by dental authorities to develop mastery in evidence-based dentistry skills, such as ability to transfer clinical situation into a scientific searchable questions, literature searching, critical analysis of literature, analysis of results and outcomes of literature, particularly systematic reviews as they are ranked at the highest level of the hierarchy of evidence.¹⁶⁻²¹

Evidence-based practice can function effectively in an abundance of high-quality, valid, and reliable systematic reviews. By nature, systematic reviews are designed to produce robust evidence-based clinical recommendations by systematically pooling down and analyzing the most valid dental research.^{10,13,16-21} But, is there high-quality evidence in dental research to guide decision-making in primary root treatment? A review by Wu et al. into the outcomes of all endodontic treatments highlighted limitations in relevant systematic reviews, such as questionable validity of the methods used to assess treatment outcomes and overestimation of success rates. Moreover, the review was able to systematically identify only 11 systematic reviews that covered endodontic-related research expanding from 1922 to 2009.²² However, the later review did not employ a valid and reliable systematic approach for search strategy or for reporting its findings. Furthermore, the reviewers did not conduct any critical assessment to the quality of research in the included studies.

Evidence-based dentistry is the recommended decision-making method for primary root canal treatment. The selection of the most successful and reliable materials, techniques, and instruments in each step during primary

root canal treatment must be guided by evidence-based decision-making process. This requires methodical assessment of relevant systematic reviews and cautious interpretations of its recommendations. Therefore, the aim of this study is to investigate the functioning and applicability of evidence-based decision-making in primary root canal treatment by assessing the quality of evidence in relevant published systematic reviews.

METHODS

Literature search

The objective of this study is to assess systematic reviews that address the success and survivability of primary root canal treatment. Therefore, only systematic reviews were included in the analysis of this study. The Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) protocols was adopted to ensure the use of a valid methodology of identification, analysis, and outcome reporting in this study.^{23,24}

A search strategy was devised to ensure comprehensive identification of all relevant publications.^{23,24} As recommended by the PRISMA protocol, a Population or Participants, Interventions, Comparisons, Outcomes question was formulated as a starting point. The elements of the Population or Participants, Interventions, Comparisons, Outcomes question are as follows:

Participants

Patients required primary root canal treatment for single- or multi-rooted permanent teeth.

Interventions and comparisons

Any primary root canal treatment options, methods, techniques, materials, or instruments either against each other or against a control or a placebo. The restorative options for primary root canal treatment would be covered in a separate study.

Outcomes

In this study, primary outcomes included all treatment outcomes, whereas secondary outcomes included success, survival, and failure rates.

Search methods for identification of studies

Electronic searches

A detailed search strategy was developed to identify the relevant systematic reviews for this study (Appendix 1). The following databases were searched: the Cochrane Oral Health Library (to June 27, 2016) and MEDLINE (to June 27, 2016), as shown in Table 1. The investigators of some of the included systematic reviews were contacted electronically to ask for details regarding their publications.

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